

Knowledge Management in Higher Education Institutions

Volume - I



Editors:

Dr. K.S. Shivraj

Dr. Phayung Meesad

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Knowledge Management in Higher Education Institutions
(ICKHI 2024)
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Central Library
Manipal University Jaipur, India



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North Bangkok, Thailand

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by

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PREFACE

It is with immense pleasure and profound pride that we present the conference proceedings of the 3rd Edition of the International Conference on Knowledge Management in Higher Education Institutions (ICKHI 2024), held on 30-31 January 2024. This collection stands as a testament to the collaborative efforts and scholarly contributions of individuals from esteemed institutions worldwide who converged to delve into the dynamic realm of knowledge management in higher education.

Organized by the Central Library of Manipal University in collaboration with King Mongkut's University of Technology North Bangkok, Thailand, the conference served as a vibrant platform for scholars, professionals, and researchers to engage in stimulating exchanges of ideas and insights. It was a forum where diverse perspectives converged, fostering rich discussions on the pivotal theme of knowledge management in higher education.

We are delighted to announce that we received a total of 140 papers from professionals and research scholars across the globe. Out of these submissions, 90 papers were thoughtfully selected for inclusion in the conference proceeding volumes, covering a broad spectrum of topics encapsulated within eight distinct categories.

1. Knowledge Management in Information Centers (KM)
2. ICT Enabled Library Services (IT)
3. Open-Source Software & Resources in Higher Education (OS)
4. Digital / Virtual Libraries in Academic Institutions (DL)
5. Mobile and Semantic Web Technologies in Libraries (MS)
6. Copy Right Issues and Total Quality Management (CR)
7. E- Learning / Virtual Learning (EL)
8. LIS Education & Best Practices in Libraries (LS)

As we extend our sincere gratitude to Dr. Gopalakrishna Prabhu, President of Manipal University Jaipur, Dr. Jawahar Mal Jangir, Pro President, and Dr. Nitu Bhatnagar, Registrar of Manipal University Jaipur, for graciously affording us the opportunity to organize this impactful conference, we also extend our heartfelt appreciation to Prof. Dr. Teravuti Boonyasopon, Chairman, King Mongkut's University of Technology North Bangkok, Thailand for their invaluable support in jointly conducting this event.

Furthermore, we express our profound gratitude to the members of the International Advisory Committee, National Advisory Committee, and the Organizing Committee, as well as the dedicated staff of Manipal University Jaipur, India, and the King Mongkut's University of Technology North Bangkok, Thailand for their unwavering support and assistance throughout the planning and execution phases of the conference.

Last but certainly not least, we extend our deepest appreciation to all the authors whose scholarly contributions have enriched the discourse on knowledge management in higher

education. Your dedication has not only advanced the field but has also contributed significantly to inspiring further research and innovation.

It is our sincere hope that this compilation of papers will serve as a valuable resource, igniting new avenues of inquiry and guiding the endeavours of scholars, practitioners, and policymakers in the field of higher education and knowledge management.

Dr. K.S. Shivraj
Dr. Phayung Meesad
Dr. Akhilesh Kumar Sharma



Message



I am delighted to learn that the Central Library of Manipal University Jaipur, in collaboration with King Mongkut's University of Technology North Bangkok (KMUTNB), Thailand, is organizing the third edition of the Online International Conference on Knowledge Management in Higher Education Institutions (ICKHI-2024) on January 30th-31st, 2024.

In higher education institutions, knowledge management (KM) plays a vital role in leveraging intellectual assets for improved teaching, research, and administrative processes. KM initiatives in academia aim to capture, organize, and disseminate both explicit and tacit knowledge among faculty, staff, and students. These efforts facilitate collaborative research, interdisciplinary cooperation, and the development of innovative educational practices. KM strategies often involve the creation of digital repositories, learning management systems, and academic networks to store and share scholarly resources. By harnessing institutional knowledge, universities can enhance curriculum development, student learning outcomes, and faculty professional development.

It is inspiring to note that more than 130 research papers have been received from academicians from all over India and various other countries. With such diverse and substantial participation, I am confident that this conference will foster a knowledge-driven environment, offering a shared platform for researchers, technologists, and scholars to exchange ideas and engage in discussions on emerging trends in the field. It is anticipated that the conversations and insights from the conference will spur innovations and ensure that everyone remains informed about the latest technological developments.

On behalf of Manipal University Jaipur, I extend a heartfelt welcome to all participants of ICKHI-2024. I extend my sincere congratulations to the Central Library and the organizing committee for their dedicated efforts in orchestrating this conference in a fitting manner.

I wish the conference great success.

Dr. G K Prabhu
President
Manipal University Jaipur

Message



I am pleased to note that the Central Library of Manipal University Jaipur, in collaboration with King Mongkut's University of Technology North Bangkok (KMUTNB), Thailand, is hosting the third edition of the Online International Conference on Knowledge Management in Higher Education Institutions (ICKHI-2024) on January 30th-31st, 2024.

The importance of fostering knowledge management in the workforce is increasingly recognized, particularly with the rapid advancements in higher education. One of the major challenges for academicians is to apply their expertise across various realms of knowledge management and engage in interdisciplinary research. It is imperative to perceive this challenge as an opportunity for progress in higher education. Another significant challenge lies in identifying how these techniques can assist young researchers in enriching their knowledge and developing innovative applications in fields such as Science and Humanity, Social Sciences, Library Sciences, and other Allied Sciences.

I am confident that this conference will offer valuable insights into the diverse domains of Science and Humanity. It will serve as a platform for presenting the latest developments and applications in the fields of Knowledge Management and Innovation across various disciplines, including Engineering, Health Sciences, Social Sciences, and other related fields. The intellectually stimulating interactions and exchange of productive ideas are expected to benefit all participants.

I extend my congratulations to the Central Library on undertaking this endeavour and offer my best wishes for the success of the conference.

Commodore (Dr.) Jawahar M Jangir
Pro-President
Manipal University Jaipur



Message



I am very happy to extend my warmest greetings to each of you, as we embark on an exciting journey towards the 3rd Edition of Online International Conference on Knowledge Management in Higher Education Institutions (ICKHI 2024), hosted by the Central Library of Manipal University Jaipur in collaboration with King Mongkut's University of Technology North Bangkok, Thailand on 30th to 31st January 2024. This conference promises to be a forum brimming with innovative ideas, insightful discussions, and valuable networking opportunities.

In the dynamic realm of Higher Education Institutions (HEIs), the role of knowledge management transcends mere information dissemination; it becomes the cornerstone of innovation and progress. As educational paradigms shift and technologies advance, the need to adeptly manage and leverage knowledge resources intensifies. HEIs must embrace a culture of continuous learning and adaptation to remain relevant in an ever-changing world.

Effective knowledge management practices not only enhance teaching and learning experiences but also empower academic communities to tackle complex challenges with agility and creativity. By fostering interdisciplinary collaboration and fostering a spirit of inquiry, HEIs can cultivate a fertile ground for groundbreaking research and holistic development.

I extend my heartfelt gratitude to the organizing committee, associates, and participants for their unwavering commitment to making ICKHI 2024 a resounding success. Your dedication and enthusiasm exemplify the spirit of academic excellence and international cooperation that defines Manipal University Jaipur and King Mongkut's University of Technology North Bangkok, Thailand.

Warm Regards,

Dr. Nitu Bhatnagar
Registrar
Manipal University Jaipur

Contents

	Page Nos.
1 Exploring Information Seeking Behaviour and Resource Utilization among Nursing Students: A Descriptive Study <i>V. Abirami and Dr. M. Jayaprakash</i>	1
2 Bibliometric and Altmetric Assessment of Scientific Research Productivity at NIT Surathkal from 2011 to 2020 <i>Kush Sibbu, Viral Asjola and Ramesh Kuri</i>	8
3 Research Productivity in Knowledge Management in India over the Last Two Decades (2004-2023): A Scientometric Study <i>Ramniwas Soni and Dr. Dharam Vir Singh</i>	23
4 A Bibliometric Study: Journal of Scientometric Research from 2012 to 2015 <i>Swapnali Saikia</i>	34
5 A Bibliometric Analysis of the Science Research Output of the University of Kashmir during 2015-2020 <i>Tahir Ahmed Batt and Dr. Saleeq Ahmad Dar</i>	43
6 Scientometric Analysis of the Publication Output of Loyola College, Chennai: A Study Based on the Web of Science Database <i>M. Gunavathi, Dr. J. Arumugam and S. Nisha</i>	56
7 Analysis of Research Output on Gut Microbiota in SAARC Countries during 2001-2023 <i>Keya Ghosh and Dr. Dhiraj Sharma</i>	63
8 A Scientometric Analysis of Geo-synthetics Research Based on Scholarly Publications: A Global Perspective <i>Mumtaj Begum H and Dr Raja S</i>	72
9 Bibliometric Analysis of Authorship Pattern in the Field of Neonatology <i>Dr. J. Ramakrishnan, Dr. K. Thavamani and R. Kanniyappan</i>	82
10 Mapping the Indian Research Output on Digital Marketing during 1992-2022 <i>S. Lakshmi and L. Santhi</i>	92
11 Measuring the University's Research Production through Scientometric Methods: An Exploratory Study at Mother Teresa Women's University of Tamil Nadu <i>Dr. R. Santhakumar</i>	104
12 Knowledge Management for Farmer's Outreach Activities in Karnataka State <i>Shivalingappa Koti, Lata R. Patil and Dr. V. T. Bagalkoti</i>	117

13	A Study on Determinants and Outcomes of Brand Attachment with Special Significance to Higher Education Sector in Rajasthan <i>Anjali Pareek</i>	125
14	Evaluating Global Research Productivity and Patterns on Archaeological Research Output: A Scientometric Analysis Using Web of Science <i>Harpreet Singh and Dr. Babita Jaiswal</i>	132
15	Identifying Hotspots Across Indian Research <i>Sheikh Shueb, Sumeer Gul, Aabid Hussain, Nahida Tun Nisa, Bilqees Aslam Shah</i>	140
16	Evaluating Student Contentment in Higher Education Using Sentiment Analysis <i>Dr. Ananthi Sheshasaayee and A. Suganya</i>	148
17	Collection Management of Electronic Information Resources for Academic Libraries <i>Mr. Srikanth H G and Dr. Malatesh N. Akki</i>	154
18	Transformative Pedagogies: Exploring the Dynamics of E-Learning and Virtual Learning Environments <i>M. Preethi Aji and Dr. E.S. Kavitha</i>	160
19	Moodle and Its Role in English Language Teaching <i>Dr. S. Shanmuga Priya</i>	166
20	Education 2030: A Roadmap to E-Learning Excellence <i>Ms. Asha Negi and Dr. Indu Bharti Ghildiyal</i>	171
21	Total Quality Management and Its Principles for Success Organization <i>Dr. P. Gomathi</i>	177
22	Elevating Learning Horizons: Embracing Challenges and Opportunities in Contemporary Open Online Education in India <i>Fakare Alam and RK Bhatt</i>	181
23	From Pages to Reality: Revolutionizing Practical Learning in Libraries with Augmented Reality and Virtual Reality <i>Suman Jain and Kinana Bohra</i>	191
24	Changing Role of College Librarians in the Digital Environment of 21st Century <i>SK Anisur Rahaman and Dr. Dhiraj Sharma</i>	202
25	KTHM College Library: Best Practices and Services <i>Sharad Shantilal Patil and Dr. Ranjana K. Jawanjal</i>	208
26	Encouraging Lifelong Learning: Libraries' Essential Function in Today's Society <i>Dr. V. Senthur Velmurugan</i>	213

27	Collection Evaluation of a Case Study of the New College Library from 2013-2023 <i>N. Suresha</i>	223
28	Evaluation of User Satisfaction with Best Practices in Academic Library <i>K. Kalaiyarasi and Dr. M. Jayaprakash</i>	229
29	An Analysis of Institutional Performance and Research Productivity of the Indian Institutes of Management (IIM's) With Special Reference to IRINS and NIRF <i>Dr. M. Sumathi, S. Gunaseelan and Dr. C. Ranganathan</i>	237
30	Lifestyle Change Management during Covid-19 Pandemic among Public Librarians in Trichy District <i>J. Eldine Romella, J. Kanimozhi and M. Ramprasath</i>	244
31	Building a Knowledge-Centric Culture in Small Libraries: Strategies for Success <i>Khushbu Rahat and Hemant Sharma</i>	251
32	Role of Librarian and Libraries in Institutional Rankings <i>Dnyaneshwar Raghunath Tayade and Hemkant M. Chaudhari</i>	255
33	Student-Teachers' Attitude towards MOOC in Teacher Education <i>Dr. F. Deepa</i>	259
34	Appraisal of Collection Development Policy in Public Libraries as a Panacea for Enhancement of Knowledge Management in Zaria Local Government Area, Kaduna State, Nigeria <i>Dr. Hussaini Suleiman, Dr. Henry Maina Abareh, Mohammed Bello Ahmed, Abdullahi Abubakar Dewa and Aminu Saleh</i>	263
35	Measuring Information Services and User Satisfaction: A Case Study <i>G. H. Inoka Dilhani</i>	271
36	Utilization of Online Search Engines in the Day-to-Day Lives of Residential Undergraduate Students: A Case Study of Sri Krishna Adithya College of Arts and Science (SKACAS), Coimbatore, India <i>A. Muthuraj</i>	280
37	Leveraging Social Media for Effective Marketing of Library Products and Services in Medical Libraries <i>Priti Sharma and Prof. R.K. Bhatt</i>	290
38	WhatsApp as a Tool for Knowledge Dissemination and Exchange: A Study of Postgraduate Science Students' Perceptions at Mangalore University, Mangalore <i>Dr. Dayanandappa Kori</i>	301
39	Use of Web-Based Resources and Services by Users of Dr. T.P.M. Library at Madurai Kamaraj University, Madurai, Tamil Nadu: A Case Study <i>Dr. V. Murugapandi</i>	307

40	Effectiveness of Library Portals of NIRF-Ranked 2023 Private Universities in Uttar Pradesh: An Evaluative Study <i>Prabhat Sameer and Dr. Deepmala</i>	314
41	Utilization of Social Networks in Academic Libraries <i>Dr. B.K. Rajput</i>	322
42	Analyzing Public Sentiment towards the G20 Summit - 2023: A Twitter-Based Study Using Sentiment Analysis <i>Ranjith Kumar Mathangi and Dr. R. Jeysankar</i>	328
43	The Growing Influence of Social Media and Its Impact on Academic Libraries <i>Dr. Neeta A. Kene</i>	341
44	Fostering Information Literacy through Zotero Reference Management Tool among the Faculty of PCACS: A Case Study <i>Dr. Sanjay B. Munavalli</i>	346
45	Poultry Farmers in Namakkal: Exploring Mobile Phone Usage for Accessing Information <i>P. Pushpam and Dr. M. Jayaprakash</i>	353
46	Mobile Technology Integration in Libraries: Enhancing Accessibility and User Experience <i>Susan Babu and Dr A. Senthamilselvi</i>	360
47	Usage of Social Networking Sites among Students in National College, Trichy: A Study <i>Dr. Issac Arputharaj, Mr. A. Manikandan, D. Prajith Jona and M. Subashini</i>	366
48	Revealing the Effects of AI-Based Chat GPT on Higher Education Institution Libraries <i>Dr. S. Subha</i>	371
49	Impact and Use of Social Media among Postgraduate Students for Academic Progress <i>Dr. A. Chitra Dhavaputhalvi and P. Vijayalakshmi</i>	378

Exploring Information Seeking Behaviour and Resource Utilization among Nursing Students: A Descriptive Study

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Abstract

The purpose of this paper is to list the resources that are used to access the information and to know the features, significance and type of information resources. Also to know the frequencies of information-seeking behaviour and their satisfaction level of information seeking. Altogether here we investigated the information-seeking behaviour of nursing students and the way they have managed to access their necessary information. This paper was a descriptive and analytical study conducted in Salem through a well-structured questionnaire. Findings show that the mobile was frequently used by participants to seek and store information. Training programs are required to help nursing students to find and access reliable and up-to-date information resources. Nursing students used electronic and print resources, and most of the respondents sought the information for educational purposes. Electronic gadgets were also used by most of the participants to access and store the information.

Keywords: Information seeking behaviour; nursing students; information resources.

Introduction

Information is the basic needs of human beings. Nowadays information is needed for social development. Today availability of sources for information seeking has to be studied in the digital era due to its high significance. Academicians such as students, teachers and researchers can get the required information by directly accessing the academic libraries. People need information for decision-making whose needs are based on their requirements and interests (Raja & Kumar, 2015). The concept of information-seeking behaviour emerged from the broad concept of user studies.(Ikenwe, 2014)Information-seeking behaviour is a set of actions applied in identifying information needs, seeking the required information to satisfy the needs, to select the right information, and to evolve the selection of information(Davies, 2007). (Farahian, M., & Parhamnia, F. 2020) has studied the information seeking behaviour, accessibility of the information resources, and barriers of Nursing students.

Usually, every healthcare professional needs information related to the treatment of their patients. And then medical students like nursing students seek the information for their needs. There are many ways like printed resources, electronic resources and so on, in which nursing students can acquire their information (Umar, A., Umar, S., & Hussaini, M. 2020). Especially healthcare professionals use medical databases such as Medline and PubMed to seek information(Gray, et al.. 2005). Weber, W., et al. (2020) proposed online health information seeking behaviour among adults. They conclude that older adults may be reached by their online health information. Lifestyles they should be taken into account when predicting health related information using behaviour.

Statement of the Problem

This paper has been undertaken to analyse the information-seeking behaviour of nursing students and the way they managed to access their necessary information, which was much more important

for nursing students. Also to know the frequencies of information-seeking behaviour and their satisfaction level of information-seeking.

Literature Review

Flynn, M. G., & Mc Guinness, C. (2011) investigated the information needs, skill levels and seeking behaviour of hospital clinicians in two Irish public hospitals. A questionnaire survey approach was utilized for this study. Data analysis was conducted using descriptive statistics. The result showed that clinicians struggle to fit information-seeking into their working days. This study focused on the factors that characterize and limit hospital clinicians' information-seeking level, and finally suggests the CI as a potentially useful addition to the clinical team, to help them resolve their information needs for patient care. Þorsteins dóttir, G., & Kane, B. (2018, June) studied information-seeking behaviour among young adults and the survey methods. Elucidate top 5 categories of search information such as Personal Health, Symptoms, Healthy Diet, Mental Health and Treatment categories. Most of the respondents report high regard for the information they retrieve in their searches. The result shows the respondents who are Swedish residents, 42% are unaware of the availability of their journaling, 56.7% who know of it, and 18% have never accessed it.

Oriogu, *et al.*, (2017) Conducted a study on the use of Internet health information resources and information-seeking behaviour among health professionals. This survey was conducted by the federal medical centre, Abuja. The questionnaire method was used for data collection. The study used survey research methods. Their study recommended that health institutions should endeavour to provide basic information technology and literacy pieces of training to health professionals. And maintain continuous subscriptions to health e-databases create awareness of open access to health information resources and also improve effective access to the Internet connection for their information needs. Soroya, S. H., Ilyas, A., & Ameen, K. (2020) investigated the information behaviour of diabetic patients in Pakistan institutes. The “embedded Design” based on the mixed methods was used in this research. Data collected through questionnaires were analyzed using the statistical package for social science (16.0). The normality, Histogram normality graphs, skewness and kurtosis test were applied in this study. The result shows that health-related information is mostly required in the national language of Pakistan. Lack of computer literacy and information overload were among the barriers that were reported by diabetic patients.

Padmvati S Tubachi (2018) reported a study on information-seeking behaviour. The purpose of this study helps to know about the information-seeking behaviour definition, types and models of development. Raja Suresh Kumar & Dr. B.R. Doraswamy Naick (2015) in this paper discussed information needs and information-seeking behaviours. This type of survey will help the library professionals providing better sources of service to the user community and upgrade the library services. Xu, X., *et al.*, (2020) has investigated the health information behaviour towards HPV vaccination. Their research helps to further understand the message framing and health behaviour promotion.

Methodology

The survey mainly focused on the primary data collection method. The target group of this study includes nursing students in Salem. We used a self-designed survey questionnaire. The questionnaire was adapted to collect quantitative data.

Samples and Data Analysis

The questionnaire was sent to a randomly selected sample of users. A well-structured questionnaire was prepared and 170 questionnaires were distributed to the nursing students. 156

questionnaires were received from the respondents. The overall response rate was 91.7%. The obtained data was analyzed and tabulated by using SPSS (Statistical Package for Social Science). Descriptive statistics were used to describe the resources used by nursing students. Mean, standard deviation and the Chi-square test were applied to analyze the hypothesis. The significance level was set at $P < 0.05$. Cramers V coefficient (V) was used with the chi-square test. These can help to interpret the relationship between the two variables. ANOVA, post hoc, homogeneous Test also used in this study.

Objectives

1. To know about the information-seeking behaviour and know the purpose of information-seeking of nursing students
2. To identify the search methods, usefulness of the electronic resources and usefulness of the printed resources
3. To identify the devices used for accessing resources and the frequency of information-seeking by nursing students
4. To know the language preference and level of satisfaction with information sources.

Hypothesis

- H_0 : Searching methods are independent of gender
 H_1 : Searching methods are dependent on gender
 H_0 : The purpose of Library visiting is independent of the age
 H_1 : The purpose of library visiting is dependent on the age

Data Analysis

In the study, one hundred and fifty-six nursing students participated out of them 58 (37.2%) of the respondents were Female, and 98 (62.8%) of the respondents were male. The purpose of information-seeking behaviour includes clinical, educational, research and other purpose. It is observed that the high level 56 (35.9%) of respondents used the resources for educational purposes and the low level 21(13.5) for clinical purposes. 55 (35.3%) of respondents used their mobile and others, 46 (29.5%) of respondents used their personal computer. 85(54.5%) of respondents used rare, 39 (25.0%) of respondents were sometimes and 32 (20.5%) of respondents frequently searched the information related to the nursing students. In terms of language preference, 142 (91.0%) of respondents used English and 14 (9.0%) of respondents used Tamil for readings.

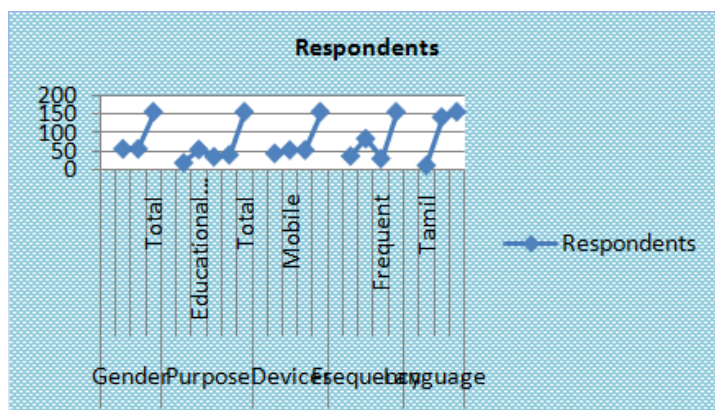


Fig.1 Searching Methods and Gender of Respondents

The table I shows the search methods and gender of respondents. 59 (37.8%) of the respondents have used keyword search methods, 39 (25.0%) of the respondents used title search methods, 35 (22.4%) of the respondents used the subject search methods, 23 (14.7%) of the respondents were used author search methods.

TABLE I SEARCHING METHODS AND GENDER OF RESPONDENTS

Searching methods					
Gender	Keyword search	Title Search	Subject Search	Author search	Total
Female	37 (63.8%)	10 (17.2%)	0 (0%)	11 (19.0%)	58 (100%)
Male	22 (22.4%)	29 (29.6%)	35 (35.7%)	12 (12.2%)	98 (100%)
Total	59 (37.8%)	39 (25.0%)	35 (22.4%)	23 (14.7%)	156 (100%)

TABLE II CHI-SQUARE TEST (METHODS AND GENDER OF RESPONDENTS)

Pearson Chi-Square value	40.521
d.f	3
P-Value	0.000
Hypothesis	Rejected
Cramers V contingency	0.510
Level of the relationship between the two variable	Moderate

H_0 : Searching methods are independent of the gender of the nursing students
 H_1 : searching methods are dependent on the gender of the nursing students

The Pearson Chi-Square value of the above table II is 40.521 at a 5% level of significance. Since the P-value is less than 0.001, the null hypothesis is rejected and the alternative hypothesis is accepted. It concluded that Searching methods are independent of the gender of the nursing students. Cramer V contingency has been used by the researcher when the number of rows and columns is not equal. I have used this Cramer’s formula in this study. The cramers value is 0.510. This means that there is a moderate relationship between the search methods and the gender of the respondents.

TABLE III STANDARD DEVIATION RANK

Variables	NO	Mean	Std. Deviation	Rank
Electronic resources	156	2.3974	1.25302	I
Printing resources	156	2.1603	0.84622	II

The table III shows the basis of the mean value and ranks assigned by the respondents. The mean score of electronic resources is 2.3974 with a standard deviation of 1.25302 is less than of mean value. It concluded that most of the nursing students used electronic resources. The mean score of 2.1603 of respondents used printing resources with a standard deviation of 0.84622. It is concluded that the printing resources are II ranks.

H_0 : The purpose of Library visiting is independent of the age of the nursing students
 H_1 : The purpose of library visiting is dependent on the age of the nursing students

The p-value of the Purpose of information seeking was found to be not significant at a 5% level of Significance. Hence the null hypotheses are accepted and alternative hypotheses are rejected. It concludes that the Purpose of Library visiting is independent of the age of the respondents.

TABLE IV ANOVA PURPOSE OF INFORMATION SEEKING

Purpose of information seeking	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.835	2	1.417	1.371	.257
Within Groups	157.204	152	1.034		
Total	160.039	154			

TABLE V POST-HOC TUKEY HSD

Dependent Variable	Age of the respondents	Age of the respondents	Mean Difference	Std. Error	Sig.
Purpose of Library Visiting	20 -30 years	30-40 years	.19818	.21310	.622
		above 40 years	.38920	.23627	.229
	30-40 years	20 -30 years	-.19818	.21310	.622
		above 40 years	.19102	.19130	.579
	above 40 years	20 -30 years	-.38920	.23627	.229
		30-40 years	-.19102	.19130	.579

TABLE VI HOMOGENEOUS

Age	N	Subset for alpha = 0.05
		1
above 40 years	44	2.4545
30-40 years	79	2.6456
20 -30 years	32	2.8438
Sig.		.168

TABLE VII SATISFACTION LEVELS OF ELECTRONIC AND PRINTING RESOURCES

Level of satisfaction						
Electronic resources	Not satisfied at all	Just satisfied	Moderately satisfied	Satisfied	Very satisfied	Total
Google	0 (0%)	0 (0%)	26 (52.0%)	7 (14.0%)	17 (34.0%)	50 (100%)
Medical databases	2 (4.3%)	0 (0%)	33 (70.2%)	12 (25.5%)	0 (0%)	47 (100%)
E-journal	1 (16.7%)	0 (0%)	0 (0%)	5 (83.3%)	0 (0%)	6 (100%)
Other	3 (5.7%)	10 (18.9%)	19 (35.8%)	9 (17.0%)	12 (22.6%)	53 (100%)
Total	6 (3.8%)	10 (6.4%)	78 (50.0%)	33 (21.2%)	29 (18.6)	156 (100%)
Printed resources						
Books	1 (2.2%)	10(22.2%)	8 (17.8%)	9 (20.0%)	17 (37.8%)	45 (100%)
Printed journals	0 (0%)	0 (0%)	17 (41.5%)	12 (29.3%)	12 (29.3%)	41 (100%)
Others	5 (7.1%)	0 (0%)	53 (75.7%)	12 (17.1%)	0 (0%)	70 (100%)
Total	6 (3.8%)	10 (6.4%)	78 (50.0%)	33 (21.2%)	29 (18.6%)	156 (100%)

The table VII describes the satisfaction level of electronic resources and printing resources among a total of 156 respondents. Out of which, 78 (50.0%) of the respondents are moderately satisfied, 33 (21.2%) of the respondents are satisfied, 29 (18.6%) of the respondents are very satisfied, 10 (6.4%) of the respondents are just satisfied, and 6 (3.8%) of the respondents are not satisfied at all.

Discussion

Information-seeking behaviour of nursing students and the way they managed to get the information was assessed in the study. Initially, here we discussed the purpose of information seeking for clinical, educational, research and other purposes. The obtained result shows most of the respondents seek the information for educational purposes through mobile. In modern today, people with mobile phones rarely search the information related to nursing students. However, most of the respondents used the English language for their readings. Concisely, a variety of resources like electronic and printed resources were used. The respondents used mostly Google for their information seeking in electronic resources and books in printed resources.

Conclusion

This study concluded that the information-seeking behaviours of nursing students and the way they managed to acquire the information. Nursing students used printed and electronic resources. In the present day, the majority of nursing students use electronic resources. Most of the respondents used search engines to seek information. Handheld mobile was frequently used by participants to seek and store information. Training programs are required to help nursing students to find and access reliable and up-to-date information resources. The nursing students may need information literacy programmes, and providing books. This would help nursing students to re-find information for future use.

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Bibliometric and Altmetric Assessment of Scientific Research Productivity at NIT Surathkal from 2011 to 2020

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Abstract

This paper aims to evaluate the scientific research productivity and scholarly impact of the National Institute of Technology (NIT) Surathkal by using Bibliometric and Altmetric assessments. The sample data was obtained from the Scopus database, covering the period from 2011-2020. A total of 3991 publications comprised only journal articles with 57,917 citations appeared. The Altmetric data was retrieved using data mining techniques, like API and scraping. An in-depth analysis incorporated various bibliometric and descriptive statistical methods using MS Excel, R statistical software (Biblioshiny), and VOS viewer. The findings show that there has been a significant rise in the research activities at NIT Surathkal over the past decade. The study reveals that the primary research focuses on Single-crystal X-ray Study, Heat transfer, and Nanofluid. The USA, Europe, and some Asian countries like Malaysia and Indonesia are the most inventive regions with divergent research directions. The study conducted a detailed analysis of the research progress, social structure, intellectual structure, and conceptual structure, along with the social media attention given to the research publications.

Keywords: Bibliometric; Altmetric; Social Media; Research Promotions; NIT Surathkal

Introduction

Bibliometric and Altmetric assessments are methods used to evaluate an institution's or individual researcher's scientific research productivity. Bibliometric analysis refers to the quantitative study of publications, citations (Wikipedia contributors, 2023), and other related factors. Altmetric analysis examines the impact of research through online attention and social media metrics (Altmetric, 2022). These assessments are becoming increasingly popular methods for evaluating the scientific research productivity of academic institutions. In this context, NIT Surathkal, also known as the National Institute of Technology Surathkal, is a premier technical institution in Mangalore, India. The institution is known for its research contributions in various fields, such as engineering, sciences, and technology (About Us | NITK Surathkal, 2023).

This study intends to gauge the scientific research productivity of NIT Surathkal using bibliometric and Altmetric analysis. By examining the institution's publications, citations, and social media mentions, we can gain insights into the research impact, collaboration networks, and online visibility of NIT Surathkal and identify its strengths and weaknesses. Through this analysis, the study aims to shed light on the institution's strengths and areas for improvement in research and provide helpful information for policymakers, funding agencies, and other stakeholders in the research ecosystem.

Review of Literature

Traditional citations have become a vital tool to measure the research impact; however, they consider only one type of research product: peer-reviewed articles. The other critical online metrics, which refer to mentions of scholarly publications in social media, are ignored, which form an essential part of the research impact, especially after most scholarly publications have moved

online. A study conducted by Priem *et al.*, 2012, his article to explore the features of social media-based metrics; the study analyzes a sample of 24,331 articles published by the Public Library of Science. The study found significant variation in activity among different indicators. Mendeley and Web of Science citations demonstrate a moderate correlation, while most altmetrics indicators appear to measure the impact that is largely independent of citation metrics. This study emphasizes the growing importance of social media platforms in scholarly communication. It highlights the potential of social media-based metrics.

Thelwall *et al.*, 2013, conducted a study to explore the correlation between altmetrics and citation counts. They compared eleven altmetric sources with citation data for a large sample of PubMed documents published in 2010-2012. The authors found six of the eleven altmetrics were significantly associated with citation counts, particularly in medical and biological sciences. Still, the study did not provide specific information about the strength of this correlation. This suggests that the prevalence of these altmetrics might not be substantial enough to be effectively utilized in practical settings. In short, this study highlighted the significant correlation between altmetrics and citation counts in medical and biological sciences and the limited coverage and questionable usefulness of certain altmetric sources. However, the study did not quantify the magnitude of the observed correlations and advised caution when interpreting results for articles with no altmetric scores.

A study conducted by Hausteine *et al.*, 2013, explored 1.4 million documents published between 2010 and 2012 from Web of Science and PubMed. The comparison between tweets and citations was used to evaluate the correlation and degree of representation on Twitter. Only 10% of the articles discussed on Twitter came from PubMed, indicating a rather low representation of biomedical research. The impact measurements for tweets differ from those for citations, implying that tweets may not always indicate intellectual effects. According to the authors, tweets do not always accurately reflect the actual intellectual impact of the study.

Collins *et al.*, 2021, investigated the correlation between the Altmetric Attention Score and traditional bibliometrics in orthopedics. The authors selected 15 orthopedic journals and reviewed the ten most cited articles from each journal between 2014 and 2017 using the Scopus database. A significant positive correlation is shown between citation count and impact factor each year. A combination of traditional bibliometrics and AAS may be necessary to determine the short and long-term impact and influence of publications in orthopedics.

Borku Uysal *et al.*, 2021, conducted a study to analyze the top 100 most cited articles on COVID-19 using bibliometric analysis, Altmetric scores, and dimension badges. The Web of Science and PubMed (January and September 2020) and the Altmetric.com website were used to obtain data. It revealed that epidemiological and therapeutic articles received more citations, generating social media attention. The number of citations and social attention an article receives does not solely indicate its quality but reflects its value and contribution to the scientific community.

Maurya *et al.*, 2022, correlated between scientometrics and altmetrics of scholarly output in the Medical Journal Armed Forces India (MJAFI) from 2010 to 2018. The study employed the observation method and extracted sample data using DIMENSIONS. Webometric Analyst 4.1 was utilized to retrieve the distribution of online attention received by MJAFI articles across various platforms. Co-authorship networks were analyzed using VOS viewer. The study demonstrated a positive relationship between citation counts and altmetric attention for scholarly publications in MJAFI. Furthermore, the "Clinical Science" category had the highest number of publications with

good relative and field citation values. The articles published in MJAFI received favorable attention on academic and social platforms.

The study by Liu & Huang, 2022, aimed to investigate the relationship between altmetric counts and citations across various academic fields using co-occurrence analysis. The authors also identified limitations associated with both citations and altmetric counts. They obtained 144,325,91 data from the altmetric provider of academic publications with accompanying DOIs. The research found a link between highly cited papers and those with high altmetric counts. The most notable discovery was that Mendeley had the strongest connection with citations of any altmetric source across all five academic categories. As a result, Mendeley was regarded as the main signal for academic evaluation since the altmetric counts from other sources did not show substantial connections with citations.

Objectives of Study

1. To examine the annual growth rate, cumulative annual growth rate, relative growth rate, and doubling time of NIT Surathkal from 2011-2020.
2. To identify the most prolific authors and examine the authorship pattern.
3. To assess the most productive institutes.
4. To identify the most preferred sources of publications.
5. To identify the most influential research publications of NIT Surathkal.
6. To examine the social media attention score of various platforms and finding out the correlation between citations and altmetric attention score

Methodology

The current research utilized the Scopus database to gather scientific publications data from 2011 to 2020. Three thousand nine hundred ninety-one bibliographic records were retrieved from Scopus in CSV format and analyzed using MS Excel, R-programming (Biblioshiny), and VOS viewer. The data was retrieved from the Scopus database using an affiliation search query as AF-ID ("National Institute of Technology Karnataka") for NIT, Surathkal. The current study has considered only journal articles for further analysis. The research output features, such as source type, subject area, source title, authorship, document type, keywords, and country/territory, were used to analyze the publication data and gather information on the most productive authors, source journals, author collaboration, and collaborative countries. The dataset was carefully arranged to enable deeper exploration and conveyed through tables and graphs for meaningful interpretation. Additionally, Altmetric data were extracted and analyzed using data mining techniques such as API and scraping. Finally, the bibliometric technique was applied to the Scopus data, and descriptive statistical methods were used on the Altmetric data. The results of the current study are presented in tables and charts for visual interpretation.

Analysis and Interpretation

The National Institute of Technology (NIT) Surathkal has existed for 62 years, established in 1960. However, the bibliographic data from 2011 to 2020 was analyzed for this study. Table I shows the year-wise distribution of publications, wherein 3991 research documents were published during ten years with an annual growth rate of 11.28%. This indicates a moderate level of research activity during the given timeline. The research papers published by NIT Surathkal were diversified in terms of sub-categories, although this study only considered documents in the Journal Articles category. Among these, the majority of publications were articles (3816), followed by reviews (90), editorials (45), erratum (10), notes (8), letters (7), data papers (6), retracted papers (6), short surveys (2), and an undefined category (1).

TABLE I YEAR-WISE DISTRIBUTION OF PUBLICATIONS

Year	Articles	AGR	CAG	CAGR	W1	W2	RGR	DT	Citations	ACPP
2011	269	-	269	-	0	5.595	0	0	3842	14.28
2012	237	-11.90	506	88.10	5.595	6.227	0.632	1.097	2685	11.33
2013	234	-1.27	740	46.25	6.227	6.607	0.380	1.823	4260	18.21
2014	252	7.69	992	34.05	6.607	6.9	0.293	2.365	4356	17.29
2015	284	12.70	1276	28.63	6.9	7.151	0.252	2.753	6237	21.96
2016	335	17.96	1611	26.25	7.151	7.385	0.233	2.973	6599	19.7
2017	455	35.82	2066	28.24	7.385	7.633	0.249	2.786	8402	18.47
2018	541	18.90	2607	26.19	7.633	7.866	0.233	2.980	7958	14.71
2019	680	25.69	3287	26.08	7.866	8.098	0.232	2.990	8113	11.93
2020	704	3.53	3991	21.42	8.098	8.292	0.194	3.571	5465	7.76
Total	3991								57917	14.51

AGR (Annual Growth Rate); CAG (Cumulative Annual Growth); CAGR (Cumulative Annual Growth Rate); ACPP (Average Citations Per Paper); RGR (Relative Growth Rate)

Table I shows a variable's annual growth rate (AGR) from 2011 to 2020, with varying growth and decline rates. The AGR ranged from significant declines of -11.90% in 2012 to substantial growth of 35.82% in 2017.

$$AGR = \frac{EndValue - FirstValue}{FirstValue} \times 100$$

To evaluate the publications, two measures are used to assess the growth rate: (1) Cumulative Annual Growth Rate (CAGR) and (2) Relative Growth Rate (RGR). These two indicators gauge the annual fluctuation in the number of published works in a particular academic discipline. CAGR can be calculated based on the formula given below.

$$CAGR = \left(\frac{ending\ value}{beginning\ value} \right)^{\left(\frac{1}{\#\ of\ years} \right)} - 1$$

As shown in the table, the CAGR is constantly decreasing except in 2017; the highest decrease is seen in 2013 when the CAGR fell from 88.10 to 46.25.

The Relative Growth Rate (RGR) is calculated as the difference between the natural logarithms of the total number of publications at two time points, divided by the duration of the time interval. RGR can be calculated based on the following formula:

$$RGR = \frac{W2 - W1}{T2 - T1}$$

- W1 = Loge (natural log of the initial number of contributions)
- W2 = Loge (genuine record of the final number of contributions)
- T1 = the unit of initial time
- T2 = the unit of last time

The table shows that the RGR is constantly reducing, except for 2017, in which 0.249 RGR was recorded. The Doubling Time of the publications gives an estimated time after which the publication gets double. The natural logarithm of 2 will be divided by RGR to calculate the Doubling Time.

$$\text{Doubling Time} = D(t) = \frac{0.693}{RGR}$$

Here, the table shows that the doubling time of publications has been increasing since 2011, except in the year 2017, but in the very next year, it increased from 2.786 to 2.980. Since then, it has gradually increased, showing researchers are more into producing publications.

TABLE II RANKING OF THE MOST PRODUCTIVE AUTHORS

Rank	Author	Department	NP	TC	h-index	g-index	PY-start
1	Isloor AM	Chemistry	181	4734	39	63	2011
2	Bhat DK	Chemistry	57	1842	28	41	2011
3	Doddamani M	Mechanical	58	1582	25	37	2015
4	Adhikari AV	Chemistry	68	1321	20	33	2011
5	Nagaraja HS	Physics	56	1398	20	35	2011
6	Narendranath S	Mechanical	55	1318	20	34	2011
7	Anandhan S	Metallurgical and Materials	63	1113	19	29	2011
8	Bhat BR	Chemistry	63	1038	19	29	2011
9	Ramesh MR	Mechanical	60	887	18	25	2013
10	Rajan J	Computer Science	27	713	17	26	2014

Table II displays the ranking of the most productive authors based on their total number of publications, h-index, g-index, and complete citations, along with their affiliated organization and country. Among the 4,796 authors considered, ISLOOR, A.M. from the Department of Chemistry has the highest number of publications (NP = 181, h-index = 39, g-index = 63, TC = 4734), primarily in the areas of Polyether sulfone, Ultra-filtration, Nano-filtration Membranes, Thin Film Composite Membranes, Lubricin, Articular Cartilage, and Hydrogel. BHAT DK from the Department of Chemistry ranks second (NP = 57, h-index = 28, g-index = 41, TC = 1842), with a focus on topics such as Phonon, Lead Selenides, Hole Concentration, Electrode, Cobaltous Sulfide, Electrode Materials, Strontium Titanium Oxide, Photocatalytic Activity, and Photocatalyst. DODDAMANI M from the Department of Mechanical Engineering ranks third (NP = 58, h-index = 25, g-index = 37, TC = 1582), with research interests in Microballoons, Epoxide, Foams, Magnetic Bearings, Magnetism, Inductance, Carbon Fiber Reinforced Plastics, Cutting Force, and Machining.

Notably, four of the top 10 authors are from the Department of Chemistry, three are from the Department of Mechanical Engineering, and the remaining three are from the Departments of Physics, Computer Science, and Metallurgical and Materials Engineering. Recognizing the authorship pattern is an essential practice in bibliometric study; it gives insight into the communication patterns, productivity, and collaboration among the authors. It has been observed that a total of 3991 publications are distributed in five ways. Two authors contributed the maximum number of papers in the authorship pattern, 1406, 35.22% of the publications, and a single author pattern donates the minimum.

TABLE III AUTHORSHIP PATTERN

Year	Single Author	2 Authors	3 Authors	4 Authors	Five and above	Total	Collaboration Coefficient
2011	3	72	83	36	75	269	0.66
2012	6	63	76	32	60	237	0.65
2013	7	83	68	35	41	234	0.62
2014	5	111	75	28	33	252	0.61
2015	1	109	88	42	44	284	0.63
2016	2	125	97	36	75	335	0.64
2017	9	159	138	72	77	455	0.63
2018	7	195	167	90	82	541	0.63
2019	11	247	202	103	117	680	0.63
2020	6	240	236	100	122	704	0.64
Total	58	1406	1233	578	726	3991	0.63

TABLE IV MOST PRODUCTIVE INSTITUTES

Institutes	Country	No. of Publications
Cameron University	USA	132
Indian Institute of Science	India	95
Manipal University	India	80
Universiti Sains Malaysia	Malaysia	69
Indian Institute of Technology	India	54
NMAM Institute of Technology	India	47
Universiti Teknologi Malaysia	Malaysia	47
King Abdulaziz University	Saudi Arabia	31
Indian Institute of Technology Bombay	India	30
VIT University	India	30

TABLE V MOST PROLIFIC SOURCES OF PUBLICATIONS

Source	NP	TC	h-index	PY-start
Materials Research Express	65	588	13	2017
RSC Advances	35	935	20	2012
Journal Of Alloys And Compounds	33	815	18	2013
New Journal Of Chemistry	29	494	13	2014
Desalination	24	1722	19	2011
Environmental Science And Pollution Research	19	429	14	2013
Construction And Building Materials	18	633	13	2017
Electrochimica Acta	17	653	14	2013
Composite Structures	15	1057	14	2013
European Journal Of Medicinal Chemistry	15	1029	14	2011

Table IV displays the most productive institutes based on the number of collaboratively published research papers with NIT Surathkal authors. As shown, most of the research publications are collaborated with institutes in India, with only a limited number of articles published in collaboration with international affiliations. The institute with the highest number of collaborative publications is Cameron University, USA, with 132 papers, followed by Universiti Sains Malaysia and Universiti Teknologi Malaysia, with 69 and 48 published collaboratively, respectively. King Abdulaziz University, Saudi Arabia, is another notable international affiliation, with 31 collaboratively published papers.

Table V displays the primary source titles of the research publications of NIT Surathkal, which are all Scholarly Journals. Journal Material Research Express, an open-access journal from the Institute of Physics Publishing, holds the top spot with the highest number of publications (NP=65), followed by the research journal RSC Advances (NP=35) from the Royal Society of Chemistry. However, the journal that received the most citations is Desalination (TC=1722), a publication from Elsevier Group, followed by Composite Structures (TC=1057), also from Elsevier Group. These leading sources mainly cover research on General Chemistry, Polymers, Plastics, Metals and Alloys, Ceramics, and Composite subjects.

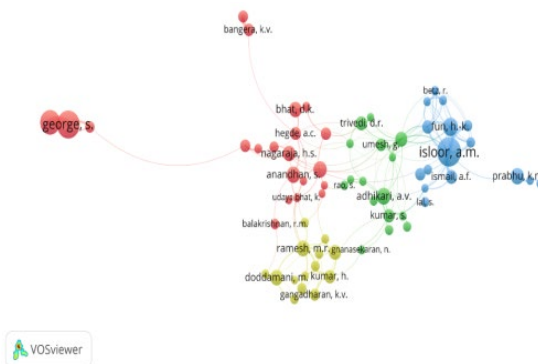


Fig.1 Co-Authorship of Authors

Fig. 1 illustrates the co-authorship networks among authors, one of the most tangible forms of research collaboration. Our analysis identified 79 authors who shared at least 20 publications, received at least 20 citations, and had the most collaborative relationships. Visualized using a network graph, the authors are clustered into four distinct groups represented by different colors.

Circular nodes represent individual authors, and their sizes correspond to the strength of their collaborative ties. Smooth lines connect the nodes, indicating the collaborations between authors. Cluster 1 (red) is the largest in the network, with 21 authors, followed by Cluster 2 (green) and Cluster 3 (blue), with 16 authors each, and Cluster 4 (yellow), with 14 authors. According to the Total Link Strength, it has been found that ISLOOR AM (NP = 181, h-index = 39, g-index = 63, TC = 4734, TLS = 156) from cluster 3 is the most collaborative author, followed by GEORGE S. (NP = 15, h-index = 12, g-index = 15, TC = 323, TLS = 144) from Cluster 1.

The co-authorship network of countries is presented in Fig. 2, which includes 74 collaborative countries. For the analysis, we selected 37 countries with a close collaborative relationship with at least five publications. These countries were grouped into ten different colored clusters based on the frequency of co-occurring terms representing each country.

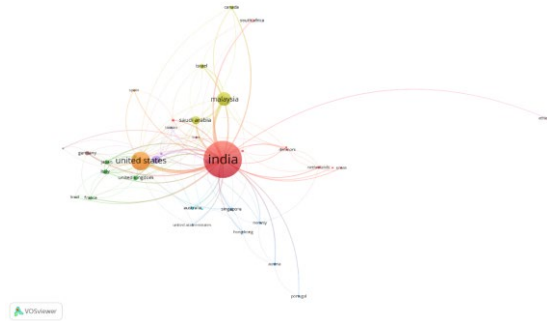


Fig. 2 Co-Authorship of Countries

The size of the circles represents the number of publications, and the thickness of the lines shows the level of collaboration. For instance, India had the highest link strength with other countries (957), followed by the USA (342) with their collaborative partners. Malaysia, Saudi Arabia, and South Korea had active collaboration, indicating an improvement in their research collaboration with NIT Surathkal in recent years.

The USA was the second most prolific country with research collaborations with Malaysia, Saudi Arabia, Israel, etc. Similarly, Malaysia collaborated with Saudi Arabia, Egypt, Israel, the USA, and the United Kingdom. The figure shows that many other countries also have good collaborative relationships with others worldwide. Cooperation between countries is an effective way to achieve more significant research results than individual research.

By analyzing co-citation patterns, researchers can identify active research areas, uncover frontier research, and pinpoint groundbreaking discoveries, all of which contribute to visualizing the intellectual structure of a field (Bayer *et al.*, 1990). Leveraging co-citation analysis, researchers can illuminate the hidden connections between influential articles in a specific domain, thereby constructing a comprehensive map of the field's scholarly architecture (Calabretta *et al.*, 2011; Culnan, 1987; White & Griffith, 1981; White & McCain, 1998). Co-citation reflects the degree of association between two units of scholarly work based on their shared citation patterns (Small, 1973). Co-citation analysis, a method of analyzing the co-occurrence of citations, enables researchers to identify active research areas, uncover frontier research, and pinpoint groundbreaking discoveries that shape the field.

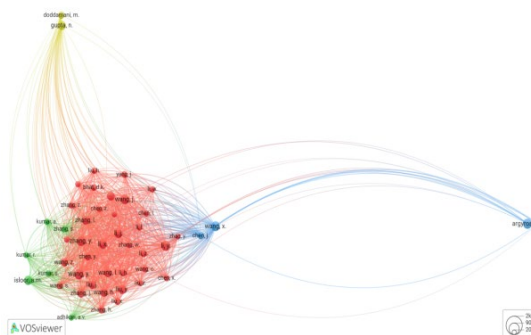


Fig.3 Intellectual Structure of Research at NIT Surathkal

The intellectual structure of research co-citation networks of cited authors is depicted in Fig. 3. The dataset includes 3991 publications, which cited 175,335 authors. Using VOS viewer, authors with a minimum of 250 citations have been included in the network visualization map, resulting in 48 authors with robust relationships. Based on their frequency of appearance in documents and total co-citation link strengths, cited authors have been categorized into four colored clusters. However, the visualization software's limitations and the weak co-citation links of certain authors have resulted in the exclusion of three of the top 10 most prolific authors from the network graph. These top 10 authors, including Wang Y (rank 1), Li Y (rank 2), Zhang Y (rank 3) from cluster 1, Wang X (rank 4) from cluster 3, and Wang J (rank 5), Li X (rank 6), Zhang X (rank 7), Liu Y (rank 8), Wang I (rank 9), and Li J (rank 10) from cluster 1, are scattered across different groups.

Table VI displays the top ten most impactful research publications from NIT Surathkal based on the total number of citations they received. All these influential publications were written in English, with seven articles and three reviews. The article titled "Enhanced hydrophilicity and salt rejection study of graphene oxide-polysulfone mixed matrix membrane" by Ganesh, Isloor, and Ismail (2013), published in the journal *Desalination* (CiteScore 16.3), and was the most cited publication with 446 citations.

TABLE VI MOST INFLUENTIAL RESEARCH PUBLICATIONS

Rank	Title	Year	DOI	Document Type	Total Citations
1	Enhanced hydrophilicity and salt rejection study of graphene oxide-polysulfone mixed matrix membrane	2013	10.1016/j.desal.2012.11.037	Article	446
2	Support vector machine applications in the field of hydrology: A review	2014	10.1016/j.asoc.2014.02.002	Review	406
3	Assessment of soil erosion by RUSLE model using remote sensing and GIS - A case study of Nethravathi Basin	2016	10.1016/j.gsf.2015.10.007	Article	366
4	A review on RO membrane technology: Developments and challenges	2015	10.1016/j.desal.2014.12.042	Review	339
5	Stress, vibration and buckling analyses of FGM plates—A state-of-the-art review	2015	10.1016/j.compstruct.2014.09.070	Review	307
6	Enhanced Energy Output From a PV System Under Partial Shaded Conditions Through Artificial Bee Colony	2015	10.1109/TSTE.2014.2363521	Article	290
7	New pyrazole derivatives containing 1,2,4-triazoles and benzoxazoles as potent antimicrobial and analgesic agents	2013	10.1016/j.ejmech.2012.12.057	Article	227
8	Green synthesis of iron nanoparticles using different leaf extracts for the treatment of domestic wastewater	2016	10.1016/j.jclepro.2016.09.019	Article	207
9	Dielectric and piezoelectric properties of PVDF/PZT composites: A review	2015	10.1002/pen.24088	Article	189
10	Fabrication of polydopamine functionalized halloysite nanotube/polyetherimide membranes for heavy metal removal	2016	10.1039/c5ta09281g	Article	180

The second most cited publication was a review article entitled "Support vector machine applications in the field of hydrology: A review," authored by Raghavendra and Deka (2009), which received a total of 406 citations and was published in the journal Applied Soft Computing (CiteScore 12.4). Among these top-cited articles, eight were published in Elsevier journals, and one each in IEEE and Wiley journals.

TABLE VII SOCIAL MEDIA ATTENTION

Rank	Publisher	Blogs	Wikipedia pages	Tweets	Facebook pages	Patents	Policy source	News outlets	Mendeley	AAS
1	Springer			14				61	59	486
2	Springer			13				61	48	485
3	APS	12		17	2			19	12	218
4	Elsevier		1	1			1	5	412	48
5	Springer			29					9	24
6	Interscience	1						2	21	21
7	Wiley	1		1	1			1	108	18
8	Elsevier			6				1	46	15
9	Elsevier		1	15	1				80	12
10	Elsevier					4			48	12
11	Elsevier					4			143	12
12	Elsevier			8		1			103	11

The pervasiveness of Information Communication Technology (ICT) has propelled publishers towards digital publication methods, marking a significant departure from traditional publishing practices. The immediacy and reach of social media have made it the primary conduit for distributing information after publication, allowing for real-time engagement and discussion. Given the ubiquity of social media, analyzing user engagement with published research articles across various platforms provides a valuable window into the societal impact of specific research endeavors. Utilizing the Altmetric Attention Score (AAS) as a guiding metric, the top ten articles from NIT Surathkal's publications have been selected to evaluate the extent to which social media influences research using Altmetric tools (Table VII). Distinguishing themselves with their far-reaching visibility and profound impact on readers, these top ten publications, adorned with high Altmetric Attention Scores, have been deemed suitable for this study.

Table VII elucidates the diverse channels through which users discover, access, and share published research articles, encompassing social media platforms, bookmarking sites, reference managers, news outlets, and other online platforms. In addition to the detailed breakdown of user engagement, the Altmetric Attention Score (AAS) has been included in the table to provide a comprehensive assessment of the social media impact of the research articles. It is found that most of the articles have been mentioned on Twitter, followed by Blogs and Facebook pages. A journal article (rank 1 & 2) entitled "Additive Manufacturing of Syntactic Foams: Part 1: Development, Properties, and Recycling Potential of Filaments" authored by Singh, A.K. *et al.*, (2018) and entitled "Additive Manufacturing of Syntactic Foams: Part 2: Specimen Printing and Mechanical

Property Characterization” written by Singh, A.K. *et al.*, (2018) published by Springer Nature’s journal JOM: The Journal of The Minerals, Metals & Materials Society was the most influential research article that has the most number of news coverage (61) and mentioned on Twitter 14 and 13 times, followed by article (rank 3) entitled “Alleviating the Tension in the Cosmic Microwave Background Using Planck-Scale Physics” authored by Ashtekar, A. *et al.*, (2020) published by American Physical Society’s journal Physical Review Letters, which is mentioned 17 times on Twitter, 12 blog posts and 19 news coverages. It is also observed that three articles stand on Rank 9 with the Altmetric Attention Score (AAS) 9. Similarly, in most cases, the articles have maximum mention on the Twitter platform.

In terms of the reading on Mendeley reference management, the article (rank 4) entitled “Hate speech review in the context of online social networks” authored by Chetty and Alathur (2018), published by Elsevier, has the most number of readers (412), followed by rank 9 (143) and rank 7 (108) total readers.

It was found that the articles with high social media attention are published by the renowned publishers Elsevier, Springer, APS, Interscience, and Wiley. In addition, the top 10 Altmetric Attention Score (AAS) articles from NIT Surathkal were paid themes, and Elsevier journal articles have the maximum readers on Mendeley.

According to the analysis, most of the articles have readers on Mendeley, but the Altmetric tool only provides statistics for three countries: India (2), Indonesia (1), and Italy (1). However, the geographical locations of readership for the rest of the articles are unspecified.

TABLE VIII DISTRIBUTION OF MENDELEY READERSHIP

Rank	DOI	Academic Professional	Researcher	Unknown	Students		
					Bachelor	Master	Doctoral
1	10.1007/s11837-017-2734-7	4	4	39	0	0	23
2	10.1007/s11837-017-2731-x	3	3	35	0	0	22
3	10.1103/PhysRevLett.125.051302	1	2	3	0	2	5
4	10.1016/j.avb.2018.05.003	28	29	239	43	58	55
5	10.1007/s00542-019-04737-0	4	0	0	1	0	0
6	10.1504/IJEW.2014.058803	0	2	7	3	3	6
7	10.1111/1751-7915.12297	0	8	45	16	13	29
8	10.1016/j.compositesb.2017.07.037	5	4	23	3	4	16
9	10.1016/j.envpol.2020.115148	0	9	37	14	14	14
9	10.1016/j.ejmech.2014.01.008	0	7	15	4	4	19
9	10.1016/j.matlet.2011.10.038	0	15	71	12	13	39
10	10.1016/j.compositesb.2017.03.062	0	12	51	0	8	45
	Total	45	95	565	96	119	273

Table VIII presents the readership statistics of the articles on Mendeley categorized by different user groups such as master students, bachelor students, PhD students, and professionals. The data

reveals that "Doctoral Students" are the most active readers on Mendeley, followed by "Master Students" and "Bachelor Students". These findings suggest that students and researchers constitute the primary readership of research articles on Mendeley.

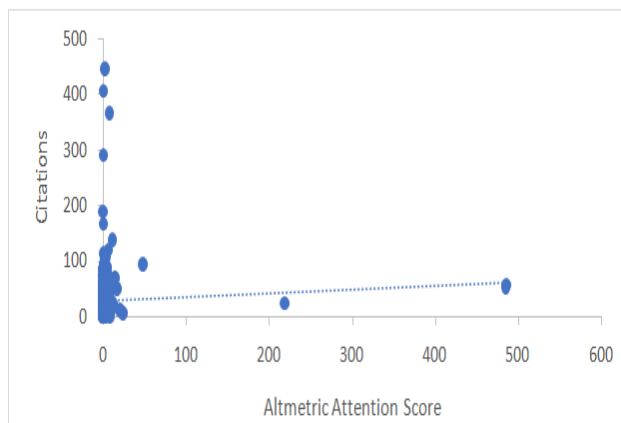


Fig.4 Correlation between Citations and Altmetric Attention Score

The presented Fig.4 portrays a correlation coefficient of 0.058903, denoting the relationship between Citations and Altmetric Attention Score (AAS). Within statistical paradigms, correlation coefficients are confined within the range of -1 to 1, where values of -1 and 1 signify perfect negative and positive correlations, and a value of 0 indicates the absence of correlation. Within the context of the ongoing investigation, the recorded correlation value is proximate to the extremes of 0 and 1. Consequently, it can be inferred that a modest yet positive correlation exists between Citations and Altmetric Attention Score.

Discussion

By utilizing bibliometrics and Altmetric tools, this study investigated the research trends of articles published by NIT Surathkal. The study revealed the intellectual structure, research hotspots, and developing trends of the publications through an in-depth review of earlier studies, which can drive future research. The research findings bridge the gap between evidence and action, providing decision-makers, policy planners, and other stakeholders with easily accessible and actionable insights. The study provided a detailed analysis of the publications' research growth, social structure, intellectual structure, and conceptual structure. The study also looked at Mendeley readership figures and online social media attention provided to scholarly papers.

According to the research analysis, there has been a noticeable rise in research activities at NIT Surathkal over the past decade, and it is expected to continue growing exponentially. The study reveals that the primary research focuses on Single-crystal X-ray Study, Heat transfer, and Nanofluid. The USA, Europe, and some Asian countries like Malaysia and Indonesia are the most inventive regions with divergent research directions. Researchers are delving into emerging themes related to Machine Learning, Microstructures, and Mechanical properties across various subject areas. The most productive authors and sources were identified using four performance and citation-based measures: the number of publications, citations, h-index, and g-index. The survey also identified influential institutes and nations based on publication, source, and h-index.

Researchers did a co-authorship analysis to find the collaboration pattern between authors and countries in NIT Surathkal research publications. Co-authorship networks were established using

several units of study, such as authors and countries, Perianes-Rodriguez *et al.*, 2016. The examination of author co-authorship (Fig.1) and country co-authorship (Fig.2) demonstrated substantial collaboration tendencies in the research papers of NIT Surathkal. Nodes represented the unit of analysis in the network graph, with node size denoting the number of publications.

Larger nodes corresponded to a more significant number of publications. The giant circles in the co-authorship of the author network represented ISLOOR AM, and GEORGE S. India, the United States, Malaysia, and Saudi Arabia were represented in the country network. This indicated that these authors and countries had collaborated extensively on research, strengthening the social structure of research and enhancing its quality. Additionally, this analysis could help researchers identify potential collaborators for future research. The co-citation analysis explored intellectual linkages between influential articles (Fig.3). Fig. 4 portrays a correlation coefficient of 0.058903, denoting a modest yet positive relationship between Citations and Altmetric Attention Score (AAS).

The top ten most influential publications were determined based on their citation counts and their online social media engagement and Mendeley viewership were assessed. While a few sources were regularly mentioned on Twitter and in the news, the analysis found that NIT Surathkal's research publications were not generating considerable social media attention. The papers, however, enjoyed a sizable viewership on Mendeley, notably among doctorate, master's, and bachelor's students. Given these findings, it is critical to promote research via social media sites such as Facebook and Twitter. By embracing social media as a dissemination tool, researchers and journals can foster a more engaged and informed scholarly community, effectively bridging the gap between academia, society, and the broader scholarly network. While publishing a high-quality article in a journal is critical, it only accounts for 50% of the citation effect. The remaining 50% comes from wide advertising and disseminating the publication (Bong & Ale Ebrahim, 2017; Ebrahim, 2012; Fagbule, 2018).

Conclusion

There is a shortage of actual knowledge that can systematically portray the current state of research publications from NIT Surathkal, and systematic reviews of research advancement in numerous sectors are still in their infancy. This study included a quick review of online social media attention to research papers and a thorough assessment of research growth and trends. The results indicate that more social media advertising is required to raise the visibility of research, even though there was no discernible relationship between Altmetric Attention Scores and the quantity of citations. This study, however, was restricted to the Scopus database; further research might be carried out by applying alternative search term parameters and gathering detailed data from other databases, such as Web of Science, Dimensions, Lens.org, and Google Scholar. Additionally, research articles in sub-domains and contemporary state-of-the-art technologies could be assessed at a micro level and in specific geographic regions in future studies.

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Research Productivity in Knowledge Management in India over the Last Two Decades (2004-2023): A Scientometric Study

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Abstract

This paper aims to examine and analyze the Indian research productivity in knowledge management (KM) published from 2004 to 2023 and indexed in the Scopus database using Scientometric analysis tools. The publication data from the last 20 years extracted from the Scopus database used for this investigation. This study demonstrates interest of Indian researchers in Knowledge Management and collaboration pattern with other researchers. The paper also displays India's productivity during the previous 20 years in Knowledge Management. The data were exported from Scopus in .csv and .bib files and methodically arranged and processed using Rstudio, VOS viewer, and Biblioshiny tools. According to this research, the number of publications on knowledge management is growing at a pace of 18.27% year on average.. It also states in relative growth rate (RGR) and doubling time (DT) which is 0.18 and 4.8 respectively. This study also shows that more collaborative work has been done by authors in this topic. The degree of cooperation is 0.88. About 47% of the articles were published in collaboration with more than two authors.

Keywords: Scientometric Analysis, Knowledge Management, Relative Growth Rate, Doubling Time, Bradford's law, Scopus database, India

Introduction

The term Knowledge Management (KM) first appeared in the American literature in the late 1980s, but received considerable attention in the 1990s (McInerney & Koenig, 2011). According to Serenko (2013), KM emerged as a set of professional practices from the growing pressure on organizations to improve efficiency and competitiveness. "Knowledge Management (KM) is the most common way of making, sharing, utilizing, and dealing with the information and data of an organization. It mentions to a multidisciplinary way to deal with achieve authoritative destinations by utilizing knowledge goals", Gupta *et al.*, 2004. "Knowledge management is the collection of methods relating to creating, sharing, using and managing the knowledge and information of an organization. It refers to a multidisciplinary approach to achieve organizational objectives by making the best use of knowledge". (https://en.wikipedia.org/wiki/Knowledge_management).

With the invention of new technologies, there has been a radical change in the methods of storage and use of knowledge. Information can now be collected, analyzed and disseminated through technological means. Computer databases and the Internet help to collect, store, filter and understand knowledge. For the last two decades, knowledge management has been an exciting topic to explore because of the demand of time. KM not only simplifies human functioning in the present but also proves to be helpful in future actions. Knowledge management is the planning, design, construction, operation, and maintenance of knowledge management systems.

The research outputs and productivity are measured using statistical techniques like Bibliometric, Informetrics, Librametrics, Webometrics, etc. Scientometrics has typically been defined as the

“quantitative study of science and technology” Van Raan (1998). In other words Scientometric is concerned with the quantitative feature and characteristics of science and scientific research. This study examines the pattern of literature published in the knowledge management field over the past two decades. Publication data were extracted from Scopus and analyzed using Scientometric techniques. It also explores the potential dimension of KM research conducted in India in the last two decades. This article is guidance for all those researchers who want to research or are interested in the topic of Knowledge Management.

Literature Review

In any type of research, the act of reviewing the literature is crucial and significant. In any field, it is the first step in the research process. Examining similar studies helps to prevent repeating work that has previously been done in the field while also discussing the expansion and depth of the research topic. Reviewing the literature that is currently accessible on the relevant topics of the current study is relevant in order to identify the gaps in the research. The following papers were examined for this study in order to learn more about the research field and the state of the field.

Lakshamanan, R (2022) conducted a study to look at the results of veterinary journals published between 1986 and 2020 in the Scopus database. The information was found by searching a database of veterinary articles from journals published by Scopus for the term indicated by the author's h-index over the previous 34 years (1986-2020). For the study, a Scientometric analysis of 2333 veterinary research publications found in the Scopus database was done. According to the findings of a Scopus publishing analysis in the field of veterinary, the study demonstrates that the Tamil Nadu Veterinary and Animal Sciences University was talented and demonstrated a growth trend in recent years.

Mahala & Singh (2021) examined the research output of top Indian universities from 2015 to 2019, as reflected in the Web of Science (WOS) database. Science Citation Index (SCI) of WOS core collection database was used for selecting top Indian universities in terms of total publications in the last five years (2015–2019). The study identified the most prolific authors, collaborating countries, collaborating institutions and the impact of their output in terms of citations per paper (CPP) and relative citation impact (RCI). The study revealed how the science research output of top Indian universities has grown in the last few years. The study suggests usefulness of the findings for identifying specific science research areas where special attention can be given.

Beerkens, (2013) studied the impact of management on the output of scholarly research is empirically examined. According to the findings, management techniques do certainly appear to have a good impact on research production and this impact was shown in both the earlier (1995–2000) and later (2001–2007) time periods. Larivière *et al.*, (2012) carried out Bibliometric analysis of LIS literature produced over a century. In 2010, it was shown that more than 60% of LIS authors had produced work in other fields. Since 1990, citations from fields other than LIS have been included in LIS literature, notably management and computer science. Majhi, (2012) analyzed the growth and development of Physical Science Research in Sambalpur University in research publication as shown in SCOPUS database for the period of 1971-2010 and found that a total of 417 research papers were published by the researchers.

Gupta & Bala, (2011) based on the overall production of publications, their growth rate, the caliber of the papers released, and India's position in the global context, authors analyzed India's research efforts in medicine from 1999 to 2008. According to the study, India is the 12th most

productive country for medical research, producing 65,745 articles, with a global publishing share of 1.59% and a growth rate of 76.68% from 1999 to 2003 to 2004 to 2008.

Scope of the Study

The present study attempts to find out the publication pattern of Indian researchers in the field of knowledge management. The study aims to analyse quantitative dimensions of the growth and development of Knowledge

Management in India in terms of publication output as reflected in Scopus database during years 2004- 2023.

Methodology

The methodology adopted in this study is a quantitative analysis. Articles published by Indian authors during 2004 to 2023 were selected for analysis. Data for the sample selected for the study were extracted from the Scopus database. The extracted data was prepared for analysis using Excel and other tools. Then, the sample data was analyzed using R and Biblioshini and some other tools to achieve the research objectives. The following search query was used to extract data from Scopus; KEY ({Knowledge Management}) AND PUBYEAR > 2003 AND PUBYEAR < 2024 AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (AFFILCOUNTRY , "India")) AND (LIMIT-TO (PUBSTAGE , "final"))

Objectives of the Study

The main objective of the study is to explore the research trends and growth of literature of Knowledge management research in India analyzing the sample data on various features. The specific objectives are –

1. To find year wise growth of research publication in KM
2. To visualize the authorship pattern and collaboration trend
3. To determine the prolific authors and the productive Institutions/Organizations
4. To analyse the author keywords mostly used in publications in the Knowledge Management.
5. To see most cited publications
6. Subject Area-wise or Domain-wise Distribution

Findings and Discussions

During last 2 decades, a total no. of 862 articles were published by Indian authors with annual average growth rate of 18.27%. The highest no. of publication was come in year 2023, 97 articles. Fig.1 clearly describes that the publication growth rate was continuously increasing year by year since 2004.

The growth rate of the research literature of each year expresses in terms of relative growth rate (RGR), it's widely used to quantify the pace of publications each year. Also used Doubling time (Dt) to know the time to double the publication.

Relative Growth Rate (RGR) = $\ln W_2 - \ln W_1 / T_2 - T_1$

$\ln W_2$ = log of the final number of articles in a specific period of interval

$\ln W_1$ = log of the initial number of articles.

T_2 - upper limit time interval,

T_1 - lower limit time interval,

Doubling timing (Dt.) = $0.693 / RGR$

TABLE I

2004	4
2005	6
2006	8
2007	24
2008	32
2009	27
2010	27
2011	39
2012	35
2013	21
2014	42
2015	33
2016	45
2017	45
2018	53
2019	84
2020	77
2021	67
2022	96
2023	97
Total:	862

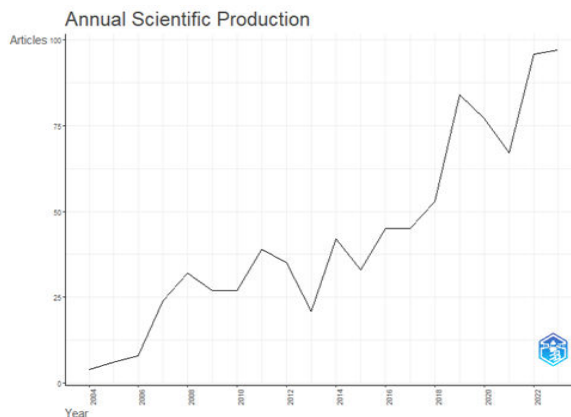


Fig.1 Year Wise Research Publication

Table II calculates the Relative Growth Rate (RGR) and Doubling time (Dt) of publications on knowledge management. Each four year publication combined in one block period, and total five block year period set up to analyse and interpret the sample data. The 2020-2023 block period has

marked highest RGR i.e., 0.233 and block year 2008-2011 has highest doubling time 9.55. (Dt). Mean value of Relative Growth Rate and doubling time is 0.18 and 4.8 respectively.

TABLE II RELATIVE GROWTH RATE AND DOUBLING TIME

Time Interval	No. of Publications	Cumulative No.	lnW1	lnW2	RGR	Mean RGR	Dt	Mean Dt
2004-2007	42	42	3.73	3.73	0			
2008-2011	125	167	4.82	5.11	0.073		9.55	
2012-2015	131	298	4.87	5.69	0.205	0.18	3.38	4.8
2016-2019	227	525	5.42	6.26	0.21		3.3	
2020-2023	337	862	5.82	6.75	0.233		2.98	

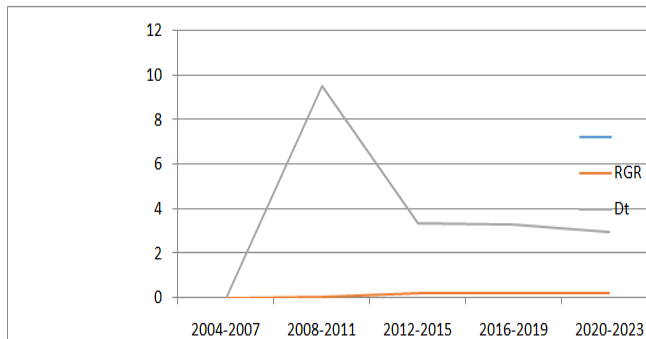


Fig.2 Relative growth rate and doubling time

TABLE III SUBJECT WISE DISTRIBUTION

Subject	Articles
Business, Management and Accounting	391
Computer Science	384
Engineering	206
Social Sciences	201
Decision Sciences	118
Mathematics	55
Medicine	38
Energy	30
Environmental Science	28
Economics, Econometrics and Finance	25
Psychology	24
Pharmacology, Toxicology and Pharmaceutics	19
Materials Science	19
Arts and Humanities	18
Agricultural and Biological Sciences	16
Physics and Astronomy	14
Multidisciplinary	14
Biochemistry, Genetics and Molecular Biology	14

Earth and Planetary Sciences	11
Chemical Engineering	10

Table III shows that Business management & accounting (391), Computer Science (384), Engineering (206), Decision science (118), and Social science (201) are the prevalent subject areas where the KM research is very high.

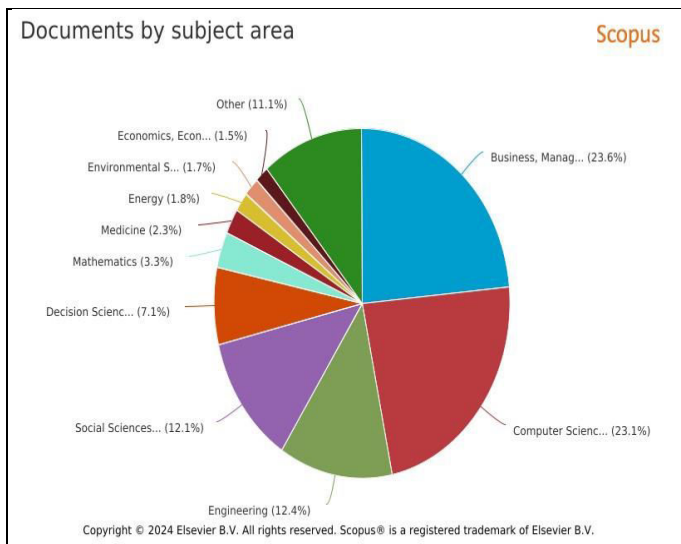


Fig. 2 Subject Wise Distribution

TABLE IV AUTHORSHIP PATTERN

No. of Authors	Article	%
1	107	12.38426
2	352	40.74074
3	190	21.99074
4	115	13.31019
5	53	6.134259
6	19	2.199074
7	6	0.694444
8	6	0.694444
9	2	0.231481
10	4	0.462963
more than 10	10	1.157407
Total	864	100

Fig.3 is displaying that more than 87% of publications came in joint authorship. Nearly 21 % of articles are written by more than three authors. Most of the publications are published in double authorship, 352 articles, 40% of total publication, 107 articles (12%) were published by single author. Degree of Collaboration (DC) is 0.88 which is significant.

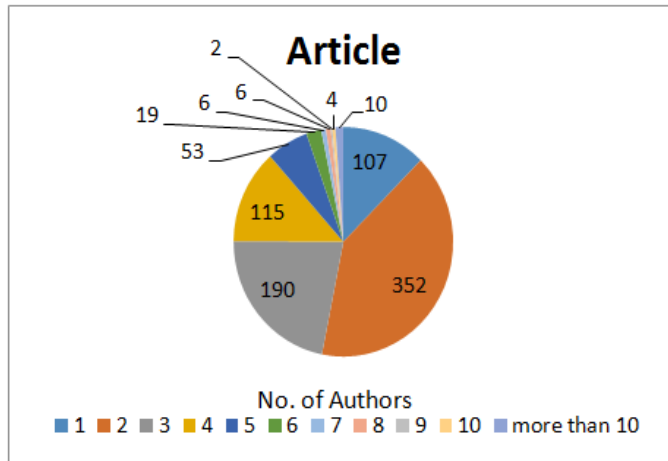


Fig.3 Authorship pattern

The degree of collaboration is a measure of the collaborative research pattern; it is defined as the ratio of the number of collaborative research publications to the total number of research publications in the subject within a given period.

$$\text{Degree of Collaboration (DC)} = \frac{N_m}{(N_m + N_s)}$$

N_m = No. of Multi author Publication

N_s = No. of Single Author T

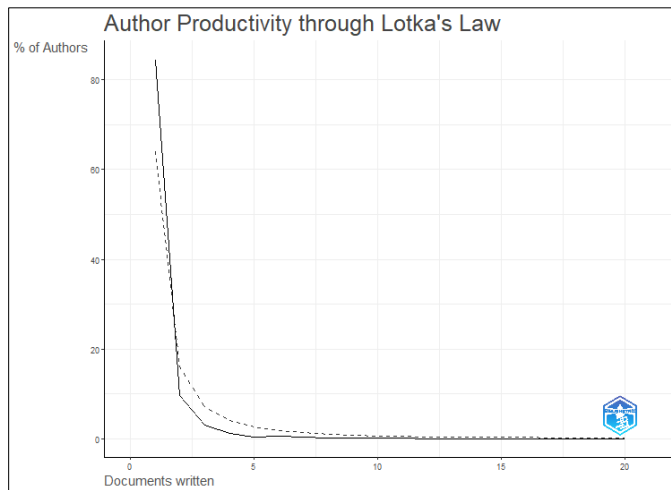


Fig.4 Degree of Collaboration (DC) = $757/864=0.88$

Fig.5 shows that IITs, IIMs, and NITs contributed more than the other institutions, VIT University also published a significant numbers of papers on KM.

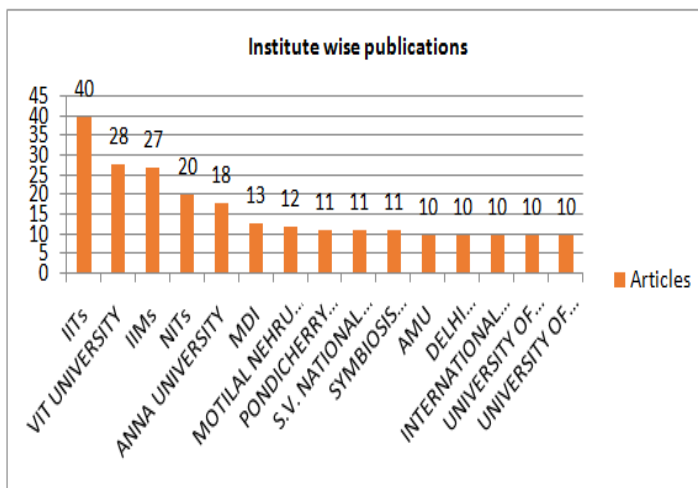


Fig. 5 Most Productive Institutions in India

Table V indicates that the word ‘Knowledge Management’ is mostly used as Keyword in sample publication data. The table consists only those keywords occurring minimum 25 times in the publications. ‘Knowledge based system’, ‘decision making’, ‘knowledge sharing’, ‘deep learning’, ‘learning system’ are also the most occurring keywords in KM research in India.

TABLE V MOST FREQUENTLY USED KEYWORDS

Words	Occurrences
knowledge management	450
Human	50
knowledge based systems	49
decision making	48
knowledge-sharing	47
deep learning	40
design/methodology/approach	38
learning systems	33
Female	31
knowledge transfer	27
Adult	26
human resource management	25
Knowledge	25
Surveys	25

The network presentation is created by VOS viewer using the .csv files of sample data, showing the keywords network.

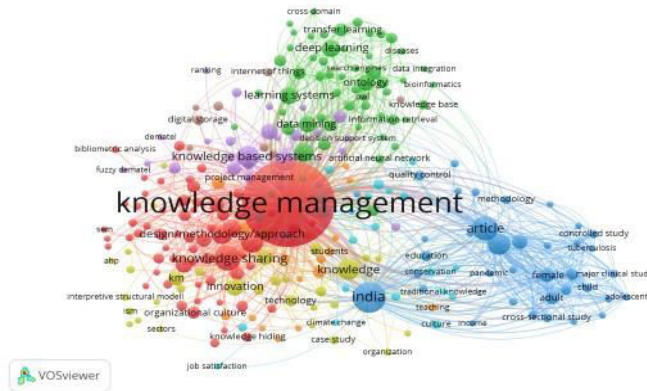


Fig.6 Keywords network

Table VI indicates that Patil SK is most cited authors with normalized TC 16.45 and TC per year 28.73.

TABLE VII MOST CITED AUTHORS (TOP 10)

Paper	Total Citations	TC per Year	Normalized TC
PATIL SK, 2014, EXPERT SYS APPL	316	28.73	16.45
SINGH MD, 2008, INT J MANAGE SCI ENG MANAGE	311	18.29	11.47
USORO A, 2007, KNOWL MANAGE RES PRACT	210	11.67	8.44
SINGH SK, 2008, J KNOWL MANAG	206	12.12	7.59
KUMAR JHA J, 2018, J KNOWL MANAG	151	21.57	8.58
ACHARYA A, 2018, INT J INF MANAGE	141	20.14	8.01
KUMAR JA, 2009, J KNOWL MANAGE	135	8.44	5.44
DABRE R, 2020, ACM COMPUT SURV	130	26.00	8.32
RANI M, 2015, KNOWL BASED SYST	123	12.30	6.05
PAL M, 2009, HYDROL PROCESSES	122	7.63	4.92

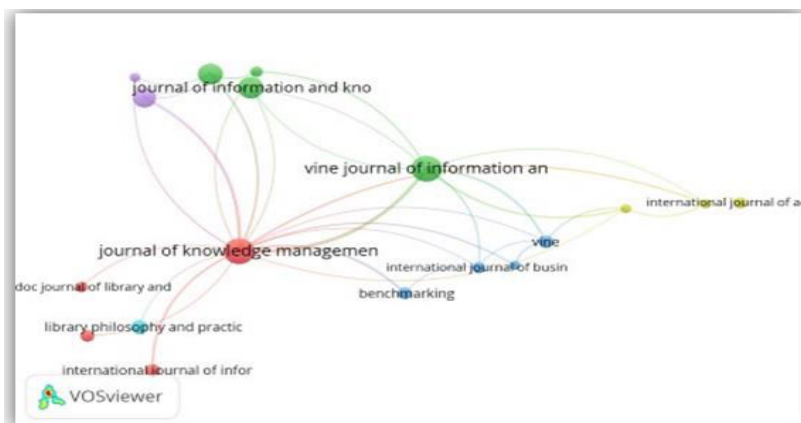


Fig.7 Most Cited journals

Conclusion

This study has examined and analyzed Indian research in knowledge management literature indexed in Scopus database from 1960 to 2017. The paper has reported the growth of knowledge management research, frequency of keywords and subject terms, level of productivity institutions, and most cited authors & publications. The major findings are;

1. The research productivity of knowledge management in India has grown significantly with annual growth rate of 18.27%. Year 2023, topped with 97 articles in one year. Relative Growth rate (RGR) and Doubling time (Dt) is 0.18 and 4.8 respectively.
2. Most of the articles were published in Business Management and Computer Science subject area.
3. Nearly 21% of articles are written by more than three authors, and 60% by more than one author, witness the strong co-authorship pattern in KM research. Degree of Collaboration is 0.88 which represents the good co-authorship works.
4. IITS, IIMs and NITs have contributed more in KM research in India.
5. 'Knowledge Management', 'Knowledge based system', 'decision making', 'knowledge sharing', 'deep learning', 'learning system' is also the most occurring keywords in KM research. Majority of KM documents are indexed under these terms.

The outcome of the study may help the researcher to provide the research trends and productivity of KM research in India. This study shows that the publication growth trend of authorship patterns has been very positive, with joint authorship patterns found in these publications, and high-quality sources of publication. The citations received by authors indicate that publications on this topic are highly cited, which is significant and encouraging to the researchers. There are much visibility and impact of the research work has published during the last 20 years on KM in India. Total 11605 citation received globally by 864 articles selected for the study, indicates that the research on KM is a burning topic for researchers around the world.

Results of this study suggest that research in KM is growing year by year in India with doubling time 4.8 units which is significant. The Indian academic institution may give more speed to the study of KM and contribute more to the discipline/area. This paper will be a point of reference for identifying and evaluating journal quality and most productive author in communicating high-quality research work in KM.

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A Bibliometric Study: Journal of Scientometric Research from 2012 to 2015

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Abstract

“Journal of Scientometric Research” is one of the premier journals of scientometric analysis of innovation studies such as sociology, economics, library and information science or any other field being published on triannual basis, and official publication of Phocog.Net. This paper presents bibliometric analysis of “Journal of Scientometric Research” from 2012 to 2015. The present Bibliometric analysis was carried on 78 research articles published in “Journal of Scientometric Research” during the year of 2012 to 2015. The analysis covers various parameters like year wise distribution, issue -wise distribution of papers, institute-wise distribution, country – wise distribution, state – wise distribution, citation analysis, ranking of journals etc. The study highlights that most of the contributions of this journal are contributed by double authorship pattern and country wise distribution reveals that the most of the contributions from India. Citation analysis of 1580 citations includes finding out the average number of citations per contribution, types of publications cited and preparing of ranked list five most cited journals in contributions of this journal. The study is perceived that “journals” are the most cited publication and “Scientometrics” is the most cited journal in the contributions of “Journal of Scientometric Research”.

Keywords: Bibliometric, Citation analysis, Journals, Scientometrics, Journal of Scientometric Research, Nature, Library, Articles, Citation, journal of American society for information science and technology.

Introduction

Bibliometric is considered as an interdisciplinary or multidisciplinary subject. It is a branch of information science and its practical applications help to evaluations of library operations and services such as research trends in subject, in authorship, author productivity, the impact of a particular paper and collaboration in research. It is the emerging and most frequently used quantitative research.

It is a statistical and mathematical study of various bibliographical features of books, journals, various research articles and other publication. Citation analysis is commonly used a bibliometric method to identify the citations cited by various articles contributed in it. Bibliometric methods have been used to identify relationship amongst journal citations. And Scientometric is the sub field of bibliometric study. Scientometric study helps in measuring and analyzing the scientific literature.

“Journal of Scientometric Research” has been published peer reviewed articles online in an open access format. The “Journal of Scientometric Research” are published various current and new generated ideas related with scientometric analysis in policy or innovation studies such as sociology, economics, library and information science or any other field.

The journal is indexed by Emerging Source Citation Index, and Directory of Open Access Journal (DOAJ). "Journal of Scientometric Research" has been published from 2012 on triannual basis, and official publication of Phocog.Net.

Review of Literature

Lalthlenglina and Shukla (2008) discussed about the bibliometric aspects of publication of "CALIBER convention 2008" held at Allahabad. This paper covered 76 articles published in the proceedings of CALIBER 2008. The study comprised to evaluate the themes and sub themes of the conference, authorship pattern, degree of collaboration, state wise and country wise geographical distribution of papers and top cited LIS journals. The study found the Library Hi-Tech News as the top cited journal of the field.

Thanuskoli (2010) conducted a bibliometric study on the "Journal of Social Sciences" from the year 2003 to 2007. The analysis covered mainly the number of articles, authorship pattern, subject wise distribution of articles, average number of references per articles, forms of documents cited, year wise distribution of cited journal etc. The studies found that maximum number of contributions were two authors and most of the authors contributed from foreign country.

Thanuskoli (2011) conducted a bibliometric study of the Journal titled "Library Herald" for the period during 2006 to 2010. The analysis covered mainly the number of articles, authorship pattern, subject wise distribution of articles, average number of references per articles, forms of documents cited, year wise distribution of cited journal etc. The result revealed that most of the contributions were from India and highest contribution by joint authors.

Bansal (2013) conducted a bibliometric study on "DESIDOC Journal of Library & Information Technology" to assessed the pattern of growth, pattern of authorship, geographic distributions of output and citation analysis of the references attached to the papers and change in them over two different periods. The maximum numbers of contributions were joint collaborations. Panda, Maharana and Chhatar (2013) analyzed publication and citation patterns in the "Journal of Information Literacy" an open access journal from 2007 to 2012. The study found that almost all papers were from academic institutions and a very few papers were from non- academic institute. The citations demonstrated that individual research had much higher than collaborative research. Singh and Mishra (2013) conducted a bibliometric study on the Journal entitled "IASLIC Bulletin" published during 2004 to 2010 with 258 contributions. The analysis covered authorship pattern, institution wise distribution of articles, state wise distribution of contributions, length of articles etc. From that analysis it is found that state wise distribution of West Bengal had the highest contributions.

Chandra (2014) conducted a bibliometric study on "IASLIC BULLETIN" during the period of 1999 to 2008 for 10 years. The aim of this paper was to assess the studies of authorship pattern, length of volumes and numbers, distribution of illustration used in the contributions concerned and state wise distribution of contribution. Garg and Bebi (2014) conducted a bibliometrics study of "Annals of Library and Information Studies" and "DESIDOC Journal of Library and Information Technology" during 2010 to 2013. The result showed that "DESIDOC Journal of Library and Information Technology" published more papers and more citations than "Annals of Library and Information Studies".

Koley and Sen (2014) conducted a bibliometric study of "Institution of Electronics and Telecommunication Engineers" for the period 2008 to 2012. The results showed that average number of articles published per volumes is 60 and the highest ratio of single and multiple author is 1: 11.

Shukla and Moyon (2017) studied a bibliometric analysis of open access LIS journal for five years from 2011 to 2015. The paper analyzed a total number of 218 articles re published and examination for distribution of articles, authorship pattern, and geographical distribution of articles had been done and conclusions from the study had been drawn from that journal prevalent two authorship patterns with degree of collaboration, India as top most contributor of the articles and amongst foreign countries.

Objectives of the Study

The objectives of the study are:

1. To find out the number of articles published in the journal during 2012 to 2015.
2. To examine the issue and year wise distribution of articles.
3. To identify the institution wise contributions of authors.
4. To determine the average numbers of references per article.
5. To find out the forms of cited document.
6. To determine country and state wise distribution of contributions of articles.
7. To rank the cited journals.

Methodology and Limitation of the Study

The present study has been designed to investigate the research contributions of “Journal of Scientometric Research”. The study is quantitative study. The articles have been received from the articles to assess the research contribution of scientometric analysis of innovation studies such as sociology, economics, library and information science or any other field. The journal has been official publication of Phocog.Net. The collected data was classified, tabulated, presented, analysed by using MS -Excel in terms of year of publication, authorship pattern, country wise contribution etc.

Data Analysis

In this study, the process of data analysis started with the collection of data from official website “Journal of Scientometric Research”. The raw data have been entered in MS- Excel sheet for analysis. The analyzed data are interpreted with the help of text, tables. From the analysis and interpretation, results of the study can be drawn.

Table I presents total numbers of articles published in the 4 volumes of period from 2012 to 2015 in the “Journal of Scientometric Research”. Table I shows that in the year 2013 has the highest contribution of articles with 29 (37.18%) out of the 78 articles, followed by Volume 4 with 22 (28.20%) contribution of articles. Again, Volume 3 with 18 (23.08%) contribution of articles. Likewise, Volume 1 in the year 2012 has the lowest contribution of articles with 9 (11.54%) respectively.

TABLE I YEAR WISE DISTRIBUTION OF ARTICLES

Year	Vol. No.	No. of contribution	Percentage
2012	1	9	11.54
2013	2	29	37.18
2014	3	18	23.08

2015	4	22	28.20
Total	-	78	100

Table II displays the issue wise publications of the 4 volumes with a total number of 78 articles. Here, it is seen that in the month of September to December has the highest publication with 32 (41.03%) of contributions which is followed by May to August with 25 (32.05%) and in the month of January to April has the lowest contributions with 21 (26.92%) of articles.

TABLE II ISSUE WISE DISTRIBUTION OF ARTICLES

Issue (Month)	Vol. No. (1)	Vol. No. (2)	Vol. No. (3)	Vol. No. (4)	Total	Percentage	Cumulative Frequency
January- April		8	7	6	21	26.92	21 (26.92)
May- August		12	5	8	25	32.05	46 (58.97)
September- December	9	9	6	8	32	41.03	78 (100)
Total	9	29	18	22	78	100	78 (100)

Table III shows that the authorship pattern of research articles during the period of 2012 to 2015 in the “Journal of Scientometric Research”. Table III highlights that two authors with (34.62%) are having the highest contributions of the journal. Next rank occupied by three authors with 24 constituting 30.77%. Likewise, 28.20% of articles contribute by one author. Again, 6.41% of articles contribute by four authors respectively.

TABLE III AUTHORSHIP PATTERN OF CONTRIBUTION

Author Type	2012	2013	2014	2015	Total	Percentage	Cumulative Frequency
One author	5	11	3	3	22	28.20	22 (28.20)
Two	2	7	6	12	27	34.62	49 (62.82)
Three	2	10	7	5	24	30.77	73 (93.59)
Four	-	1	2	2	5	6.41	78 (100)
Total	9	29	18	22	78	100	78 (100)

Table IV presents the institution wise distribution of contributions. It is clearly evident from table 4, Bhabha Atomic Research Center, Mumbai is on top having the highest number of contributions, i.e. 12 research articles out of total 78 research articles received by all journals, followed by Dalian University of Technology ranks second with 10 contributions. CSIR-National Institute of Science Technology and Development Studies is contributing 8 research articles and occupying the third rank in the list. The fourth rank is occupied by Jawaharlal Nehru University of India contributing 7 research articles. On the other hand, Sri Venkateshwar University is on fifth rank contributing 5 research articles respectively.

Table V highlights the country wise distribution of contributions in the four volumes of the journal. Out of 78 contributions, the highest number i.e. (47.62%) has been contributed by India. Similarly,

Iran, Brazil, China are on second place having 6.55 % of contributions. Likewise, Turkey is on third place having 5.95% of contributions. Similarly, USA and Netherlands are on fourth place having 4.76% of contributions.

TABLE IV INSTITUTION WISE DISTRIBUTION OF CONTRIBUTIONS

S. No.	Institution name	No. of contributions
1	Bhabha Atomic Research Center, Mumbai,	12
2	Dalian University of Technology	10
3	CSIR-National Institute of Science Technology and Development Studies	8
4	Jawaharlal Nehru University	7
5	Sri Venkateshwar University	5

TABLE V COUNTRY WISE DISTRIBUTION OF CONTRIBUTIONS

Country	2012	2013	2014	2015	Total	Percentage
India	8	28	21	23	80	47.62
USA	1	4	1	2	8	4.76
Belguim	1	1	1	-	3	1.79
China	1	-	6	4	11	6.55
Austria	3	-	-	-	3	1.79
Brazil	1	4	6	-	11	6.55
Netherlands	3	4	-	1	8	4.76
Poland	-	2	-	1	3	1.79
Turkey	-	4	1	5	10	5.95
Iran	-	9	-	2	11	6.55
Germany	-	1	1	-	2	1.19
Greece	-	-	2	-	2	1.19
Israel	-	-	2	-	2	1.19
South Africa	-	-	1	-	1	0.59
Spain	-	-	2	-	2	1.19
Mexico	-	-	-	1	1	0.59
France	-	-	-	3	3	1.79
Fiji	-	-	-	1	1	0.59

United Kingdom	-	-	-	4	4	2.38
Finland	-	-	-	2	2	1.19
Total	18	57	44	48	168	100

On the contrary, United Kingdom is on fifth place having 2.38% of contributions. Similarly, Belgium, Austria, France and Poland are on sixth place having 1.79% of contributions. Likewise, Germany, Greece, Spain, Finland and Israel are on seventh place having 1.19% of contributions. On the other hand, the lowest contributions of authors are from South Africa, Fiji and Mexico having 0.59% contributions respectively.

Table VI highlights that the state wise distribution of authors from India in “Journal of Scientometric Research”. From table VI, it is seen that, total 12 states of India has contributed in this journal, among which New Delhi, capital of the country highest contributions with 47.50%. The analysis shows that New Delhi scored first rank and Uttar Pradesh is on second rank having 21.25% of contributions.

Similarly, Himachal Pradesh, Haryana, Kerala and Andhra Pradesh are on third rank with 16.25% of contributions. Likewise, Maharashtra is with 12.50% of contributions. On the contrary, Tamil Nadu is with 6.25% of contributions. Similarly, Karnataka is with 5.00% of contributions. Likewise, Madhya Pradesh is with 2.50% of contributions. On the other hand, lowest contributions of authors are from Lucknow, and West Bengal having 1.25% of contributions respectively.

TABLE VI STATE WISE DISTRIBUTION OF AUTHORS

Country	2012	2013	2014	2015	Total	Percentage
New Delhi	8	10	7	13	38	47.50
Maharashtra	-	7	3	-	10	12.50
Himachal Pradesh	-	3	-	-	3	16.25
Uttar Pradesh	-	2	3	2	7	21.25
Lucknow		1	-	-	1	1.25
Haryana	-	1	2	-	3	16.25
Kerala	-	1	-	2	3	16.25
Tamil Nadu	-	3	-	2	5	6.25
Karnataka	-	-	4	-	4	5.00
Madhya Pradesh	-	-	2	-	2	2.50
West Bengal	-	-	-	1	1	1.25
Andhra Pradesh	-	-	-	3	3	16.25
Total	8	28	21	23	80	100

Table VII indicates the 4 volumes have 1580 citations appended to the 78 articles. Out of 1580 citations, Volume 2 has the highest number i.e., 550 (34.81%) of citations, followed by Volume 4 with 541 (34.24%) and Volume 3 with 283 (17.91%) of citations. On the other hand, volume 1 has the lowest number i.e.206 (13.04%) of citations respectively.

TABLE VII REFERENCES PER VOLUME

Years	Volumes	No. of articles	No of references	Percentage	Cumulative References
2012	1	9	206	13.04	206 (13.04)
2013	2	29	550	34.81	756 (47.85)
2014	3	18	283	17.91	1039 (65.76)
2015	4	22	541	34.24	1580 (100)
Total	-	78	1580	100	

Table VIII shows the single author and multi author contributions. It shows that one author is highly cited with 40.95% in the journal. It is followed by more than two authors cited with 28.23%. Similarly, two authors cited with 25.19%. On the other hand, there were only 5.63% of publications cited from association respectively.

TABLE VIII AUTHORSHIP PATTERN OF CITED ARTICLES

Authorship pattern	2012	2013	2014	2015	Total	Percentage
One author	74	222	135	216	647	40.95
Two authors	51	140	59	148	398	25.19
More than two author	56	165	66	159	446	28.23
Association	25	23	23	18	89	5.63
Total	206	550	283	541	1580	100

TABLE IX FORMS OF CITED DOCUMENTS

Cited documents	2012	2013	2014	2015	Total	Percentage
Journals	144	297	188	431	1060	67.09
Books	22	152	45	66	285	18.04
References	1	3	0	0	4	0.25
Conference proceedings/seminars	6	26	11	16	59	3.73
Web resources	13	49	23	13	98	6.20
Research papers/reports	19	22	12	11	64	4.05
These/dissertations	1	0	4	4	9	0.57

Unpublished manuscript	0	1	0	0	1	0.07
Total	206	550	283	541	1580	100

Table IX presents the 4 volumes have 1580 citations appended to the 78 articles. Here, it is seen that Journals (67.09%) are cited by highest authors. Similarly, books 18.04% are cited by authors. Likewise, web resources 6.20% are cited by authors, followed by research reports/papers 4.05%, conference proceedings/seminars 3.73%, thesis/ dissertations 0.57%, references 0.25%, and unpublished manuscript (0.07%) are cited by authors respectively.

Table X shows the ranking of journals. It is clear from table 10, the journal “Scientometrics” is on top having the highest number of citations, i.e. 166 citations out of total 1580 citations received by all journals, followed by the “Journal of American society for information science and technology” ranks second with 35 citations. “Journal of Informatics” is having 26 citations and occupying the third rank in the list. The fourth rank is occupied by “DESIDOC Journal of Library & Information Technology” having 22 citations. On the other hand, “Nature” is on fifth rank having 20 citations respectively.

TABLE X RANKING ORDER OF TOP MOST FIVE CITED JOURNALS

Journals	Total no. of citations	Rank
Scientometrics	166	First
Journal of American society for information science and technology	35	Second
Journal of Informatics	26	Third
DESIDOC Journal of Library & Information Technology	22	Fourth
Nature	20	Fifth

Major Findings of the Study

1. Highest contribution of articles in the year 2013 with 29 (37.18%) out of the 78 research articles.
2. Highest publication in the month of September to December during this period with 32 (41.03%) of contributions.
3. Majority of the articles two authors with (34.62%) is having the highest contributions of the journal.
4. Highest number i.e. (47.62%) has been contributed by country India.
5. Highest number i.e. (47.50%) has been contributed by state New Delhi of India.
6. Highest number of citations Volume 2 with 550 (34.81%) of citations and volume 1 has the lowest number i.e. 206 (13.04%) of citations respectively.
7. One author is highly cited with (40.95%) in the journal.
8. Journals (67.09%) are cited by highest authors.
9. Journal “Scientometrics” occupied first rank having highest number of citations, i.e. 166 citations and “Journal of American society for information science and technology” occupied second rank with 35 citations in the ranked list of articles in the journal.

Conclusion

Bibliometric studies have become the most popular recent research topic in the field of Library and Information Science. It helps in bibliographic control, preparation of retrospective

bibliography and for library management. Advertising in the social networking sites can be undertaken to make popular amongst the states of India and internationally so that new upcoming researcher contributed their research paper with their updated knowledge and importance of publishing research articles in the journal. This journal needs publicity to improve its international visibility and acceptance.

The study has signified an actual picture of “Journal of Scientometric Research” as it is the most relevant and the best quality journal of scientometric analysis of innovation studies such as sociology, economics, library and information science or any other field. It is expected that “Journal of Scientometric Research” will further improve its importance in the days ahead as it has gradually sponsored its quality through its global readership.

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A Bibliometric Analysis of the Science Research Output of the University of Kashmir during 2015-2020

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Abstract

The present study aims to trace out the Science research output of University of Kashmir from 2015 to 2020, as reflected in the Web of Science (WOS) database. The present study has selected the Science Citation Index (SCI) of WOS core collection for selecting university in terms of total publications in the last 6 years (2015–2020). The study attempt to examines the content of papers published, including the annual average growth rate percent, authorship pattern, degree of collaboration, distribution of citations, organizational affiliation of papers. For visualizing purposes, VOS viewer was used.

Keywords: Bibliometric anlysis, University of Kashmir

Introduction

Universities are essential to a nation's research and development. Scientific progress, technological advancements and development is the backbone of a society. New and original scientific research is open to the scientific community through publications. The reports that are read and used by the scientific community at large, reflects the intellectual capacity and the collective research potential of a society to look into the issues facing the world. Universities worldwide exist to generate advance human knowledge through research efforts of their departments and laboratories.

The countries which want to evolve as knowledge economies should focus on creating, disseminating and preserving knowledge. There are several methods of evaluation, but the most widely acclaimed metric procedure to characterize the scientific literature is bibliometrics, which analyses the quantification of science, its communication, and scientific policy (Milojevic& Leydesdorff, 2013). A Bibliometric analysis is an essential tool used by the administrators, funding agencies, government, and researchers to know the publication trend on a topic, institution, author and journaletc.

Traditionally, Bibliometrics is known as “the measurement of patterns in written communication (Broadus,1987). However, it involves not only the characterization of publications and citations but also the evaluation of variables that include the number of scientific publications and citations that each author, research group, or institution has over time. Bibliometric analysis can also be used to understand the nature and complexity of research activities and their characteristics (Aswathy&Gopikuttan,2013). It is also employed for quantification and assessment of the research output of researchers, research institutions, and that of contributing countries and the results of such studies are used for ranking, awarding, budgeting, and defining research priorities (Mohammad et.al, 2011). These methods are also used to appraise the impact or perceived merit of journals, and that of articles, researchers, institutions and subjects.

Bibliometric study is used as an “instrument in the collection building strategy by providing the precise and much needed information to the administrators to take the right decision in right time as to what documents they should select and what documents they should discard from the existing collections of their respective libraries.” Bibliometrics is an examination strategy utilized

in library and information science. “It is a quantitative study of different parts of literature on a point and is utilized to distinguish the example of distribution, authorship, and auxiliary journal inclusion to pick up understanding into the elements of development of learning in the areas under thought. This can prompt better association of information resources, which is basic for successful and productive use. Bibliometrics has accomplished refinement and intricacy with a national, global, and interdisciplinary character (Thanuskodi, 2010). The largest union territory in India is Jammu and Kashmir, which has 1.30 crore people living there. It has a strong history of academic excellence, with 320 colleges connected with Jammu and Kashmir's universities, as well as 12 central and state universities. One would assume that the region would have enough scientific output for bibliometric analysis and that it would be standard practice to evaluate the academic output of research given the region's diverse higher educational system.

The present study aims to trace out the Science research output of University of Kashmir from 2015 to 2020, as reflected in the Web of Science (WOS) database. The present study has selected the Science Citation Index (SCI) of WOS core collection for selecting university in terms of total publications in the last 6 years (2015–2020). The study attempt to examines the content of papers published, including the annual average growth rate percent, authorship pattern, degree of collaboration, distribution of citations, organizational affiliation of papers. For visualizing purposes, VOS viewer was used.

University of Kashmir: A Brief Profile

The University of Jammu and Kashmir was founded in the year 1948. In the year 1969 it was bifurcated into two full-fledged Universities: University of Kashmir at Srinagar and University of Jammu at Jammu. The University of Kashmir is situated at Hazratbal in Srinagar. It is flanked by the world-famous Dal Lake on its eastern side and Nigeen Lake on the western side. The Main Campus of the University spread over 247 acres of land is divided into three parts – Hazratbal Campus, Naseem Bagh Campus and Mirza Bagh Campus (serving residential purpose). Additional land has been acquired at Zakura near the main campus for further expansion of the University. The tranquil ambience of the Campus provides the right kind of atmosphere for serious study and research.

Over the Years University of Kashmir has expanded substantially. It has established Satellite Campuses at Anantnag (South Campus), Baramulla (North Campus) and Kupwara (Kupwara Campus) to make higher education more accessible to people living in remote areas of Kashmir valley. The University has also established a Sub-Office at Jammu to cater to the needs of the candidates enrolled with the University from outside Kashmir.

The University is committed to provide an intellectually stimulating environment for productive learning to enhance the educational, economic, scientific, business and cultural environment of the region. The University offers programmes in all the major faculties; Arts, Business & Management Studies, Education, Law, Applied Sciences & Technology, Biological Sciences, Physical & Material Sciences, Social Sciences, Medicine, Dentistry, Engineering, Oriental Learning and Music & Fine Arts. It has been constantly introducing innovative/ new programmes to cater to the needs and demands of the students and the society.

Over the years, the University has marched towards excellence in its programmes and activities. It has been re-accredited as Grade-A+ University by the National Assessment & Accreditation Council (NAAC) of India. This is recognition and reflection of the high standard of quality in teaching and research at the University of Kashmir.

Review of Literature and Research Gap

Numerous quantitative studies based on bibliometric methods have been published to assess the research output of certain people, institutions, nations, etc. Studies are also available to confirm the applicability of established bibliometric laws, productivity variables, and the effects of research carried out in various nations. These studies are particularly beneficial for evaluating scientific advancements as well as their application to the administration of library and information resources. Recent years have seen a rise in the use of Bibliometric and Scientometric tools for evaluating scientific research. The results of these studies contribute to increasing the exposure of institutions, trends in their research output, research collaboration, etc., and as a result, funding agencies step forward to support their research. Keeping this perspective in mind the present study has been carried out. A good quantity of literature in India as well as abroad on bibliometric analysis of research is available. Such research has been reviewed as under:

Singh (2022) analysed research the performance of all the three generations of IIMs on a wide range of parameters such as open access profile of research, the social media visibility of research, thematic areas of research and gender distribution of research by retrieving records from Scopus. the study mainly focuses on quantitative analysis to uncover the relevant bibliometric patterns which need to be used as input by a systematic qualitative analysis to better understand the probable reasons behind the observed patterns.

Garg & Rahul (2022) used “Citation per Paper (CPP), i-10 index, the citation pattern of the published articles, the identification of highly cited papers, and the pattern of domestic and international collaboration” to analyses 699 papers published in Library & Information Science Research between 1994 and 2020. Although the USA had a low CPP over the period compared to Norway and Finland, the study revealed that it did. The most attention was paid to the field of Scientometric evaluation of countries and institutions.

Nisha et. al (2022) conduct bibliometric analysis of the top 100 most cited studies in the discipline of Library and Information Science using SSCI. This study will aid librarians in locating publications that have made significant contributions to the fields of information and library science. It will help in identifying highly cited papers over the previous 21 years. The results of this investigation demonstrated the distribution of research output among nations has been found to be asymmetrical, which suggests that papers published in this publication will receive more attention and have an impact on forthcoming studies.

Shriram & Dinesh (2022) based on the Scopus database, top-ranked journals like Nature and Science were among the 32 journals that ‘Eugene Garfield's’ 50 highly cited papers were published in study from 2022. They suggested that future studies could focus on qualitative assessments of these papers, particularly seminal ones, using the h-index as a parameter. These foundational works might benefit from a thorough study and meta-analysis to better understand the co-occurrence network of concepts, keywords, and other terms. This study uses a variety of approaches and analyses, such as co-authorship analysis, co-citation of keywords, coupling of bibliographies, and many others.

Das (2021) On Indian physics and astronomy, looked at a review of 159 bibliometric works. They found that existing research subjects and themes of astronomy and physics are hardly selected for the Bibliometric studies. they found that both facets of bibliometrics like astronomy and physics as tool and subject need to be focused as per the requirement and relevance of time. There is large

scope for bibliometric research using recent topics on the emerging and modern areas of physics field.

Gupta (2021) examined the various parameters of research productivity of the University of Jammu. The annual growth rate of the University of Jammu is continuously increasing from 2010 to 2019. The researchers from different disciplines of the University contribute research papers to enhance the research productivity of the University of Jammu. Sonkar et.al (2021) examined the science research output from nine central Indian institutions between 2011 and 2020. The study identified many writing skills and channels of communication behind the increased research output. The researchers in India lack proficiency in English language and so that they fail to get published in the core journals. The researchers need to be trained in writing the quality research papers in English language medium.

Mahala (2021) conducted a Bibliometric study on the topic research output of Indian universities in sciences subjects using a Scientometric analysis by retrieving 26,173 records from the data source tool web of science and Scopus. The study reflected that multi-authored papers have more research impact and output in terms of citation received. The study revealed the science research output of top Indian universities has grown in the last few years. They identified some discipline of science where special attention should be given. Mayta- Tovalino (2021) conducted a retrospective study of Bibliometric analysis of the national scholarly output of all Dental Schools of Peru by using Scopus database. It was concluded that there was a prominent increase in scientific production in Public as well as in Private Dental schools of Peru. The most factors such as economic incentives for publication, improvements of infrastructure with IT and the hiring of teachers with a research profile could enhance scientific production, the quality of education and national scientific production.

Pandya et.al (2021) analysed that there is a large growth in scholarly publication during the period 2010-2019. The trend of collective and joint research is increasing among the scholars and scientists in majority of the concerned fields. However, there are new subject fields where the amount of research is very insignificant. Therefore it is recommended that the researchers of the universities should give equal emphasis to all the subject fields and should carry out more research work in the less worked subject areas. The stream includes social science and Humanities like Demography, Gender studies, international relations, public administration, Education, Law, Political science, Transportation, and Urban studies etc.

Garg (2021) made a bibliometric analysis of 1,698 papers published in "DESIDOC Journal of Library and Information Technology" during 1992-2019 of 28 years based on complete count. The study found that 1,698 papers and articles were contributed by 39 countries. Among all of these, maximum contributions were made by Indian authors. However, in USA the papers published had the maximum impact as reflected by the values of citation per paper (CPP) and relative citation impact. Rahaman (2021) in Peer-reviewed, A LIS TODAY analyses the scientific research output of Jadavpur University using the SCOPUS database for the study period from 2002 to 2021 based on following parameters; 'document-wise distribution of the publication, Collaborative indices, authorship pattern, the most preferred journals, times series analysis and Bradford's law of test'. The Journal articles are the most preferred form of publication type of documents used by the Jadavpur University. Time series analysis calculation showed that there is a positive growth in the research output and productivity of Jadavpur University publications.

Bapte (2020) examine the international research output on an information literacy on the basis of data retrieved from SCOPUS based database from 1975 to 2019. In information literacy, a Scientometric assessment of global research output 'Communication in the Computer and

Information Science' was found to be leading journal and 'Journal of Academic Librarianship' has been verified for receiving maximum citations and maximum h-index.

Kumar (2020) at the University of Madras. carried out the Scientometric analysis and examined the research output of the institution for ten years, from 2009 to 2018, as recorded in the Web of Science database. The method and analysis in this paper covers the growth of literature, annual distribution, most prolific authors, publication types. The countries that are work in partnership with other universities, journals and articles used by the researchers, subject - year wise distribution, and highly cited papers of the institution.

Guskov et. al (2018) have elaborated the top 100 universities under the Russian Project improved and increased fivefold in the period 2010-2016. The study discovered several factors that contributed to the rise in research output, including Russian conferences with proceedings included in the Scopus database, the preference of the top universities to publish in international journals rather than local ones, and the participation of two other universities in the publication of predatory journals. According to the study, there was one publication per author every year, and production per author increased insignificantly during the period.

Sonal (2018) in their study analysed that "bibliometric is used as an instrument in the collection building policy by providing the exact and much needed information to the administrators to take the right decision in right time as to what documents they should have.

to select and what documents they should discard from the existing collections of their respective libraries." The researcher has identified the research papers from 2012-2013 was having productivity in the streams of Arts, Science and Social Science. In science discipline there was little difference during 2011-2012.

Cancion (2017) carried out bibliometric analysis of leading universities in innovation research between 1989 and 2013. The results show that the most prestigious American universities are not only the most influential in the number of citations of their publications but are also highly productive universities in this area.

Nabi (2016) investigated the research output in the field of science and technology of Kashmir university from the period 2009-2013 by collecting the data from the Web of science tool. The study found 240 articles have been published by 54 faculty members in the concerned field with having maximum research output in the department of physical sciences, followed by applied sciences and life science.

Pandita (2015) conducted a study to assess the research tendencies published in a library science journal from Jammu and Kashmir. they founded that the journal publishes "research articles and book reviews with an international contribution from many countries". India contributes more articles with maximum contributions from J and K. The study also found that single-author's contributions are more predominant and there is an average reference of 14.76 per article that have been cited.

Wani (2015) examined the research impact and productivity of Kashmir University and Jammu University and found that that in the scientific research productivity Jammu University is leading in the with a good margin against Kashmir university having more faculty members that contribute to research than to Kashmir University. Faculty research output in science field of University of Kashmir lags behind in the research productivity and output than faculty at University of Jammu.

Froghi et al. (2012) applied various indices like h-index, Eigen factor and crown index etc. in measuring the research effectiveness and productivity of different urology departments and faculties. In their study they decided that bibliometrics is useful and advantageous, as it offers an arithmetical outline for assessment of research quality; equally, to attain finest consequences, the modification for original indices is a necessity for assessment purposes.

Siemens & Matheos (2010) in their study emphasized that the role of institutions of higher education in general and universities in particular towards producing the skilled and competent workforce to accept the social responsibility. The academics are of the view that the research activities of the universities account for the national research output and research activities undertaken in science and technology of the area has become the foremost area to be worked upon.

Sevukan & Jaideep (2008) give a thorough review of the research output of the biotechnology faculties in the central universities from 1997 to 2006 by using data from three database sources namely PubMed, NCBI and Science Citation Index Expanded (SCIE). The approaches and analysis in this paper comprised Pattern of authorship, collaborative coefficient, Lotkas law, Identification of the Core Journals and Country-wise distribution of journals. However, the entitlement and claim of Bradford's law does not fit to the studied works. Yadav, Verma & Singh estimated publication research output of Mizoram university from 2004 to 2017 based on Indian Citation Index. The study involved and contained "collaborative index, collaboration coefficient, co-authorship index, annual authorship distribution, and collaborative" research output during the study period.

Objectives

1. To measure the research output of the university.
2. To identify the most prolific researchers during the period.
3. To identify the most favored research area.
4. To identify the authorship patterns in the papers published.
5. To identify the journals which were most preferred by the researchers of the university.
6. To identify the most prolific institution/organization.
7. To identify the geographical distribution of papers.

Methodology

The study conducted an advanced search with the words "University of Kashmir" in the field with the time span 2015 to 2020 in the SCI-Expanded database of WoS for retrieving the research publications. This database is chosen because of having the oldest and most comprehensive record of citation indexes. The VOS viewer data analyzing tool will be used to summarize bibliometric features, including publication years, journals, and keywords, and the cooccurrence map of countries, institutions, and keywords. The search statement adopted in the study, including the time span, is represented as: Search Strategy. Advanced Search
PS = (University of Kashmir); Indexes = SCI-EXPANDED; Timespan = 2015–2020

Analysis & discussion

Table I gives the annual distribution of papers, out of 308 papers published maximum number of 66 (22.42%) papers are published in 2020 followed by 2019 (19.48%); 2018. (17.85%); 2017 (14.61%), 2016 (14.28%) and 2015 (12,32) respectively. The range of papers published per year during the period under study is in between 38- 66.

Table II gives a detailed overview of authorship pattern of papers published during 2015.

to 2020. It is observed that out of 308 contributions, a total of 102 (33.11%) contributions have been contributed by three authors followed, by four authors (27.9%), two authors (18.83 %), Five authors (9.7 %), and one author (08.7%) respectively.

TABLE I ANNUAL DISTRIBUTION OF PUBLICATION

Year	No of Publication	Percentage %	Annual average growth rate percent (%)
2015	38	12.32	-
2016	44	14.28	15.90
2017	45	14.61	2.31
2018	55	17.85	22.17
2019	60	19.48	9.131
2020	66	22.42	15.09
Total	308	100	

TABLE II AUTHORSHIP PATTERN OF PAPERS PUBLISHED

Year	One	Two	Three	Four	Five	>Six	Total
2015	4	8	17	14	7	1	51
2016	5	11	15	13	4	1	48
2017	3	6	13	12	5	0	39
2018	4	10	16	13	4	2	49
2019	5	11	20	16	5	1	59
2020	6	12	21	18	5	1	62
Total	27 (8.7%)	58 (18.83%)	102 (33.11%)	86(27.9%)	30(9.7%)	18 (5.8%)	308(100%)

Table III shows that during the period of 2015 and 2020, a total of 941 authors have contributed 308 journal articles with an average of 3.05 authors per article and 0.32 productivity per author. Further, out of 941 authors, only 445 were affiliated to Kashmir University with 1.44 average authors per paper and 0.69 productivity per author.

TABLE III AUTHOR PRODUCTIVITY

Year	Total no Papers	Total No. of Authors	Total AAPP	Total PPA	Authors (KU)	AAPP (KU)	PPA (KU)
2015	38	110	2.8	0.34	55	1.45	0.69
2016	44	144	3.2	0.30	70	1.60	0.62
2017	45	154	3.4	0.29	60	1.34	0.75
2018	55	165	3	0.33	68	1.24	0.80
2019	60	170	2.8	0.35	90	1.5	0.66
2020	66	198	3	0.33	102	1.55	0.64
Total	308	941	3.05	0.32	445	1.44	0.69

Note: Average Authors Per Paper (AAPP) = Number of authors/ Number of papers.
Productivity per author (PPA)= Number of papers/ Number of authors.

The subject-wise rank distribution of publication is listed in Table IV, which shows

Physics is the most favoured area of research among the research community of Kashmir University with 27.65%, followed by Biochemistry (24.12%), Chemistry (9.7%), Plant Science with 9.0 % each. Engineering and Materials Science stood at the fourth position with 7.65% each.

TABLE IV MAJOR RESEARCH AREAS

Rank	Top ten Research Areas	No. of publication(N=308)	Percentage(%)
1	Physics	87	28.2
2	Biochemistry	58	18.8
3	Chemistry	30	9.7
4	Plant Science	28	9.09
5	Engineering Materials Science	18	5.8
6	Astronomy & Astrophysics	13	4.2
7	Optics	12	3.8
8	Mathematics	11	3.5
9	Pharmacology	11	3.5
10	Pharmacy	9	2.9
10	Biotechnology Applied	9	2.9
11	Microbiology	8	2.5
12	Science Technology & Others	4	1.2
13	Engineering	3	0.9
13	Agriculture	3	0.9
14	Computer Science	2	0.6

Degree of collaboration is an examination of the prominent area of inquiry in bibliometric studies indicating the trend in patterns of single and joint authorship in the publication of Kashmir University during the period under study, as shown in Table V. The degree of collaboration “C” is 0.86 (nearly equals to 1) that means there is few contributions by single author.

$$C = \frac{NM}{NM+NS}$$

Where, C = Degree of Collaboration

NM = Number of multiple authors

NS = Number of single authors

TABLE V DEGREE OF COLLABORATION

Year	Single authored paper (NS)	Multiple authored paper (NM)	NM+NS	Degree of Collaboration(C)
2015	7	35	37	0.95
2016	6	38	44	0.86
2017	8	45	53	0.84
2018	7	45	52	0.86

2019	8	48	56	0.85
2020	11	55	66	0.83
Total	47	266	308	0.86

The journal distribution of Table VI shows that there was a tremendous scattering of literature in the publication pattern of the university. Further, it shows that the first zone or nucleus contains four journals which covered about one-third of the total papers, followed by second zone with nine accounted for another one-third and the third zone with 88 journals covered the remaining third zone.

TABLE VI. DISTRIBUTION OF CORE JOURNALS IN 2015-2020

Rank	Name of Journals	No. of articles (n=308)	Percent (%)	Cumulative	
1	Indian Journal of Animal Sciences	65	21.1	65	21.1
2	Indian Journal of Agricultural Sciences	45	14.6	110	35.7
3	Journal of The Indian Chemical Society	38	12.33	148	48.05
4	Indian Journal of Horticulture	32	10.38	180	58.4
5	Indian Veterinary Journal	30	9.7	210	68.1
6	Current Science	29	9.4	239	77.5
7	Indian Journal of Pure & Applied Physics	25	8.11	264	85.7
8	Journal of Food Science and Technology—Mysore	23	7.4	287	93.1
9	RSC Advances	11	3.2	298	96.7
10	PLoS One	10	2.9	308	100
Total		308	100	-	-

Table VII shows the most prolific contributor during the period under study. With 105 (34.0%) publication authors affiliated with University of Jammu contribute 40 (12.9 %) followed by Sher-e-Kashmir University of Agriculture Sciences and Technology of Kashmir 30 (9.7%) and Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu 30(9.7%).

TABLEVII MOST PROLIFIC INSTITUTION/ ORGANIZATION

Rank	Most prolific Institution/ Organizations	No. of publication(N=308)	Percentage (%)
1	University of Kashmir	105	34.0
2	University of Jammu	40	12.9
3	Sher-e-Kashmir University of Agriculture Sciences and Technology of Kashmir	30	9.7
3	Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu	30	9.7

4	Sher-i-Kashmir Institute of Medical Sciences	25	8.1
5	Shri Mata Vaishno Devi University	20	6.4
5	Indian Institute of Integrative Medicine, Jammu	20	6.4
6	National Institute of Technology Srinagar	17	5.5
7	Government Medical College Srinagar	13	4.2
8	Indian Institute of Integrative Medicine, Srinagar	8	2.59

Table VIII shows the most prolific authors during the period under study. Masoodi, Farooq Ahmad with 17 (19.4%) contributions stood at the 1st place, followed by Gani, Adil (14.6%), Wani, Idrees Ahmed (12.9%), Sheikh, J. A. (12.3%), Reshi, Zafar A. (10.3%), Dar, Aijaz Ahmad (9.7%), Shah, N. A. (7.1%), Aziz, A (5.1%), Ahmad, Parvaiz (4.8), and Shah , Manzoor Ahmad (2.5%).

TABLE VIII MOST PROLIFIC AUTHORS

Rank	Name of Contributor	No. of Contribution(N=308)	Percentage (%)
1	Masoodi, Farooq Ahmad	60	19.4
2	Gani, Adil	45	14.6
3	Wani, Idrees Ahmed	40	12.9
4	Sheikh, J. A.	38	12.3
5	Reshi, Zafar A.	32	10.3
6	Dar, Aijaz Ahmad	30	9.7
7	Shah, N. A.	22	7.1
8	Aziz, A	16	5.1
9	Ahmad, Parvaiz	15	4.8
10	Shah , Manzoor Ahmad	8	2.5

On the whole 308 contributors belonging to India (Kashmir University), the collaborative contributors are from USA with 5.8%, Saudi Arabia (5.1%), United Kingdom(3.2%),Germany (1.9%), and People’s Republic of Chinawith1.2% each respectively.

TABLE IX GEOGRAPHICAL DISTRIBUTION OF PUBLICATION

Year	Country	No. of Contribution (N=308)	Percentage (%)
1	India	244	79.2
2	United States	18	5.8
3	Saudi Arabia	16	5.1
4	United Kingdom	10	3.2
5	Germany	6	1.9
6	People’s Republic of China	4	1.2
7	Pakistan	3	0.97
8	South Africa	2	0.64
9	Japan	1	0.32

10	South Korea	1	0.32
11	Egypt	1	0.32

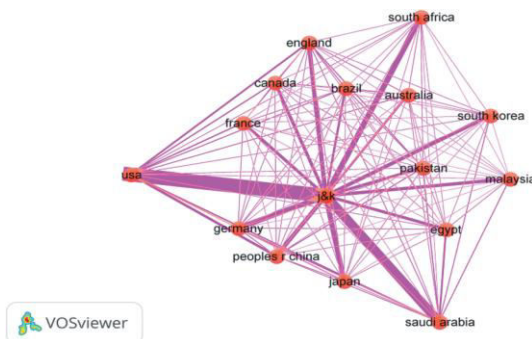


Fig. 1 top 10 most collaborative countries with Jammu and Kashmir researchers

Findings and Conclusion

The followings are the key findings of the present study:

1. Out of 308 papers published maximum number of 66 (22.42%) papers are published in 2020 followed by 2019 (19.48%); 2018(17.85%); 2017 (14.61%), 2016 (14.28%) and 2015 (12,32) respectively. The range of papers published per year during the period under study is in between 38- 66.
2. Maximum number of three authored papers (33.11%) published which is followed by four authors (27.9%), two authors (18.83%), five authors (9.7%) one author (08.7%).
3. Physics is the most favoured area of research followed by Biochemistry(24.12%), Chemistry, Plant Science with 9.0% , Engineering and Materials Science with 5.65% etc.
4. Farooq Ahmad Masoodi from Department of Food Science & Technology with 17 (19.4%) contributions stood at the 1st place, followed by Adil Gani with (14.6%) papers and Idrees Ahmed Wani (12.9%), J. A. Sheikh with (12.3%), Zafar Reshi with (10.3%) papers.

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Scientometric Analysis of the Publication Output of Loyola College, Chennai: A Study Based on the Web of Science Database

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Abstract

Scientometric is a quantitative and qualitative research used to study and measure various aspects of scientific parameters for better understand of the mechanism of research activities. This paper attempts to represent a quantitative and qualitative analysis of the publication output of Loyola College, Chennai. The data has been collected from Web of Science database. A total of 1,349 research publications were downloaded from the period of 2013-2022. The analysis covers mainly the year wise distribution of publications, and which journal is most productive and which journal are most cited documents, most prolific author based on number of publications, most prolific author based on H-index, co-authorship network of countries and most common keywords used by authors by applying Histcite, Visualization and mapping tool of VoS viewer, and Biblioshiny through R- Studio software applications.

Keywords: Scientometric Analysis, Web of Science, Loyola College Chennai.

Introduction

Scientometric analysis is a quantitative and qualitative research methods used to study and measure various aspects of scientific literature, publications and their impact on the scientific community. It provides statistical and bibliometric techniques to analyze patterns, trends and relationships within scientific publications, authors, journals, institutions and research fields. Scientometrics aims to provide insights into the structure and dynamics of scientific knowledge, communication and collaboration. The research output is a number of publications by individual researchers, institutions or countries over a specific period. And the citation analysis is an examine of how frequently a particular paper, author, journal or institution is cited by other researchers. Citations are often used as an indicator of the impact and influence of scientific work. The collaboration patterns between the researchers, institutions, or countries to understand the dynamics of knowledge exchange and innovations. A measure that reflects the average number of citations to articles published in a particular journal over a specific period. Identify the emerging research areas, hot topics and shifts in scientific interest over time.

Loyola College

Loyola College, situated in Chennai, Tamil Nadu, India, is a distinguished private Catholic institution of higher education administered by the Society of Jesus. It was established in 1925 through the efforts of the French Jesuit priest, Francis Bertram, in collaboration with other European Jesuits. Affiliated with the University of Madras, Loyola College holds autonomous status and is renowned for its academic excellence. In recognition of its outstanding contributions to research, Loyola College received the prestigious designation of a Scientific and Industrial Research Organisation from the Department of Scientific and Industrial Research in January 2011, a remarkable achievement for an Arts and Science College. Consistently featured in the list of India's top 10 colleges by India Today for the past 21 years, Loyola College has also been granted the "College with Potential for Excellence" status by the University Grants Commission. In the latest NIRF Ranking of 2023, Loyola College has secured the 7th position in the College category, solidifying its reputation as one of the top 100 colleges in India. Along with Women's Christian

College, Loyola College achieved an "A++" Grade re-accreditation from NAAC during the 4th Cycle in 2021, highlighting its commitment to academic excellence and quality education.

About Web of Science database

The Web of Science is abstract and citation database. It was developed by Eugene Garfield, the founder of the Institute for Scientific Information and the inventor of important information retrieval tools such as Current Contents and the Science Citation Index. It is currently owned by Clarivate. It is a paid-access platform that provides (typically via the internet) access to multiple databases that provide reference and citation data from academic journals, conference proceedings, and other documents in various academic disciplines. Clarivate Analytics' Web of Science (WoS) is the world's leading scientific citation search and analytical information platform. It is used as both a research tool supporting a broad array of scientific tasks across diverse knowledge domains as well as a dataset for large-scale data-intensive studies.

Review of Literature

Bharvi, D., Garg, K., & Bali, A. (2003) defines the use of scientometric indicators for decision making is constantly on the rise resulting in the rapid growth of scientometric studies. Since the beginning of the eighties, scientometrics has evolved into a distinct scientific discipline with a specific research profile with several sub-fields.

Chadegani, A., et al. (2013) Compares between Scopus and Web of Science Database, Nowadays, the world's scientific community has been publishing an enormous number of papers in different scientific fields. In such environment, it is essential to know which databases are equally efficient and objective for literature searches. It seems that two most extensive databases are Web of Science and Scopus. Besides searching the literature, these two databases used to rank journals in terms of their productivity and the total citations received to indicate the journals impact, prestige or influence.

Objectives

1. To examine the pattern of year wise growth of the publication output of Loyola College.
2. To find out the top collaborating affiliations with Loyola College.
3. To find out the most prolific author on the basis of number of Publications and H-Index.
4. To visualize Co-authorship network of countries based on total link strength.
5. To determine which journals are most productive and most cited documents.
6. To find most common keywords.

Methodology

The present study is designed to investigate the research output of Loyola College, Chennai. The study was undertaken based on the data downloaded from Web of Science database. The search string in the affiliation box used for the collection of data was (Loyola College, Chennai) with the refine the data to be downloaded. A total of 1,349 research publications were downloaded from 2013-2022. These records were with the bibliographical details such as title, authors, source, year, affiliation, citation information etc. The data obtained was downloaded in Plain text file format from Web of Science and final analysis was done applying the Scientometrics parameters as per objectives of the study with MS-Excel, Histcite, Visualization and mapping tool of VoS viewer, and Biblioshiny through R- Studio software applications.

Data Analysis and Interpretation

Table I shows the publication output of Loyola College was recorded and retrieved as a cumulative total of 1,349 during study period 2013 to 2022. Highest publications in the year 2022 with 161 publications followed by 152 publications in the year of 2019 followed by 2015 with 142 publications. Highest citation in the year 2017 received 3194 Total Global Citation Score.

TABLE I YEAR WISE DISTRIBUTION OF PUBLICATIONS

Sl.No.	Year	Articles	Citable Years	TGCS
1	2013	104	11	2997
2	2014	123	10	3194
3	2015	142	9	2418
4	2016	125	8	2688
5	2017	140	7	4264
6	2018	133	6	2514
7	2019	152	5	2558
8	2020	115	4	1337
9	2021	139	3	1147
10	2022	161	2	626

Table II shows that the Faculty of Loyola College mostly published their research findings in the form of Journal Articles 1143 (21495 TGCS) as the preferred channel for their publications. They have also presented their papers in 112 (355 TGCS) Proceedings paper and also they have published 49 (1704 TGCS) review paper as well.

TABLE II DOCUMENT TYPE WISE PUBLICATIONS

S. No	Document Type	Recs	TGCS
1	Article	1143	21495
2	Proceedings Paper	112	355
3	Review	49	1704
4	Article; Book Chapter	9	29
5	Editorial Material	9	4
6	Correction	6	1
7	Article; Proceedings Paper	5	80
8	Article; Early Access	4	1
9	Meeting Abstract	4	0
10	Letter	2	24

Table III displays how many times journals have cited a given article. The top ten papers with over 2367 citations ‘Applied Science’ by Sharma A has the most citations with 481 Citations and followed by ‘Photochemistry and Photobiology B: Biology’ by Ezhilaasi AA., with 272 Citations.

TABLE III MOST GLOBAL CITED DOCUMENTS

Sl.No.	Paper	Total Citations	TC per Year	Mean TC per Article
1	Sharma A, 2019, SN Applied Science	481	96.2	0.6
2	Ezhilaasi AA, 2016, J Photochemistry and Photobiology B: Biology	272	34	3.89
3	Kaviyarasu K, 2017, Materials Science and Engineering C	238	34	8.25
4	Manikandan A, 2013, Superlattices and Microstructures	217	19.73	11.63
5	Ezhilarasi AA, 2018, J Photochemistry and Photobiology B: Biology	211	35.17	16.83
6	Magdalane CM, 2017, J Alloys and Compounds	203	29	18.9
7	Kaviyarasu K, 2017, J Photochemistry and Photobiology B: Biology	199	28.43	30.46
8	Manikandan A, 2014, J Magnetism and Magnetic Materials	193	19.3	21.5
9	Magdalane CM, 2016, J Photochemistry and Photobiology B: Biology	180	22.5	17.03
10	Valsalam S, 2019, Photochemistry and Photobiology A: Chemistry	173	34.6	25.97

Figure I shows that researchers from 10 institutions collaborated with the Faculty of Loyola College for more than 1128 publications. Among them, King Saud University stands with 187 publications followed by University of Madras with 173 publications.

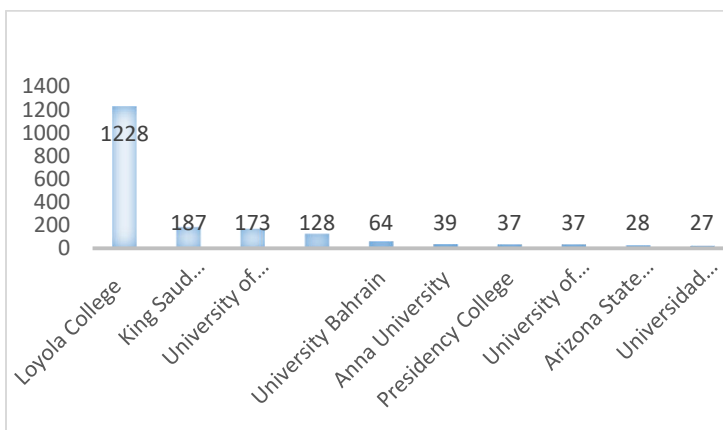


Fig. 1 Collaborative Institution

Figure II and Table IV below depicts clear that Ignacimuthu, S has maximum number 174 of publications in his name, followed by Vijaya, JJ with 166 publications, Kennedy, LJ with 139 publications. he is the most prolific author in the period of study 2013 to 2022. As per the observation of the basis of h-index Vijaya, JJ has highest value of 52 h-index followed by Kennedy, LJ with 48; Ignacimuthu, S with 32 h-index.

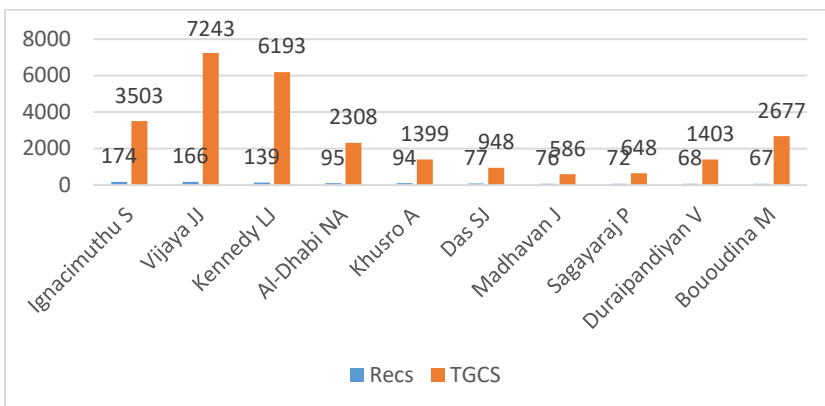


Fig. 2 Most predominant author on the basis of number of publications

TABLE IV TOP 10 MOST PROLIFIC AUTHORS ON THE BASIS OF H-INDEX.

Sl.No.	Name of Author	No. of Publications	H-index
1	Vijaya JJ	166	52
2	Kennedy LJ	139	48
3	Ignacimuthu S	174	32
4	Bououdina M	67	29
5	Al-dhabi NA	95	27
6	Kaviyarasu K	36	27
7	Duraipandiyan V	68	24
8	Manikandan A	29	21
9	Arasu MV	39	20
10	Agastian P	62	19

Figure III shows the Co- Authorship network of Countries for the study period. India has a very good network of research work with Saudi Arabia and South Korea based on total link strength.

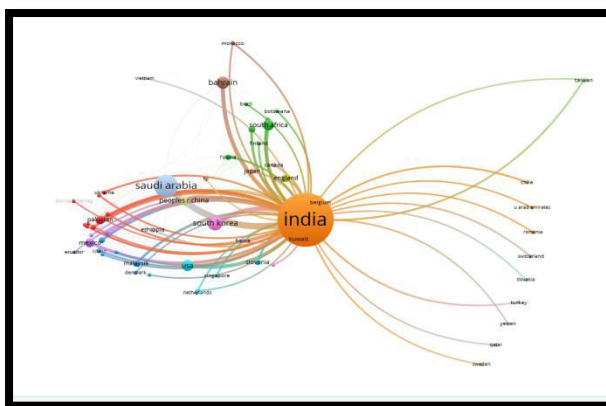


Figure III Co- authorship network of Countries

Figure 4 depicts the most productive journal in the period of study. The observation of the figure reveals that maximum number of Materials Today Processing which is 65 publications, this is followed by Journal of Nanoscience and Nanotechnology are 39 publications, Journal of Materials-Science in Electron are 35 publications.

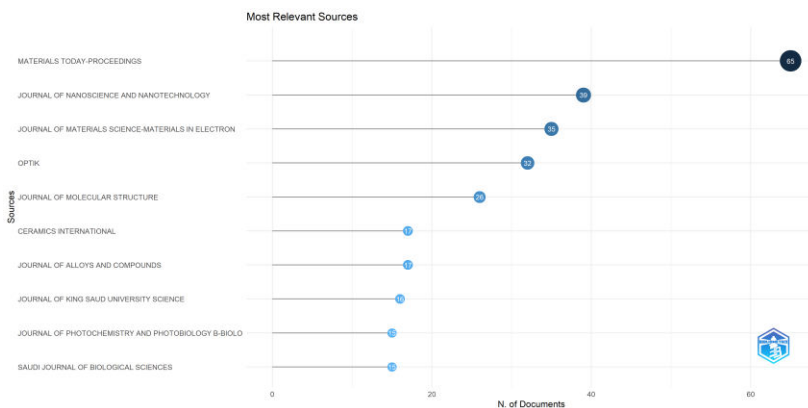


Fig. 4 Most Productive Journal

Figure 5 shows the most common keywords used by authors which are the most widely used Nanoparticles, followed by growth and performance most productive keywords used by the researchers.

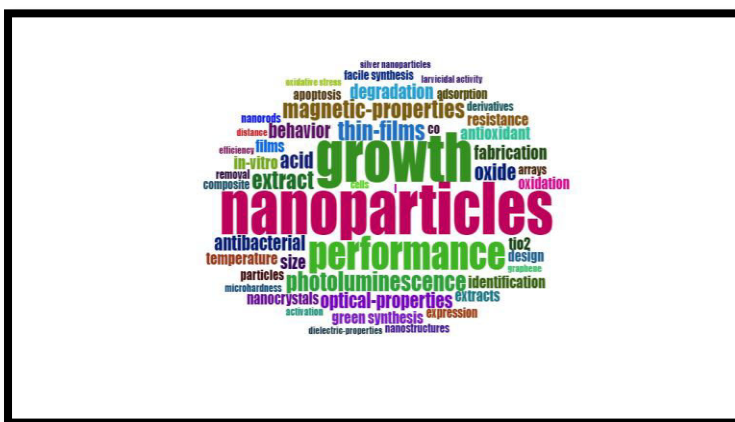


Fig. 5 Most Common Keywords

Findings

The following findings are based on research study:

1. The year wise growth of the publication output of Loyola College with the highest publications with 161 publications in the year of 2022.
2. The faculty of Loyola College mostly published their research findings in the form of Journal Articles 1143 (21495 TGCS) as the preferred channel for their publications.
3. The top ten papers with over 2367 citations. ‘Applied Science’ by Sharma A has the most citations with 481 Citations.

4. The King Saud University stands first with 187 publications provided the greatest amount of records, it has been discovered.
5. The most predominant author with number of publications Ignacimuthu, S has maximum number 174 of publications and as per the observation of the basis of h-index Vijaya, JJ has highest value of 52 h-index.
6. The observation of the most productive journal reveals that maximum number of Materials Today Processing which is 65 publications.
7. In that Co- Authorship network of Countries for the study period. India has a very good network of research work with Saudi Arabia.
8. The most common keywords used by authors which is the most widely used Nanoparticles were utilised as keywords in publications more frequently.

Conclusion

In conclusion, the scientometric analysis of the publication output of Loyola College, Chennai, based on the Web of Science database provides valuable insights into the institution's research productivity and impact. Through a comprehensive examination of research articles, citations, collaboration patterns, and subject areas, this study has shed light on the college's contributions to the global research landscape. It underscores the importance of research institutions like Loyola College in generating knowledge and fostering collaboration within the academic community. The findings of this study can serve as a basis for future strategic planning, resource allocation, and academic endeavors to further enhance the institution's research excellence and impact.

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Analysis of Research Output on Gut Microbiota in SAARC Countries during 2001-2023

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Abstract

A Significant number of studies have been made on gut microbiota and health and it has flourished in the last 23 years. The goal of this study was analysis of the published scopus indexed gut microbiome literature in SAAARC countries using scientometric method to observe the present research status and summarize the most advanced achievements in this field . Analysis based on research output of gut microbiota -1917 papers were retrieved from Scopus for the period of 2001 to 2023 on 9th January,2024. In respect of Literature Publications India is at the top among SAARC countries With publications (n = 1507), followed by Pakistan (n = 283), “Bangladesh (n=135)”, “Sri-Lanka (n=19)”, “Nepal (n=7)”, “Afghanistan (n=1)” among the SAARC Countries. “Maldives” and “Bhutan” have no contribution in this field during this time period. Frontiers in Microbiology is the most presiding journal in the field of Gut microbiota with 44 publications.

Keywords: Gut microbiota; Vos viewer; SAARC countries.

Introduction

Research output plays an important role in Scientometric analysis. Research Output’ means research outcomes or research products presented or published through research papers/articles by faculty, researcher scholars or the scientists of an institution. Many researchers have studies on different aspects and many researchers analyse review studies. Scientometric analysis is a quantitative and qualitative method used to evaluate different facets of scientific research. Analytical and mathematical processes are used to measure ,analyse the motifs of scientific publications, citations, collaboration, and other related data. Scientometric analysis plays a vital role in mapping the advancement of scientific knowledge, identifying prolific researchers and institutions, and providing a quantitative basis for research evaluation and policy-making. The gut microbiota is an umbrella term used to refer to the diverse population of microbes (mostly bacteria and fungi, protozoa, and viruses) both commensal and pathogenic that inhabit the gastrointestinal tract. Research on human microbiota started as early as 1681 with the studies of Anton Von Leuvenhock. Later on, the seminal contributions of Theodor Escheric, Henry Tissier, Ilya Metchnikov and Alfred Nissile greatly advanced our understanding of the gut flora including their clinical applications (*Farré-Maduell& Casals-Pascual, 2019*). The introduction of affordable sequencing technologies together with the identification of novel markers provided a strong impetus to microbiome research (*Ursell et al., 2012*). Microbiome research spurred over the last twenty years providing better understanding of the nature of activities of gutmicrobiome and its relation to overall health. Recently gut microbiota has a considerable impact as an agent in maintaining health and resisting diseases.

In this study we have taken up an initiative to measure the literature outcome in the area of Gut microbiota using Scientometric analysis during the time period 2001 to 2023 and specified to The SAARC countries. Until 2021, SAARC comprises 3% of the world's land area, 21% of the world's population and 5.21% (source: <https://en.wikipedia.org/>) of the global economy. SAARC countries collaborate on various regional issues, including scientific research. Collaboration in

microbiota research leads to merging of resources, expertise, and information, which helps in a more detailed understanding of microbiota-related phenomena. As Microbiota play a crucial role in human health, influencing aspects such as digestion, immune response, and metabolism. Investigating microbiota in SAARC countries can contribute valuable information to address public health challenges specific to the region. By including SAARC countries in microbiota research, the global scientific community can foster international collaboration. This can enhance the overall quality of research by integrating diverse perspectives, methodologies, and findings. Collaborative research on microbiota within the SAARC region can contribute to capacity building and knowledge transfer. This is particularly important for countries with developing research infrastructures, helping the SAARC region. Studying microbiota in this context can provide insights into addressing specific health challenges that affect the region's population. VOSviewer(Jalal, 2019)tools were used to create network plots to know the cooperative regions relating to authors, subject areas and key-terms. The result of this study established that the year wise research growth on Gut microbiota in India is comparatively more as compared to other SAARC countries.

Literature Review

Mu *et al* (2022) have conducted a Scientometric study on published literature of Web of Science on relations Gut Microbiota and Heart Failure for the time period 2006 to 2021. The result shows that continuous growth in the number of published articles and citations, literature on cardiac cardiovascular systems holds the leading position . The most prolific state was the United Kingdom, and centre on National alliance. Cleveland Clinic and Nathalie M. Delzenne hold the most significant position in publications. The mostly used keywords areinflammation,obesity, heart failure, risk factor, andgut microbiota. A dietetic approach to nutritional interventions in Cardiovascular disease had proved to be an effective master plan in reducing cardiovascular risk. Another research on Global scientific output trend for Akkermansiamuciniphila was conducted by Dehghanbanadaki *et al.*(2020) Relevant documents (556) to Akkermansiamuciniphila in any language from 2004 – 2019 was retrieved from Scopus database. 353 original articles, 194 on animal studies and 112 studies on human. Furthermore, 65 different diseases were taken into consideration for this investigation. The highly fascinated areas are “obesity” with 71 articles and “type2 diabetes” with 39 articles. The United States is the chief country on Akkermansia publications (n = 132), China (n = 95). With 23 publications on “Akkermansia” in “Frontiers in Microbiology” is the principal journal. During the last 10 years Akkermansia research has been the subject of Interest. Another study on gut microbiota and obesity was carried out by Ejtahed *et al.* (2019) to analyze the tendency of global scientific Literature publications in this field. From Scopus database the bibliometric data were extracted from January 2000 to April 2017. All the data has been analyzed with the help of VOS viewer tool (version 1.6.5), Scopus analysis tools and SPSS. We found out that a total of 4384 documents were published and the United States with 28% publications was at the leading position, followed by China and the United Kingdom. The most productive year was 2016 and Medicine was the key subject area. Ultimately documents were cited 153576 times and average citation rate per article is 35.03, and h-index 159. If we consider the co-authorship network, “Wang J.” from China was the top author. “PLoS One” was the leading source journal.

Objectives

The aims of this study are stated below.

1. To Point out annual development patterns of SAARC countries on gut microbiota in the last 23 years;
2. To highlights the prime journals;

3. To recognize the most prolific Author;
4. To build up co-authorship relationship using the bibliographic tool named VOSviewer;
5. To build keyword co-occurrences map and bibliographic coupling.

Methodology

In the present study we considered 1917 documents published by authors from SAARC countries during 2001-2023. We collected the data of 1917 documents from the Scopus database and then tabulated and analysed the data importing it into Microsoft Excel. Visualization analysis of retrieved data was done by Version 1.6.19 VOSviewer software. The study area of the procured documents is “Gut microbiota”. This area was preferred due to its vast literature coverage . Only Scopusindexed documentswere collected from 2001 - 2023 and there was no language barrier if the term “Gut microbiota” is included in titles, abstracts, and keywords. The search query performed was - TITLE-ABS-KEY ("Gut microbiota") AND PUBYEAR > 2000 AND PUBYEAR < 2024 and then filtered by the SAARC countries. As the citations might change on daily basis and so the bibliometric indicators, we retrieved all the data at once and on the same day we collected the other necessary bibliometric information and prolific data such as documents with most citations, most prolific authors, best journals, top institutions, leading countries, and top sponsors, to avoid any difference in data. We considered all the retrieved articles to analyze the various types ofdocument and subject facets of Gut microbiota literature. A bibliometric data visualization tool like VOSviewer (version 1.6.19) has been used in this study for visual representation of the relationship among various authors, organizations, Nations, key terms. The relation between items based on their repetitions , co-authorships and co-citations is highlighted. Bibliographic coupling (Eck & Waltman, 2009), was used to realize the connection between repetitions and terms along with most co-authorship of authors and Nations. The yearly publications growth, thepublications with most citations, prolific journals and prolific institutions, prolific countries, prolific funding agencies.VOS viewer is a free bibliographic tool used for data mapping.The collected data were imported to VOSviewer v.1.6.19 (<https://www.vosviewer.com/>), for data analysis This tool has been used to present visual network maps which demonstrate research collaboration and research hotspots (Eck & Waltman, 2009).

Result and Discussion

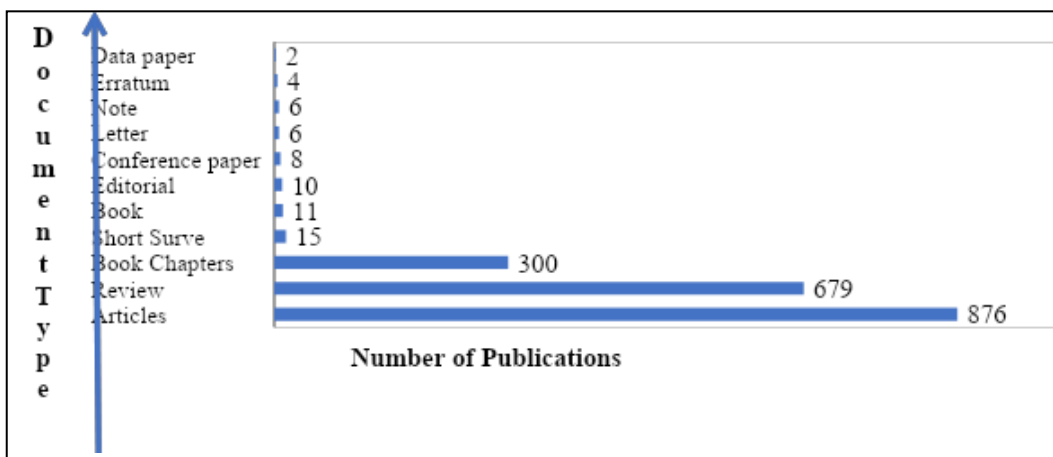


Fig. 1 Document type of the total documents taken

From the collected dataset of 1917 documents on “gut microbiota” from Scopus filtered to SAARC Countries, total 925 documents are open access and 985 are assigned to others. Major share of the dataset are journal articles (n=876, 45.69%), followed by review articles (n=674, 35.419%), book chapters (n=300, 15.64%), short survey (n=15, 0.7824%), book (n=11, 0.57%), editorial (n=10, 0.5216%), Conference paper(n=8, 0.417%), letter (n=6, 0.3141%), note (n=6, 0.3129%), Erratum (n=4, 0.2085%), Data paper (n=2, 0.1043%), editorial(n=2, 0.1043%). All articles published inenglish.

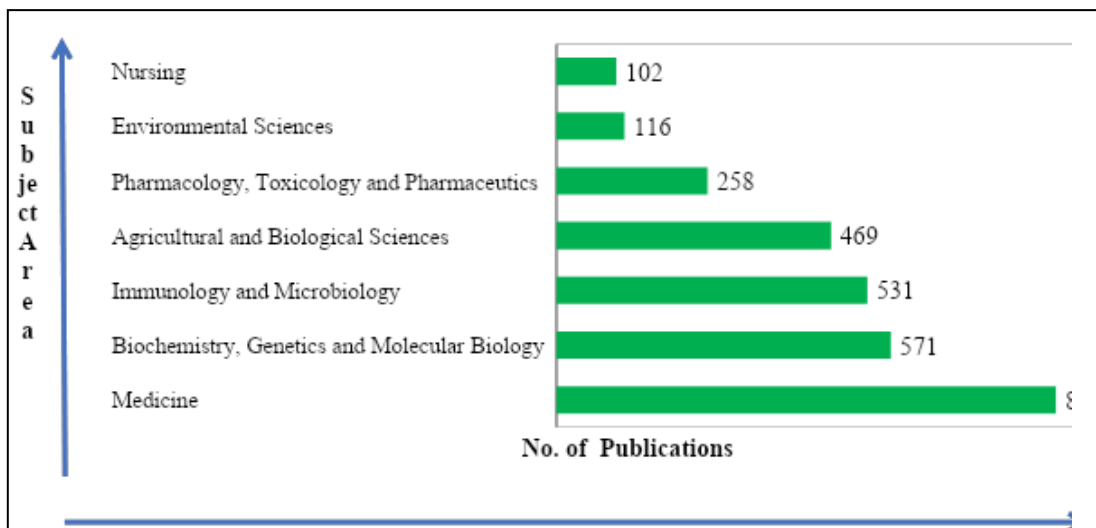


Fig. 2 Total articles in “gut microbiota” presented by subjectareas

The annual publication outcome of all the collected document on *Gut microbiota* has been depicted in Fig. 3. From the line graph presented in Fig. 3, we can see that 1st Scopus indexed articles on “Gut microbiota” has been published in 2002 (article=1).We also observed that the publications productivity of this subject domain “gut microbiota” had slowly increased after 11 years of uniform publications. The total no. of publication in the year 2014 was 29 and then publications progressively increased and peaked with 498 articles in 2022, followed by 459 articles in 2023.

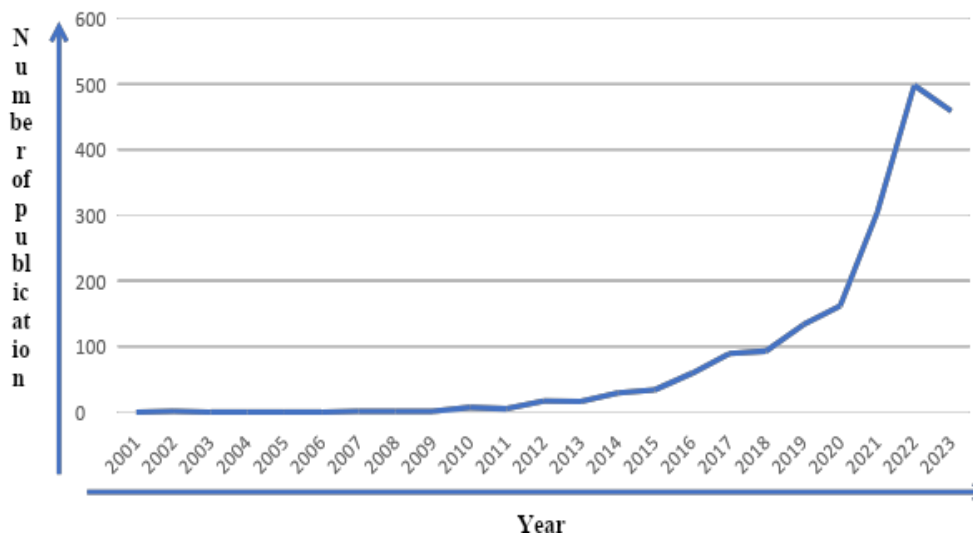


Fig. 3 Year wise distribution of “gut microbiota” articles from 2001 - 2023

The leading journals in the subject domain of Gut Microbiota have been evaluated in Table II. In this field the “Frontiers in Microbiology” with 44 articles is the most productive Journal followed by “Scientific Reports”, “Microorganisms”, “Frontiers in Nutritions” and “Nutrients” with 25, 21, 20, 20 articles respectively.

TABLE I TOP JOURNALS WITH “GUT MICROBIOTA” ARTICLES

Sl. No.	Journal name	No. of Publication(s)
1.	“Frontiers in Microbiology”	44
2.	“Scientific Reports”	25
3.	“Microorganisms”	21
4.	“Frontiers in Nutritions”	20
5.	“Nutrients”	20

Among SAARC Countries the top 3 leading countries in terms of total number of publications are as follows: India with 1513 articles is the leading country, followed by Pakistan with 282 articles, Bangladesh with 135 articles Table II).

TABLE II TOP RANKED COUNTRIES IN TERMS OF TOTAL NO. OF PUBLICATION

Sl. No.	Country	Number of Publications
1	India	1513
2	Pakistan	282
3	Bangladesh	135

The most active sponsors for Gut Microbiota research among SAARC countries are – “Department of Biotechnology”, “Ministry of Science and Technology” with 112 articles, “Department of Science and Technology”, “Ministry of Science and Technology”, India

(articles=106), “Indian Council of Medical Research” (81), “Council of Scientific and Industrial Research”, India (72) and “University Grant Commission” (61) respectively. “National Natural Science Foundation of China” with 66 publications has been excluded as it is not part of SAARC countries.

TABLE III LEADING FUND SPONSORS IN THE “GUT MICROBIOTA” RESEARCH FIELD

Sl. no.	Affiliation	Number of Publications	Country
1	“Department of Biotechnology, Ministry of Science and Technology”	112	India
2	“Department of Science and Technology, Ministry of Science and Technology”	106	India
3	“Indian Council of Medical Research”	81	India
4	“Council of Scientific and Industrial Research”	72	India
5	“University Grant Commission”	61	India

Ghoshal, U.C. with 27 publications is most prolific author in the field of “gut microbiota” among SAARC countries, after that Shouche, Y.S. (22), Foysal, M.J. (19), Bishnoi, M. (18), Kondepudi, K.K. (18) are among the most prolific authors.

The following Fig. 4 shows the co-authorship in the field of *Gut microbiota* publication. To get an adequate visual map, we consider an author with 2 minimum numbers of documents. So, from 1884 authors, only 36 have more than one publication; five of them were excluded due to no co-authorship.

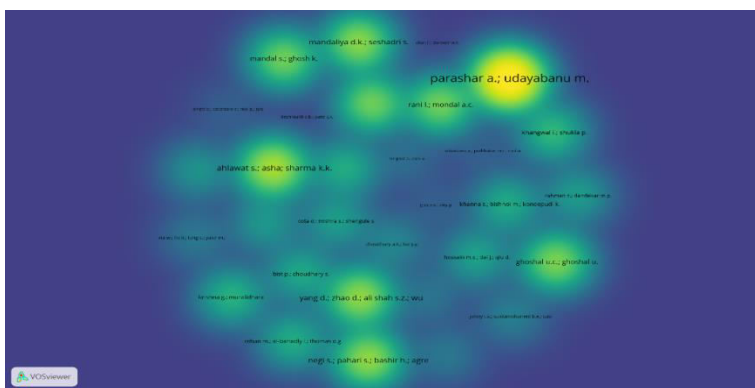


Fig. 4 Density network of co-authorship based on the weightage of citations

Furthermore, we examined the partnership of countries in publications of this field and the result has been shown in Fig. 5. To accomplish such conclusions, 1917 numbers of published articles those have author collaboration when the analysis performed taking the minimum number of documents as 10 from individual countries among a total 105 nations, out of them 37 meet the requirement. We estimated the potency of the co-authorship links with other Countries for each of

the 37 countries. The countries having exceptional total link strength has been picked. India is the pioneer in the field of gut microbiota with 1514 documents with 31871 citations.

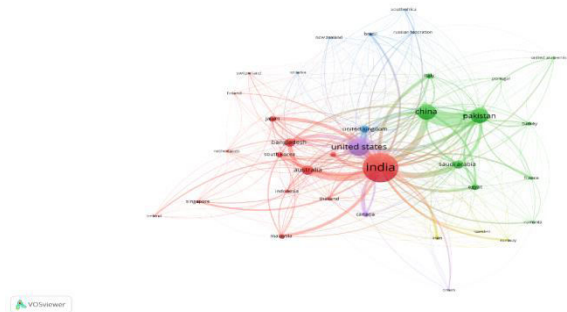


Fig. 5 Co-authorship visualization network of among countries

If the minimum number of keyword occurrences is 10 then out of 4076 ,only 106 keywords fulfilled the criteria. This study reveals the co-occurrences of the following words “gut microbiota” (n = 663 co-occurrences), “probiotics” (n = 360), dysbiosis (n = 137), Prebiotics (n=123), microbiota (n = 165), microbiome (n = 127), obesity (n = 94), Gut-microbiome(n=136), inflammation (n = 94), “Gut-brain axis” (n = 56), “diabetes” (n=38). From the study it was found that the maximum repetitive keywords of authors are connected with “Gut microbiota” and its related terms.

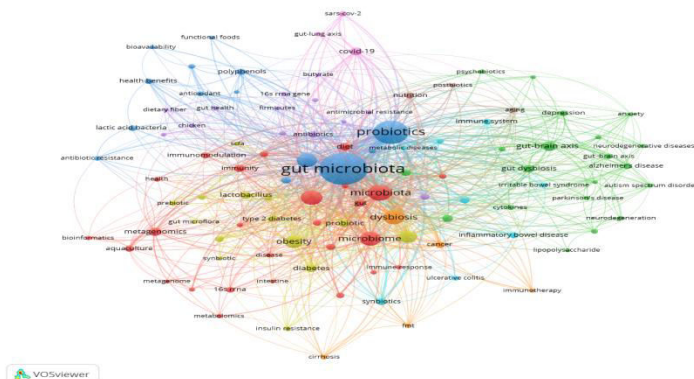


Fig. 6 Visualized network of repetitive author's keywords

We evaluated the total number of the co-occurrences link with other keywords out of 106 keywords. The keywords with the most link strength has been picked.

“Intestine Flora” (n= 1031 occurrences),keyword was the most appeared terms in the articles of Gut *Microbiota* .Then “nonhuman” (n=810), “Human” (n = 856), “humans” (n=622), “gastrointestinal microbiome”, (n = 586), “article”, (n = 519), “gut microbiota” (n=710), “Review” (n=446), “Probioticagent” (n=395), “animals” (n=388) and so on.

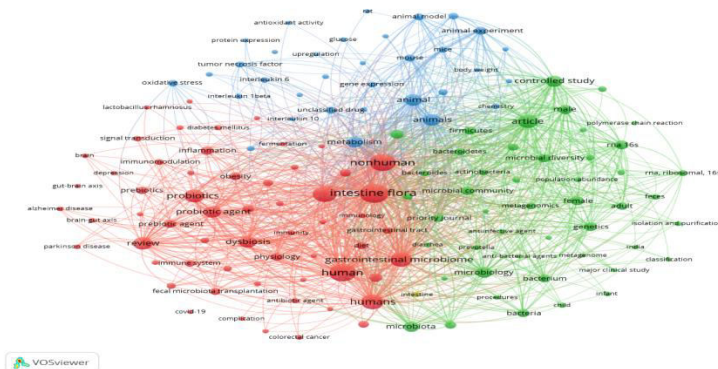


Fig. 7 Visualized network of mostly used keywords terms

These frequent terms were identified after considering a keyword term with lowest number of occurrences 50 among the total 13485 keywords and we found that under this criterion 140 keyword terms were present. These concurrence terms were mostly grouped into 4 different groups such as - group 1 (59 items), group 2 (47 items), group 3 (33 items), group 4 (1). These terms have been plotted in Fig.7.

If we take into consideration the document with minimum citations 50, then out of 1916, 189 numbers meet the points. In this network out of 189 items few items are not interconnected. There are 167 items in the largest set.

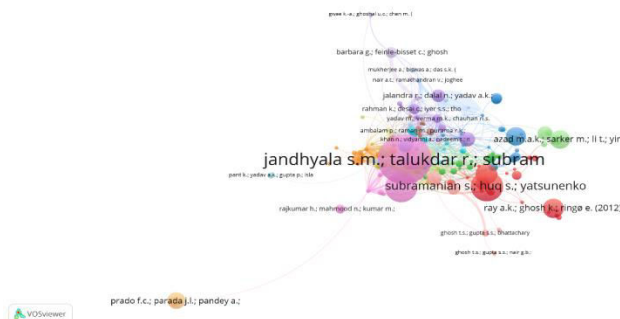


Fig. 6 Visualized network of bibliographic coupling based on citations

The study aims at scientific Literature productivity in the area of Gut microbiota from the scientometric point of view. In the field of Gut microbiota documents were evaluated from the first published year that is 2001 to 2023. Nowadays research on Gut microbiota is on trend during the last 20 years and increased in 2022. The connection between microbiota composition and health conditions has been studied by scientists by using new improved tools. Composition of Gut microbiota have been linked with diseases like obesity, gastrointestinal conditions, and type II diabetes. Our study reveals that significance of this area is the engrossment of few developing nations such as India, Pakistan, and Bangladesh. Most productive institutes were “Sanjay Gandhi Postgraduate Institute of Medical Sciences” and “Amity University” with 43 publications followed by “All India Institute of Medical Sciences”, “International Centre for Diarrhoeal Disease Research Bangladesh” and “ICAR - National Dairy Research Institute” with 41 publications. We have noticed that Microbiota and Disease are the most recurrent terms. We observed that, 1466 studies were carried out on human population, whereas 1020 studies were performed on

Intestinal flora, while 800 on nonhuman ,702 studies on Gut microbiota etc. Recently most of the research on Gut microbiota is related to animal studies and mainly on human health.

Limitation and strength

Within my knowledge probably this study is the first Scientometric analysis on the Gut microbiota literatures on SAARC countries from the beginning till date. Several databases are there for data retrieval such as “Scopus”, “Web of Science”, “PubMed”etc, Due to vast data coverage here we consider only Scopus. Furthermore, we considered only SAARC countries. So, the other related articles from other countries were also excluded from this study.

Conclusion

This study analyses several scientometric features of Scopus indexed articles and gives a thorough outcome of research over time in the area of Gut microbiota. During the last decade a progressive change happens in this Research field .Researchers have been investigating how the structure and activity of gut microbiota impacts on various aspects of human health, such as digestion, metabolism, immune function, mental health, and long-term consequences of antibiotic treatments. Recent research tendency in gut microbiota mainly focused on the relation between gut microbiota and diseases like ulcerative colitis, parkinson’sdisease, Rheumatoid arthritis,anxiety, Type2 diabetes,obesity, Alzheimer’s disease etc.

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A Scientometric Analysis of Geosynthetics Research Based on Scholarly Publications: A Global Perspective

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Abstract

The keyword research on "Geosynthetics Research" is examined in the current study using scientometrics analysis. From 2013 to 2022, 1616 records from all across the world were examined. The Web of Science database is where the information was gathered. In this study, the keyword research on "Geosynthetics Research" was discussed year by year. The study was conducted to look at the distribution of contributions by year, the patterns of authorship, the relative growth rate, the doubling time, and the distribution of records by document. A number of publications with 239 (14.79%) records were published in 2022. With 422 (26.11%) records, China took the top spot in the Geosynthetics Research, followed by the United States (336) and India (172), who came in second and third. Several records that were released as a result of article 1558. In this study, multi-author publications made up 97% of the total publications, with single authors contributing only 3% of the total. According to the survey, the Degree of Collaboration was on average 0.96. In the period of 2013–2022, the study examined the relative growth rates (RGR), which increased from 2014 (0.70) to 2022 (3.08). If the doubling time (DT) is determined year by year, from 2014 (0.98) to 2022 (0.22), it has drastically dropped.

Keywords: Geosynthetics, Scientometrics, Synthetics, Time Series analysis, Relative Growth Rate and Doubling Time.

Introduction

Scientometrics is a statistical and mathematical analysis that quantifies the publication patterns of all micro and macro communications as well as their authorship. "The measurement of scientific output and the impact of scientific findings on public policy" is what scientometrics are. Some of the applications of scientometrics are to determine information growth and research patterns. to gauge how comprehensive secondary magazines are. to determine authorship and its tendencies in texts on different science topics. To recognize users of various disciplines, Nalimov and Mulchenko coined the word "scientometrics" in 1969. Scientometrics was described as "the application of those quantitative methods which are dealing with the analysis of science viewed as an information process" by Nalimov and Mulchenko. Scientometrics is a broad field with ill-defined boundaries. It is a collective word for a body of knowledge that makes an effort to examine the scientific and technological system using a range of methods from the field of science and technology studies (STS). A "Science of Science," scientometrics is a discipline. Materials created by humans called geosynthetics are used to improve soil quality. The name is derived from Geo, which means earth or soil, and Synthetics, which means man-made. Typically, petrochemical-based polymers (also known as "plastics") are used to create geosynthetic materials because they are biologically inert and will not disintegrate when exposed to microbial or fungal activity.

The use of geosynthetics in drainage systems, for filtration, separation, and water movement, is well established. In place of aggregate-filled "French drains" next to roads or as slope interceptor drains, geocomposite drainage materials can be used. Behind subterranean structures, they also provide drainage and pore pressure relief. Geotextile-geonet, geotextile-geogrid,

geonetgeomembrane, or a geosynthetic clay liner (GCL) are a few examples. A plastic drainage core enclosed by a geotextile filter creates prefabricated geocomposite drains or prefabricated vertical drains (PVDs).

Review of the Literature

Giglio, C., Vocaturro, G. S., & Palmieri, R. (2023)¹ has used a scientometric study to assess the scientific literature on the industrialization and commercialization of geosynthetics for infrastructures in the context of Industry 4.0 based on Life Cycle Assessment (LCA). Both a quantitative and a qualitative technique was used to assess a group of articles that were published in Scopus. The important keywords, themes, and subjects are identified and explored within the framework in which the results are reported. The examination of new trends and the confluence of many themes and topics are examples of such outcomes. In actuality, findings from the available literature in this field are still changing and exposing progressively new trends and themes, opening up fresh and difficult study perspectives in terms of creative applications. This analysis also outlines the major nations and connections that contribute to this field. Portelinha, F. H., Goulart, J. M., & Neto, J. O. A. (2023)² Sustainable solutions involving geosynthetic-reinforced soil walls have been achieved in projects that use locally available backfill materials and a reduced volume of geosynthetic reinforcements. Different arrangements of reinforcements can be adopted to reduce the volume of geosynthetics. This paper reports the deformation measurements taken from four instrumented geosynthetic-reinforced soil walls constructed with different arrangements of reinforcement layers including different lengths and tensile properties. The effect of the non-uniformity of reinforcement lengths along the wall height was also evaluated. Resulting in increases of approximately 80% in the wall's deformation. In contrast, the use of rigid reinforcements at lower layers led to a reduction in facing displacements of 50% at lower instrumented layers and of 60% at upper instrumented layers. The distribution pattern of facing displacements, reinforcement-mobilized loads and strains along the wall height was significantly affected by the adoption of heterogeneous reinforced layers. Yang, K., & Thoo, A. C. (2023)³ This study aims to conceptualise and perform a systematic scientometrics review of reverse logistics and sustainability performance to identify research hotspots and emerging trends and offer suggestions for future research agendas by reviewing, retrieving, and analysing 848 papers from the Scopus databases. Based on the analysis, there was a rapid rise in the number of publications within this domain, while, at the same time, increasing interdisciplinary subject research has appeared. Furthermore, scholars and institutions from China, India, and the USA were the most prolific in this research domain. Mainly, the current study underscored some pivotal research hotspots, such as assessing the reverse logistics effect on different sustainability performance dimensions and developing a reverse logistics and sustainability performance network. Moreover, emerging trends include game theory, artificial intelligence, Industry 4.0, the manufacturing industry of developing countries, and the circular economy. Finally, a moderator was also sought to be proposed to optimise the relationship between reverse logistics and sustainability performance due to the inconsistent link between them. Having a comprehensive overview of reverse logistics and sustainability performance over the last 24 years may help practitioners and researchers better understand global trends and directions in this field. Anita, A., Karthika, S., & Divya, P. V. (2023)⁴ In this study, the possible utilization of mixed construction and demolition waste (CDW) is evaluated for constructing geosynthetic-encased stone columns. A detailed geotechnical characterization is presented, including investigation of the physical, mechanical, and hydraulic properties of the CDW. Further, the performance of a group of 36 geosynthetic-encased stone columns (GECs) constructed using CDW (CDW-GECs) is investigated by 3D numerical modeling. Vertical stresses imparted to the CDW-GEC were 3 times the total vertical stresses imparted to the surrounding soil, resulting in a stress concentration ratio of 3. This is due to the better stiffness of the CDW-GECs compared with the surrounding soil and soil arching effect. The

CDW-GECs helped in dissipating excess hydrostatic pressure developed in the clay by acting as a vertical drain. Around 65% of the total settlement happened during construction itself. Maximum hoop tension in geosynthetic encasement of the CDW-GECs was developed at a depth of 2.5 times the diameter of the column and was 15 kN/m. Tension mobilized in the basal geogrid was in agreement with the differential settlement pattern with a maximum value near to the center of the embankment, which is found to be 23 kN/m. The present study indicates that CDW can be considered as a sustainable and valuable resource for the construction of geosynthetic-encased stone columns.

Methodology

The study is based on scientometric analysis and the data for this study was collected from the “Web of Science” a multidisciplinary platform developed by Institute for Scientific Information (ISI), now maintained by Clarivate Analytics Group. The present study is limited to the research output of ‘Geosynthetics’ for the past ten years 2013- 2022. A total of 1616 publications were recorded during the study period. The data was collected and analysed as per the objectives of the study. Each publication recorded with complete bibliographical details such as Title, Year, type of documents, geographical distributions, etc. have been downloaded from the WoS database. The data was tabulated in MS Excel for its simple frequency calculation, Bibexcel for analyzing and VOS viewer for visualization map.

Objectives of the Study

1. Analyse the annual distribution of Articles;
2. Find out the contribution of authorship Pattern of Publications;
3. Calculate the Relative Growth Rate (RGR) and Doubling Time of publications;
4. Identify the top countries of publications;
5. Study the Most Prolific Authors; and
6. Perform the time series analysis for the study period 2013-2022

Data Analysis and Interpretation

TABLE I YEAR-WISE DISTRIBUTION OF GEOSYNTHETICS

Year	Publication	Percentage
2022	239	14.79%
2021	233	14.42%
2020	209	12.93%
2019	184	11.39%
2018	173	10.71%
2017	171	10.58%
2016	144	8.91%
2015	111	6.87%
2014	78	4.83%
2013	74	4.58%
Total	1616	100

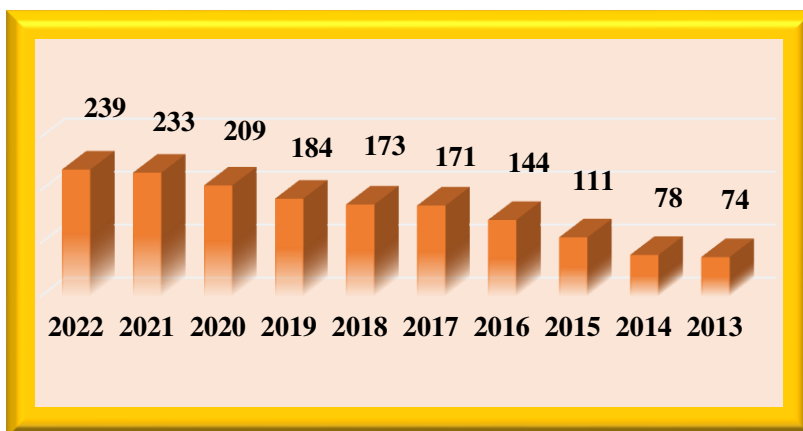


Fig.1 Yearly output

Table I and figure 1 indicates that the year-wise distribution of publication of Geosynthetics; it is observed that the research output in the field of Geosynthetics showing the ranges of growth year wise. The total number of publications 1616 was published, the highest number of publications in the year 2022 which was 239 articles. The minimum number of publications which was recorded in the year 2013 numbered in 74 articles. From 2013 the publication seemed to rise gradually from 74 to 239 in 2022.

TABLE II DISTRIBUTION OF DOCUMENT TYPES

Document Type	Records	Percentage
Article	1,558	96.41%
Review Article	29	1.80%
Editorial Material	26	1.61%
Correction	2	0.12%
Meeting Abstract	1	0.06%

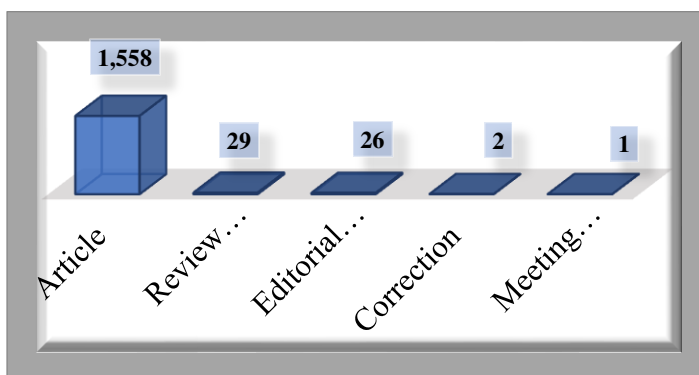


Fig.2 Focument types

Table II and figure 2 reveals the type of document used for publication during the period 2013-2022. It could be seen that most of the publications were in Articles with 1558, followed by Review Article 29, Editorial Material 26, Corrections 2, and Meeting Abstract 1 record.

TABLE 3 TOP 10 AUTHORS OUT OF 2856

Authors	Records	Percentage
Rowe RK	89	5.51%
Han J	56	3.47%
Bouazza A	41	2.54%
Bathurst RJ	33	2.04%
Zornberg JG	30	1.86%
Hatami K	25	1.55%
Touze-foltz N	20	1.24%
Brachman RWI	18	1.11%
Gates WP	18	1.11%
Leshchinsky B	18	1.11%

Above the table was shown most prolific authors (Top 10 only out of 2856)

TABLE 4 LANGUAGE-WISE DISTRIBUTION

Language	Records	Percentage
English	1,610	99.63%
Croatian	2	0.12%
German	2	0.12%
Japanese	1	0.06%
Portuguese	1	0.06%

The distribution of Geosynthetics by language showed that the most common scholarly communication was in the English language with 1610 (99.63%) articles. Followed by Croatian and German with 2(0.12%) records, Japanese and Portuguese with 01(0.06%) records.

TABLE 5 TOP 10 COUNTRIES OUT OF 70

Country	Records	Percentage
Peoples R China	422	26.11%
USA	336	20.79%
India	172	10.64%
Canada	164	10.15%
Australia	163	10.09%
Iran	121	7.49%
England	91	5.63%
Brazil	87	5.38%
France	64	3.96%
Japan	56	3.47%

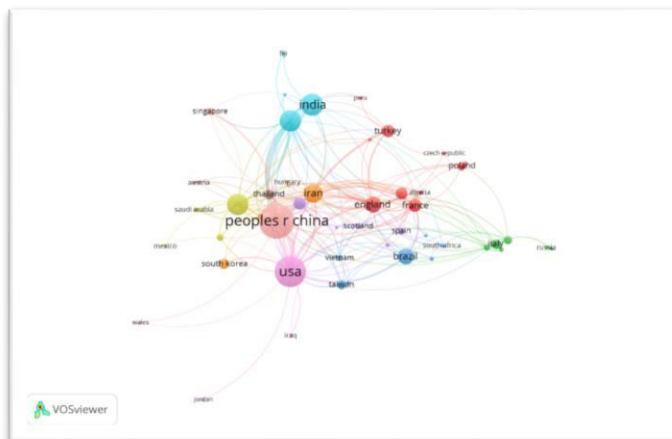


Fig.3 visualization map on country collaboration

Top10 countries are listed above in the table 5 shows the Distribution of International Collaborative Papers in Geosynthetics research and the highest number of publications is made by the China with 422 articles, followed by USA with 336 records and having second place; above the table Japan least with 56 publications for each respectively. And India had got the third position with 172 records.

TABLE VI AUTHORSHIP PATTERN

Authorship Pattern	Records	Percentage
1 Authors	53	3.279703
2 Authors	416	25.74257
3 Authors	468	28.9604
4 Authors	359	22.21535
5 Authors	180	11.13861
6 Authors	84	5.19802
7 Authors	37	2.289604
8 Authors	7	0.433168
9 Authors	7	0.433168
10 Authors	2	0.123762
12 Authors	1	0.061881
14 Authors	1	0.061881
15 Authors	1	0.061881
Total	1616	100

Table VI shows the authorship pattern of Geosynthetics research articles published during the period studied 2013 to 2022. The total publication numbered 1616 articles was published. The three author was the highest number of contributed 468 articles, followed by two authors 416 articles, four authors 359 articles, five authors 180 articles, six authors 84 articles, one authors 53

articles, seven authors 37 articles, eight and nine authors 7 articles, ten author 2articles andtwelve, fourteen and fifteen author are have just 1 article.

TABLE VII SINGLE VS MULTI AUTHORS

Authorship Pattern	Records	Percentage
Single Authors	53	03
Multi Authors	1563	97
Total	1616	100

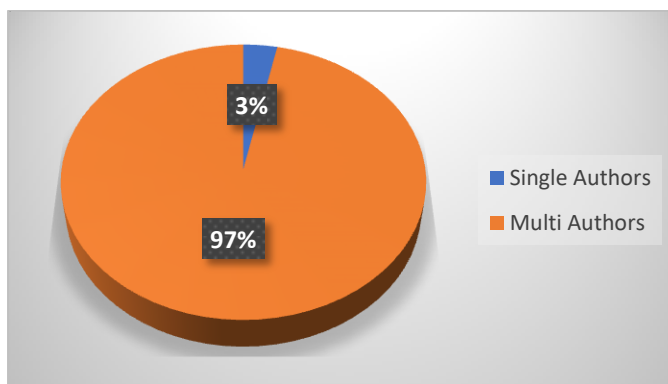


Fig.4 Single vs multi author

It is observed from the table 4.7 that the authorship pattern in terms of Single Authors and Multi-Authors during the period of study (2013 to2022). Out of 1616 research outputs, Multi – authors published the majority of 1563(97%) papers and single authors published the rest of 53(03%) articles.

TABLE VIII RELATIVE GROWTH AND DOUBLING TIME

Year	Records	Cumulative of Records	W1	W2	W2-W1	Mean RGR	DT	Mean DT
2022	239	239	5.476464	5.476464	0	1.8	0.42	0.42
2021	233	472	5.451038	6.156979	0.705941			
2020	209	681	5.342334	6.523562	1.181228			
2019	184	865	5.214936	6.76273	1.547794			
2018	173	1038	5.153292	6.945051	1.791759			
2017	171	1209	5.141664	7.097549	1.955885			
2016	144	1353	4.969813	7.21008	2.240266			
2015	111	1464	4.70953	7.288928	2.579397			
2014	78	1542	4.356709	7.340836	2.984127			
2013	74	1616	4.304065	7.387709	3.083644			

Table VIII shows that research results in the period from 2013 to 2022. A total of 1616 scientific articles published throughout India for 10 years. The highest percentage of papers was published in 2022. The above table shows that relative growth rates for Geosynthetics research is increased

from 0.70 in the year 2014, to 3.08RGR in 2022. Mean RGR is 1.80. And the doubling time for publications of Geosynthetics decreased in 0.98 in 2014 to 0.22 in 2022. Mean DT is 0.42 during the research period.

TABLE 9 TIME SERIES ANALYSIS

Year	Records(Y)	X	X ²	XY
2013	74	-5	25	-370
2014	78	-4	16	-312
2015	111	-3	9	-333
2016	144	-2	4	-288
2017	171	-1	1	-171
2018	173	0	0	0
2019	184	1	1	184
2020	209	2	4	418
2021	233	3	9	699
2022	239	4	16	956
Total	1616	-5	85	783

In this study, the straight-line equation under time series analysis is used to identify and evaluate the future development of Type 1 Touch Screen.

Straight line

$$Y_c = a + Bx$$

$$a = \frac{\sum Y}{N} = \frac{1616}{10} = 161.6$$

$$b = \frac{\sum XY}{\sum X^2} = \frac{783}{85} = 9.211765$$

Estimated literature in 2023 is when $X = 2035 - 2023 = 12$

$$= 161.6 + 9.211765 \times 12$$

$$= 170.8118 \times 12$$

$$= 2049.742$$

Estimated literature in 2023 is when $X = 2040 - 2023 = 17$

$$= 161.6 + 9.211765 \times 17$$

$$= 170.8118 \times 17$$

$$= 2903.801$$

The predicted value of scientific publications for the year 2035 is 2049.742, and the expected amount of publications for the year 2040 is 2903.801.

It is divided that the formula time series analysis shows the predicted value of literature output in Type 1 touch screen for the period between 2035 and 2040. The results represent that future growth and research trends in publications of Type 1 Geosynthetics in all over the world. The inferences prove that a gradual decreasing trend at the publications of Type 1 Geosynthetics research. Hence, it needs more attention to study for the betterment of Geosynthetics, growth in terms of scientific publications.

TABLE X TOP 15 KEYWORDS

S.No	Keyword	Publication
1	Geosynthetics	482
2	Behaviour	426
3	Performance	155
4	Soil	153
5	Model	153
6	Design	144
7	Strength	137
8	Sand	118
9	Tests	112
10	Hydraulic Conductivity	75
11	Bearing Capacity	71
12	Reinforcement	69
13	Stability	68
14	Shear-Strength	64

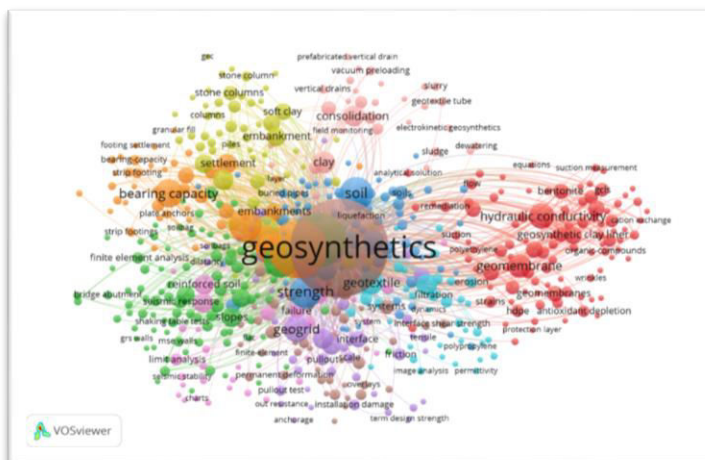


Fig. 5 Visualization map on keyword analysis

Table X presents the top 14 keywords used by the researchers in their publications. It is clearly seen from above the table that the word “Geosynthetics” has been used 482 times by the researchers, followed by the word “Behaviour” 426 times. And this is true to the case, as it supports the key word “Geosynthetics” for the present study.

Findings and Conclusion

1. The highest number of publications 239 articles with an average of 14.79 percentages in the year 2022. In this research gradually increased from 2013(74) to 2022(239).
2. The distribution of publications by document type was found mostly in the form of articles with 1558 publications during the study period.

3. The top 10 distribution of articles by the country during 2013-2022 ranked China at the top among all the countries with 422 (26.11%) publications.
4. The distribution of Geosynthetics by language showed that the most common scholarly communication was in the English language with 1610 (99.63%) articles.
5. The authorship pattern indicated that the maximum number of papers was published by the collaborative work of above three authors 468 and the least number of papers published by a twelve, fourteen and fifteen author with just 01 records.
6. During 2013 to 2022 there was a tremendous and gradual increase in the publishing of papers where multiple authors i.e., 1563 (97%) had contributed more than the single authors i.e., 53 (03%).
7. There could be observed an increasing and decreasing trend in the relative growth rate and doubling time data. The mean relative growth rate for the period 2013-2022 was 1.80. The mean doubling time was 0.42 for the period of 2013-2022.
8. The average degree of collaboration rate is 0.96.
9. The most common keyword used by the researcher was “Geosynthetics” with 482 of the total records.

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Bibliometric Analysis of Authorship Pattern in the Field of Neonatology

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Abstract

This study helps a bibliometric analysis of authorship pattern in the field of neonatology literature in the medline database which covered in pubmed. A total of 25239 of the publications in the research productivity in the field of neonatology covered in the medline database for a period of ten years i.e. From the year 2010 to 2019. The maximum number of 4248 publications was published in the year 2018. The ratio of single and multi-authors' publications is 1:21. The year-wise degree of collaboration shows the ratio in-between 0.91 to 0.96 in the field of neonatology literature. The result shows the multi-authors' publications are more in the field of neonatology. The values of co-authorship index (cai) for single and two authored publications were higher in the first block and declined in the second blocks. But, the value of co-authorship index (cai) for more than two authors' publications was lower in the first block and higher in the second block period in neonatology literature. It shows that the collaboration of authors in the field of neonatology research. It also displays that multiple authors' publications are in an increasing trend in recent years. The average collaborative co-efficient (cc) has been reached at 0.62 which also shows large number of publications was by multiple authors.

Keywords: Bibliometrics, Neonatology, Degree of Collaboration (dc), Co-Authorship Index (cai), and Collaborative Co-Efficient (cc).

Introduction

Neonatology is a sub-specialty of pediatrics. It consists of the medical care of newborn infants. The patients of neonatologists are newborn infants who require special medical care. The more number of publications were printed in the field of Neonatology due to more research in the field of Neonatology. So, this is suitable period to evaluate quantitatively the literature in the field of Neonatology. There are number of Bibliometric techniques were used by scientists. But in this paper the Bibliometric techniques i.e. Degree of Collaboration (DC), Co-Authorship Index (CAI), and Collaborative Co-efficient (CC) were used. These bibliometric techniques help to study of authorship pattern in the field of Neonatology. It was meant to study the authorship pattern in the field of Neonatology with the help of the database namely MEDLINE which covered in PubMed. It is required to study in the area of authorship pattern to expose the research publications in the field of Neonatology.

Literature Review

The contributions on authorship pattern in the bibliometric analysis were studied by different researchers. In this paper only a few studies discussed. Das studied the collaboration pattern in computer science research in India. Farahat study was authorship patterns in agriculture sciences in Egypt. Shaoyi He analyzed the geographic distribution of foreign authorship in LIS Journals. A bibliometric study of the publication patterns of scientists in South Africa was studied by Daisy Jacob. Scientific productivity of authors in theoretical population genetics was analyzed by Karisiddappa, Gupta, and Kumar. Koteswara Rao, and Raghavan studied the collaboration in knowledge production: a case study of superconductivity research in India. The research conducted by Maheswarappa, and Savadatti in authorship pattern and collaborative research in

Plant Breeding. Sanjay Mishra and, Manoj Mishra examined the collaborative research in medicinal and aromatic Plants. Munshi, Vashishth, and Gautam studied the research collaboration in agricultural sciences.

Aim of the Study

1. To study the authorship pattern. i.e. Single Vs. Multiple authors in the field of Neonatology literature.
2. To analyze the collaboration research in the field of Neonatology literature.
3. To observe the types of authorship pattern in the field of Neonatology literature.
4. To evaluate the collaboration of research in the different countries in the field of Neonatology literature.

Method Used for this Study

The publications covered in the MEDLINE data from the year 2010 to 2019 in the field of Neonatology which are covered in the PubMed were saved as text file. The saved publications details were loaded in SPSS for the use of analysis. The keyword 'Neonatology' was used to retrieve the publications details available in the above-said database. The publications details saved from the source database on the literary production of 'Neonatology' have been scrutinized by using bibliometric techniques i.e. Degree of Collaboration (DC), Co-Authorship Index (CAI), and Collaborative Co-efficient (CC).

Data Analysis

The year-wise publications of literature in the field of Neonatology are given in Table-1. A total of 25239 of the publications in the research productivity in the field of Neonatology covered in the MEDLINE database for a period of ten years i.e. from the year 2010 to 2019. The maximum number of 4248 publications was published in the year 2018. This is followed by 3970 publications in the year 2019 and 3286 publications in the year 2017. It is also seen from the table that from the year 2010 onwards there is a gradual increase in Neonatology research publications every year except the years i.e. 2016 and 2019 where the publications were decreased compared to the previous year. (Figure-1)

TABLE I LITERATURE PUBLISHED IN NEONATOLOGY BY YEAR-WISE

Year	No. of Publications	%	Cumulative No. of publications
2010	1089	4.31	1089
2011	1192	4.72	2281
2012	1310	5.19	3591
2013	1592	6.31	5183
2014	2335	9.25	7518
2015	3191	12.64	10709
2016	3026	11.99	13735
2017	3286	13.02	17021
2018	4248	16.83	21269
2019	3970	15.73	25239
Total	25239	100.00	

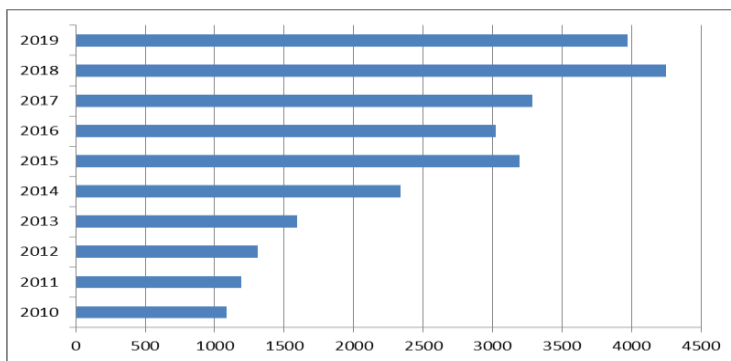


Fig.1 Literature published in neonatology by year-wise

This study has tried to examine the level of authorship pattern. i.e. Single Vs. Multiple authors, Degree of Collaboration (DC), Pattern of Co-Authorship Index (CAI), and Collaborative Co-efficient (CC).

The authorship pattern of Neonatology literature has been presented in the table-2. The year-wise sharing of publications according to the number of authors is presented. It is seen from the Table-2 that 4.75% of the publications were by single author publications. 94.88% represent two and more authors’ publications, which show that the shared research is evident in the field of Neonatology literature. Meager percentages i.e. 0.37% of publications show anonymous authors. (Figure-2)

TABLE II AUTHORSHIP PATTERN OF NEONATOLOGY LITERATURE

Authors	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	No. of Publications	%
Single Author	93	78	97	94	127	144	129	138	149	149	1198	4.75
Two Authors	113	123	122	131	203	250	209	207	329	289	1976	7.83
Three Authors	141	131	161	181	228	322	273	286	393	337	2453	9.72
Four Authors	139	174	201	209	303	405	348	385	478	417	3059	12.12
Five Authors	168	184	172	260	289	415	404	426	503	473	3294	13.05
> Five Authors	427	482	548	707	1176	1647	1658	1837	2384	2299	13165	52.16
Anonymous	8	20	9	10	9	8	5	7	12	6	94	0.37
Total	1089	1192	1310	1592	2335	3191	3026	3286	4248	3970	25239	100.00

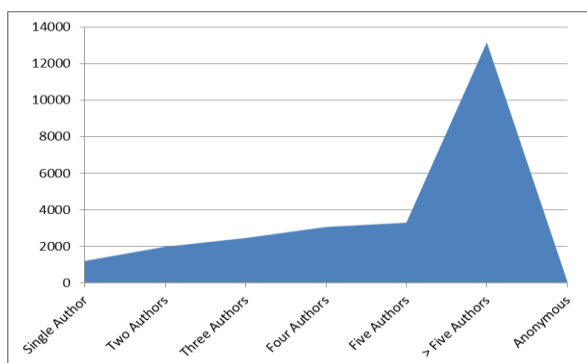


Fig. 2 Authorship pattern of neonatology literature

Table III displays that the authorship pattern of research output of Neonatology literature. The multi-authors' publications found the major percentage in this study. It also shows that a total of 94.88% of publications are written by multi-authors. The ratio represents that the single and multi-authors' publications is 1:21 in the field of Neonatology. But, it was understood that meager percent (0.37%) represent anonymous authorship in this study. The high occurrence by multi-authors' publications is the phenomenon of scientific research which is proved by different researchers in their different studies. (Figures-3, and 4).

TABLE III SINGLE VS MULTI AUTHORED PUBLICATIONS IN NEONATOLOGY RESEARCH

Year	Anonymous		Single Authored		Multi Authored		Total	%
	Publications	%	Publications	%	Publications	%		
2010	8	8.51	93	7.76	988	4.13	1089	4.31
2011	20	21.28	78	6.51	1094	4.57	1192	4.72
2012	9	9.57	97	8.10	1204	5.03	1310	5.19
2013	10	10.64	94	7.85	1488	6.21	1592	6.31
2014	9	9.57	127	10.60	2199	9.18	2335	9.25
2015	8	8.51	144	12.02	3039	12.69	3191	12.64
2016	5	5.32	129	10.77	2892	12.08	3026	11.99
2017	7	7.45	138	11.52	3141	13.12	3286	13.02
2018	12	12.77	149	12.44	4087	17.07	4248	16.83
2019	6	6.38	149	12.44	3815	15.93	3970	15.73
Total	94	100.00	1198	100.00	23947	100.00	25239	100.00

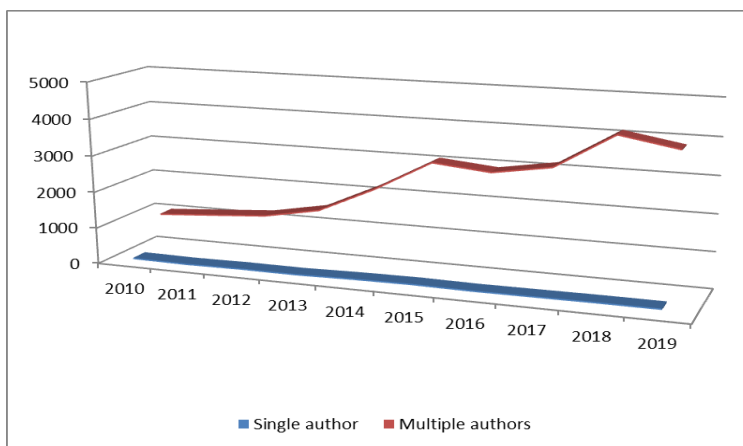


Fig. 3 Single vs. Multi authored publications in neonatology research

The Degree of Collaboration of authors by year-wise is seen in Table-4. The Degree of Collaboration in the field of Neonatology literature has been calculated with the help of the formula made by K. Subramaniam. Consequently, the Degree of Collaboration has been calculated for the year 2010. It is given as follows:

$$C = \frac{988}{988 + 93} = \frac{988}{1081} = 0.91$$

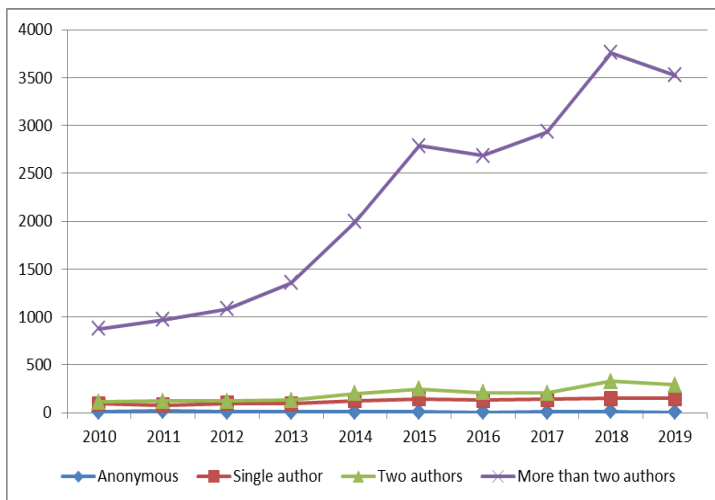


Fig. 4 Authorship pattern of neonatology research

Correspondingly, the Degree of Collaboration is considered for every year and given in Table-4. It is presented from the table that the year-wise Degree of Collaboration displays the ratio in-between 0.91 to 0.96 in the study of the degree of collaboration in the field of Neonatology. The year-wise Degree of Collaboration falls more than 0.5 and showing that the multi-authors' publications are more in the field of Neonatology. (Fig.5)

TABLE IV DEGREE OF COLLABORATION IN NEONATOLOGY RESEARCH

Year	Anonymous	Single author	Two authors	Three Authors	Four Authors	Five Authors	More than Five authors	Total	More than one author	Degree of Collaboration
2010	8	93	113	141	139	168	427	1089	988	0.91
2011	20	78	123	131	174	184	482	1192	1094	0.93
2012	9	97	122	161	201	172	548	1310	1204	0.93
2013	10	94	131	181	209	260	707	1592	1488	0.94
2014	9	127	203	228	303	289	1176	2335	2199	0.95
2015	8	144	250	322	405	415	1647	3191	3039	0.95
2016	5	129	209	273	348	404	1658	3026	2892	0.96
2017	7	138	207	286	385	426	1837	3286	3141	0.96
2018	12	149	329	393	478	503	2384	4248	4087	0.96
2019	6	149	289	337	417	473	2299	3970	3815	0.96
Total	94	1198	1976	2453	3059	3294	13165	25239	23947	0.95

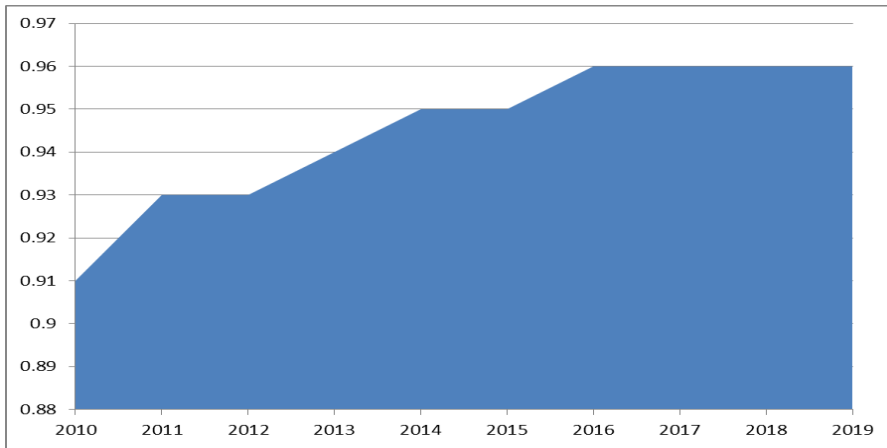


Fig.5 Degree of collaboration in neonatology research

To study the patterns of co-authors have changed in the field of Neonatology Research from the year 2010 to 2019, the formula of Co-Authorship Index (CAI) has been employed. For the purpose of measuring CAI the entire data set was divided into two blocks. Consequently, the Co-Authorship Index (CAI) has been considered for the single author (first block) as follows:

$$CAI = \{(489/7462) / (1198/25145)\} * 100$$

$$CAI = 137.55$$

Likewise, the Co-Authorship Index (CAI) is measured for every block and given in Table-5. For measuring the CAI, the entire publications were divided into two blocks as per the formula and the results of CAI are presented in Table-5. It is seen from the Table-5 that the value of CAI for single-author publications was higher in the first block and declined in the second block. Likewise, for two-author’s publications, the CAI in the first block was 118.01 and declined in the second block. The CAI for more than two authors’ publications was lower in the first block and enriched in the second block period i.e. from the year 2015 to 2019. This shows that the group of researchers worked together in the field of Neonatology research. It also shows that it is in an increasing trend in recent years. (Fig.6)

TABLE V PATTERN OF CO-AUTHORSHIP INDEX (CAI) BY YEAR-WISE

Sl.No.	Year	Single Author	Two authored	More than Two authors	Total
1	2010-2014	489 (137.55)	692 (118.01)	6281 (96.33)	7462
2	2015-2019	709 (84.16)	1284 (92.40)	15690 (101.55)	17683
Anonymous					94
Total		1198	1976	21971	25239

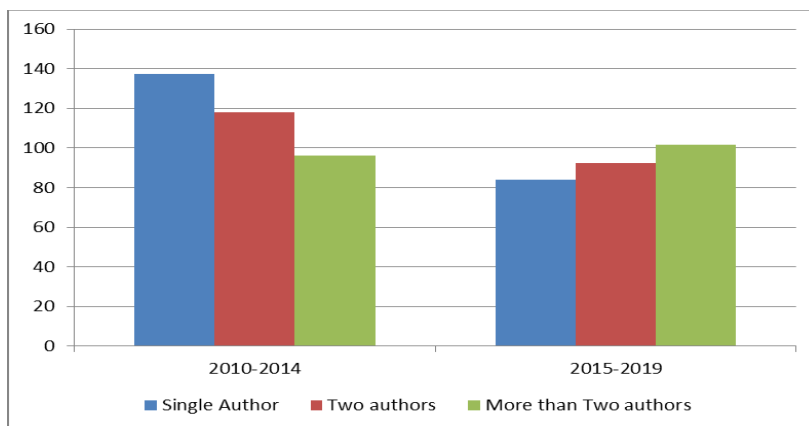


Fig. 6 Pattern of co-authorship index (cai) by year-wise

To study the pattern of co-authorship among countries, the entire publications were divided into single, two and more than two authors for each country and the results are given in the Table 6. The pattern of co-authorship among different countries has been examined by making use of collaborative Co-efficient (CC) recommended by Ajiferuke. The formula employed for measuring CC is presented below:

$$CC = 1 - \left[\sum_{j=1}^k (1/j) F_j / N \right]$$

F_j = the number of authored publications

N = total number of research published; and

k = the greatest number of authors per paper

$$CC = 1 - [(349/5807) + \frac{1}{2} (555/5807) + \frac{1}{3} (4903/5807)]$$

$$= 0.61$$

According to Ajiferuke, the CC tends zero as single authored publications lead, and on the other hand if the CC is in increasing that results in multi authored publications. In other words, greater the value of CC, more the chance of multi authored publications in the field of Neonatology. In this study it is seen that the average CC has been arrived at 0.62 which shows large share of publications were by multiple authors in the field of Neonatology.

The value of CC for Tunisia, Romania, Mexico, and Bulgaria was highest (0.67 each) in this study followed by Greece, and Sweden (0.66 each) and this is followed by Bangladesh, Pakistan, Puerto Rico, and China (Republic: 1949-) (0.65 each). The other countries in the table-6 have also above the CC value of 0.50 as more than the value of 0.5 indicates that those countries have better collaboration of research.

TABLE VI COLLABORATIVE COEFFICIENT (CC) AUTHORSHIP PATTERN

Country	Single authored publications	Two authored publications	More than Two authors	Total	Collaborative Coefficient
United States	349	555	4903	5807	0.61
England	161	351	3271	3783	0.62
Switzerland	101	91	1062	1254	0.60
Germany	94	46	913	1053	0.60

Bibliometric Analysis of Authorship Pattern in the Field of Neonatology

Netherlands	43	119	781	943	0.62
Ireland	33	44	505	582	0.62
Australia	14	28	444	486	0.64
Norway	48	45	400	493	0.59
France	44	37	392	473	0.59
India	43	85	346	474	0.58
China	4	32	254	290	0.64
Singapore	10	9	203	222	0.63
Italy	23	8	146	177	0.57
Turkey	4	7	136	147	0.64
Brazil	5	6	78	89	0.62
Poland	2	6	69	77	0.64
Spain	3	7	65	75	0.62
Denmark	3	3	66	72	0.63
Japan	3	1	56	60	0.63
Bangladesh	1	0	42	43	0.65
Pakistan	0	3	37	40	0.65
United Arab Emirates	4	6	30	40	0.58
Israel	1	4	30	35	0.63
Greece	0	1	33	34	0.66
Argentina	5	2	25	32	0.55
Scotland	1	1	31	33	0.64
Austria	2	0	30	32	0.63
Canada	1	0	29	30	0.64
Czech Republic	2	2	24	28	0.61
Tunisia	0	0	28	28	0.67
Iran	1	1	22	24	0.63
Romania	0	0	21	21	0.67
Sweden	0	1	17	18	0.66
Saudi Arabia	2	1	11	14	0.56
Chile	3	0	10	13	0.51
Puerto Rico	0	1	12	13	0.65
Mexico	0	0	12	12	0.67
Belgium	0	4	7	11	0.61
Bulgaria	0	0	11	11	0.67
China (Republic : 1949-)	0	1	9	10	0.65

Other countries	10	9	73	92	0.58
Not Mentioned	178	459	7337	7974	0.64
Anonymous				94	
Total	1198	1976	21971	25239	0.62

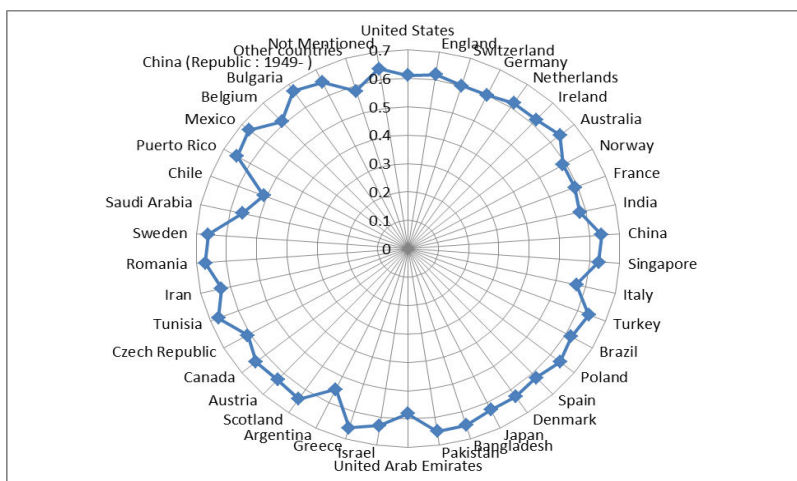


Fig. 7 Collaborative coefficient (cc) authorship pattern

Discussion

1. A total of 25239 of the publications in the research productivity in the field of Neonatology
2. The maximum number of 4248 publications was published in the year 2018 in the field of Neonatology literature.
3. A total of 0.37% of publications represents anonymous authors in the field of Neonatology literature.
4. A total of 94.88% represent two and more authors' publications, which show that the shared research is evident in the field of Neonatology literature.
5. The ratio of single and multi-authors' publications is 1:21 in the field of Neonatology literature.
6. The year-wise Degree of Collaboration shows the ratio in-between 0.91 to 0.96 in the field of Neonatology literature.
7. The value of CAI for single-author publications was higher in the first block and declined in the second block in the field of Neonatology literature.
8. Likewise, for two-author's publications, the CAI in the first block was higher and declined in the second block in the field of Neonatology literature.
9. The CAI for more than two authors' publications was lower in the first block and enriched in the second block period in the field of Neonatology literature.
10. The average CC has been arrived at 0.62 which indicates large number of publications was by multiple authors in the field of Neonatology literature.
11. The total study exposed that the multi-authors' publications are lead in the field of Neonatology literature.

It also shows that the collaboration in Neonatology research is in an increasing trend in recent years.

Conclusion

A total of 25239 of the publications were found in the field of Neonatology literature. A total of 94.88% publications represent collaborative research. The average value of Degree of Collaboration (DC) has arrived at 0.95. The Co-Authorship Index (CAI) for single-author and two authors' publications show a declining trend from one block year period to another block. But the CAI for more than two authors' publications was lower in the first block and enriched in the second block period. It displays that the recent years the collaboration of authors was increased. The average of collaborative Co-efficient (CC) has been reached at 0.62. The result shows large shares of publications were by multiple authors.

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Mapping the Indian Research Output on Digital Marketing during 1992-2022

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Abstract

Digital marketing has become one of the emerging topics among the both Library & Information Science (LIS) professionals and science & humanities research scholars. To conduct this study, the researcher have used Web of Science database for articles published between 1992 and 2022 which brought out 1006 publications from India. MS-Excel, Biblioshiny and Vosviewer were used to analyze the extracted data. A significant increase in the publication on digital marketing over the last decade (2011 to 2022) has been observed. It is found that the average authors per document are 3.03 and the collaborative index is 3.22 in this study. This research gives a better knowledge of collaborative processes in the digital marketing. The outcome of the research will assist in intensifying the digital marketing profile among the researchers who are unfamiliar

Keywords: Digital Marketing; Marketing; Web of Science; Bibliometrics; Co-citationanalysis; Co-occurrence network;

Introduction

The economy of many countries significantly changed with the advent of personal computers with the internet connectivity. Marketing has changed with rapid developments of ICT tools in digital era with the ever changing and dynamic world. The most assertive tool to keep connected with customers any where any time is through Digital Marketing.

Digital Marketing refers to any marketing done by use of web and digital channels namely, search engines, social media, email, and other web pages connecting with the customers Digital Marketing comes with different terms such as Online Marketing, Electronic Marketing, e-Marketing, Web Marketing and so on. Digital Marketing has become the most influential marketing platform for advertising products and services in contrary to traditional marketing (Schwarzl & Grabowska, 2015; Yasmin, et al., 2015). The increased level of social involvement, propagation and correspondence plays a major role in the evolution of digital marketing which have in turn enhanced the firm's ability to engage with their customers and keep them informed of the products and services. (Ko, 2019; Lamberton & Stephen, 2016; Martín-Consuegra, et al., 2018).

Review of Literature

Adopting digital marketing as a method to enhance the sales of products have recently led to many research works published in the last few decades especially after 2010. The Literature on the metrics in digital marketing indicates the importance of digital marketing in our everyday lives and scholarly world. (El-Gohary, 2010) in his study examined the literature review on e-marketing from the perspective of small businesses and found that the studies have exploited both quantitative and qualitative approaches. Meanwhile from the point of author's view there was no classic method for the research undertaken. The study also suggested that triangulation approach required affirmation to a larger extent with respect to the effort, time, and money and also it removes the prejudice which is frequently linked to a particular technique and helps in increase the

validity and credibility of the research conclusions. (Corley, Jourdan & Ingram, 2013) performed a content analysis on Internet Marketing for 18 years (1994-2012) of 411 articles in the top 13 Information System Journals and 22 research papers published in the 5 most productive marketing journals. The results showed an inclined distribution of research papers on internet marketing that mainly focused on investigative procedures, and the various approach to researches that were also under stated in the internet marketing research cluster. The study was conducted in 3 different phases: Phase 1- Cumulation of Research articles ; Phase 2- Categorization of research approach & Phase 3- Categorization by internet marketing research topic. (Appio, Martini, Massa & Testa, 2016) used bibliometrics and text-mining techniques to evaluate the scholarly output of research based on social media. 155 articles were taken for this study and applied DCA analysis that revealed 5 main clusters namely: “Organizational Learning; Open and Distributed Innovation; Value Co (Creation); User/Customer involvement in innovation processes; and Knowledge sharing in Communities”. The study also stated that innovation in social media is relatively a impending area of research. Clusters 1, 2 & 3 shape the contents on customer’s and firm’s antecedents, their behaviors, platform characteristics, firm’s performance, while Clusters 4 & 5 have been attentive on the relationship between Input & Process and Process & Output. (Fatima, A. et al. 2017) in their study informed that “most of the academic research work related to electronic commerce in China has been published on logistics topic and least number of researchers was found to be on marketing and CRM issue, and transformation issue from last six years is available on university digital resources. So, digital resources based studies is helpful in analyzing academic research trends”. (Krishen, et al, 2021) assessed about the bibliometric network analysis on interactive digital marketing from different perspectives. The fitted growth indicated 5 stages of development related to interactive digital marketing. It is also proved that the analysis provided an immense sight of integrative and comprehensive scholarly activities on interactive digital marketing. (Karaman & Aykin, 2021) aimed to assess the papers on digital marketing published during 1985-2021 using social network analysis method and also the show t

The research trends in the digital marketing area. For this, the 469 research articles on digital marketing were extracted from Scopus database. The most prominent languages in which the research articles were published were in English, Portuguese and Spanish. India, America and United Kingdom contributed the majority of publications. It was also found that the journal “Digital Marketing” have received the maximum number of citations and the article authored by (Kannan and Li, 2017) have received the most number of citations. The most discussed topics were “interests of young adults, evolving big data, and consumer buying behavior”. The most frequently used keywords were “digital marketing, marketing, commerce, social media, sales, social networks, human, artificial intelligence, internet, and big data”. (Ghorbani, et al., 2021) analyzed in their research the importance of digital marketing research for the period 1979 to 2020 through bibliometric tools. 924 articles published indexed in Scopus database were taken for study using bar charts and bibliometrix R tool. This results showed deliberate interest prevailed during the early years, first two decades. The highest quantity of research papers on digital marketing was reported in the year 2019 with 163 papers. The countries like the USA, Korea, Australia, France, Netherlands etc had the highest multiple country collaboration. The keyword analyses revealed that during 2001-2016 the focus was more on internet marketing, search engine marketing, internet, e-commerce, advertising, mobile marketing whereas the focus shifted to consumer behavior, online advertising, display advertising, online marketing, machine learning, real-time bidding, big data, digital marketing, content marketing, social media, social media marketing and influencer marketing during 2016-2020. Given this growing use of digital marketing, academic research on digital marketing is sparse, particularly in comparison to other research areas in promotion of products

Objectives of the Study

The aim of the study was to examine the research and development dynamics in digital marketing from the perception of multi-disciplinary domain through analyzing the relevant research articles obtained under study.

1. To analyze the development of digital marketing research and citations from India
2. To identify document wise research output on digital marketing
3. To find out the Authorship pattern of Digital Marketing research in India
4. To find out the most productive authors, research institutions and journals
5. To identify the most frequently used keywords by Indian researcher in digital marketing research and reveal the co occurrence of keywords
6. To Co-citation network of journals
7. To identify the most prominent subject category on publishing digital marketing research.

Data Source and Search Strategy

The source of data for this study is 'Web of Science-Core Collection', a Clarivate Analytics Product. The authors downloaded all records published using the Advance search mode and the string CU= "India" during 1992 to 2022. The downloaded data included name of all authors along with their departments, affiliations, source name, and place of publications, type of publications and citations received by the retrieved articles for the study period.

Scientometric Indicators

There were many bibliometrics and scientometric indicators proposed in the literature review to evaluate the research output, and how well the research is impacting the countries, institutions, and authors research performance. In the present study, quantitative analysis was done using simple frequency and descriptive statistical tools. To begin with, the number of publications, document type and authorship pattern were evaluated. In the next step the relative part of the research techniques such as co-authorship pattern, co-occurrence of keywords and co-citation network were identified and visualized the bibliometrics maps using VOSviewer application and to determine the nature of citations, authorship pattern, production from different countries and co-word mapping, the Biblioshiny application was used.

Research Findings

From the below Fig. 1, it can be identified that the pattern of publication has a fluctuating research trend during 1992 to 2005 with 61 publications in total during this period. There was an increase in the publications of 15 articles in 2006 and then dropped off to 9 publications in 2007, again increased to 13 publications in 2008 and to only 4 publications in 2009. Having the year 2000 as the landmark of Internet penetration in India during these years, the researchers limited their research and digital marketing was also in budding stage. It has been identified that after 2010 reported a noteworthy contribution on digital marketing.

The annual percentage of growth rate is 17.13%. The decennial dispersion of publications illustrates that almost only 3.88% of publications were published in the first decade 1992 – 2002 and in the second decade 11.13 % of publications and the largest share of 84.99% works related to digital marketing were published in the last decade.

It was found that there were less than 40 publications during the first decade 1992 – 2002: 2 publications each in 1992 and 1993; 7 publications each in 1995 and 2000; 5 publications in 2001 and 3 publications each in 1996, 1997, 1999 and 2002. There were no publications in 1998. During the second decade 2003 – 2012, there were only 112 articles published. From 2013 to

2019, it was evident from the study that there was increase in the interest on digital marketing among the marketing professionals and academicians as there were 855 publications published during that period. The year 2021 (n=201, 19.98%) had highest share of publications during the period of study.

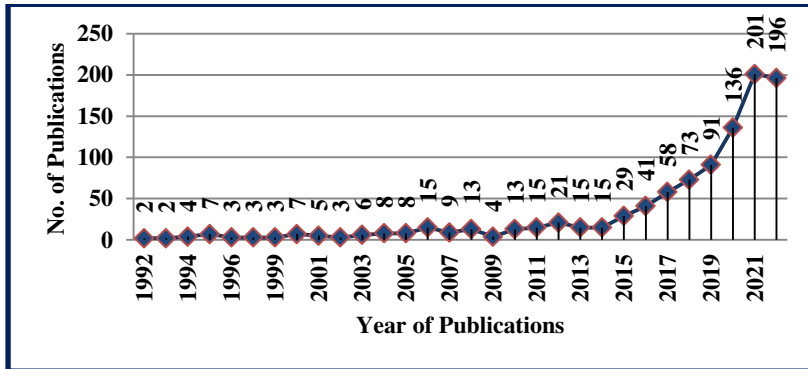


Fig.1 Year wise distribution of articles

As per Fig. 2 there were totally 533 citations recorded for the 1006 publications on digital marketing during the study period. The year 2016 and 2021 had more than 50 citations and 2001, 2018 and 2022 had zero citations. The trend shows an inconsistency in the citations obtained by the articles published during the study period. The average citations per document are 23.61 which are evaluated by means of dividing the total number of citations by the total number of articles. The average citation per year per document is 4.121, calculated by dividing the total number of citation received by a paper by the number of citable years (30 years).

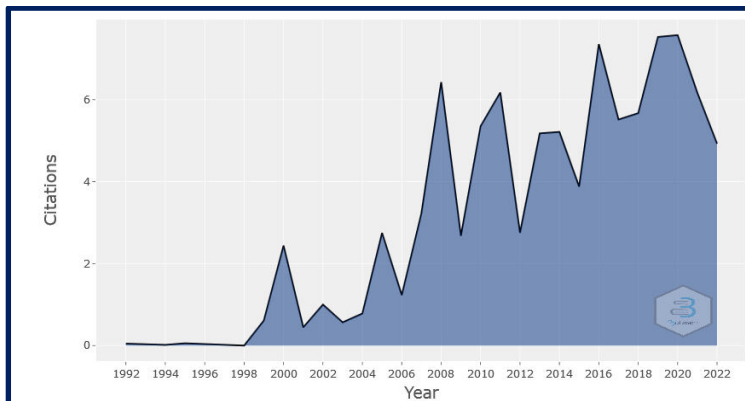


Fig. 2 Average total citation per document per year

It can be seen from Fig. 3, the marketing researchers have preferred to have their works published in the form of Articles (82%) followed by Review Articles(14%) and the remaining document types form less than 4% of the publications.

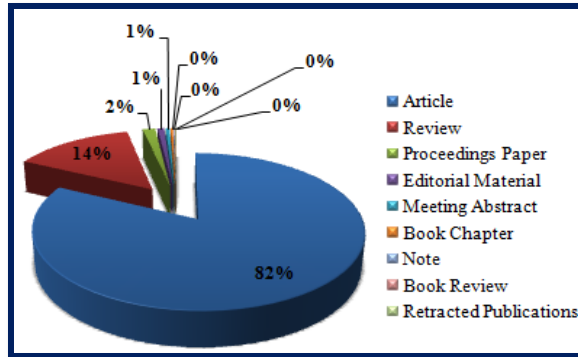


Fig. 3 Document types of publications on digital marketing

The assessment of the pattern of authorship is a significant bibliometric indicators that can be used to establish the roles the authors play in the research output on digital marketing.

AUTHORS	
Authors	3050
Author Appearances	3879
Authors of single-authored documents	75
Authors of multi-authored documents	2975
AUTHORS COLLABORATION	
Single-authored documents	82
Documents per Author	0.33
Authors per Document	3.03
Co-Authors per Documents	3.86
Collaboration Index	3.22

Fig.4 Authorship and collaboration pattern

It is evident from the above Fig. 4 that there were totally 3050 authors in total contributed research on digital marketing during the study period. The average authors per document are found to 3.03 and there are about 2.86 authors who have coauthored the publications in this case. The collaboration index (Total authors of co-authored articles/ No. of coauthored articles) is evaluated as 3.22. Further Fig.5 shows the authorship pattern in the digital marketing domain research from the extracted data during the study.

Fig. 5 exhibits clearly the rate of each type of authorship pattern having 282(28.03%) publications with the highest share from two authors followed by 261 publications (25.94%) from three authors and 233 publications (23.16%) from five and more than five authors. The least 82(8.15%) publications was contributed by single authors and 148 publications by four authors. Multiple Authorship accounts for about a major share of 91.85% of publications on digital marketing. Hence, this analysis supports and interprets that the digital marketing research is often related with collaborative work rather than individual research work from Indian researchers.

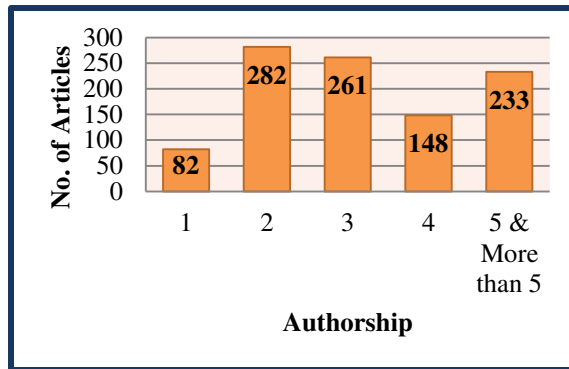


Fig.5 Authorship pattern of digital marketing research

Table 1 lists out the authors who have published more than 12 articles in Digital Marketing field over the period of study. The most productive author was Kumar S, affiliated to Malavia National Institute of Technology, Jaipur (N=26, 2.58%) followed by Kumar, A affiliated to Simbiosis Institute of Business Management, Maharashtra (N=23, 2.29%) and remaining authors had less than 1.7% share of total publications under study.

With respect to the citations per paper, it was found that Dwivedi, YK (N=15, TC=829, CPP=55.27) of Swansea University, UK was the most prolific author followed by Kumar A (N=23, TC=1097, CPP=47.70) and Rana NP (N=15, TC=624, CPP= 41.60) of University of Bradford, UK. These top ten authors contribution amounted together 16.40% of the total publications and citations per paper was recorded at 30.91.

Table II reveals the most prolific institutions based on the number of highest research output. According to the Web of Science Database, Indian Institute of Technology, Madras (N=70, 6.96%) has the largest of research output in the field of Digital Marketing followed by Indian Institute of Management, Ahmadabad (N=36, 3.58%) and National Institute of Technology (N=31, 3.08%). The remaining eight institutions, have contributed less than 3% of the total research output: Indian School of Business (2.39%); Indian Institute of Science, Swansea University, University of Delhi (2.19%); Indian Institute of Management, Calcutta, Indian Institute of Technology Delhi (1.79%) and Indian Institute of Management Ranchi (1.69%).

Fig. 6 shows the most productive journals preferred by the marketing researchers in India. Journal of Retailing and Consumer Services ranked first in terms of publications i.e. 29 Publications followed by IEEE Access (N=27). Electronics Information & Planning and Journal of Business Research have contributed 17 publications each. International Journal of Bank Marketing, International Journal of Information Management, Journal of Research in Interactive Marketing and Marketing Intelligence & Planning has contributed 13 publications each. Technological Forecasting and Social Change have 12 publications and Wireless Personal Communications have 11 publications published in digital marketing research.

On the other hand Journal of Retailing and Consumer Services has received the highest 1319 citations to its publications followed by Journal of Business Research with 1100 citations to its publications. Electronics Information & Planning has received the least number of 13 citations.

TABLE I MOST PROLIFIC AUTHORS IN DIGITAL MARKETING RESEARCH

Author	Affiliation	No. of Publications	% of Publications	No. of Citations	CPP
Kumar S	Malaviya National Institute of Technology, Jaipur, Rajasthan	26	2.58	568	21.85
Kumar A	Symbiosis International University, SIBM, Pune, Maharashtra	23	2.29	1097	47.70
Gupta S	Indian Institute of Management, Udaipur, Rajasthan	17	1.69	257	15.12
Kumar V	Indian School of Business, Gachibowli, Hyderabad, Telangana	16	1.59	826	51.63
Rana NP	University of Bradford, West Yorkshire, UK	15	1.49	624	41.60
Dwivedi YK	Swansea University, Wales, UK	15	1.49	829	55.27
Singh S	Indian Agricultural Research Institute, New Delhi	14	1.39	139	9.93
Kumar N	Indian Institute of Technology, Roorkee, Uttarakhand	14	1.39	299	21.36
Gupta A	The Business School, University of Jammu, Jammu	13	1.29	329	25.31
Chatterjee S	Indian Institute of Technology, New Delhi	12	1.19	232	19.33

*CPP – Citations per Paper * TC – Total Citations * N – Number of Publications

TABLE II TOP 10 MOST PROLIFIC INSTITUTIONS IN DIGITAL MARKETING RESEARCH

Sl. No.	Name of Organizations	No. of Publications	Share of Publications (%)
1	Indian Institute of Technology, Madras	70	6.96
2	Indian Institute Management, Ahmadabad	36	3.58
3	National Institute of Technology	31	3.08
4	Indian School Business	24	2.39
5	Indian Institute of Science	22	2.19
6	Swansea University	22	2.19
7	University of Delhi	22	2.19
8	Indian Inst Management Calcutta	18	1.79
9	Indian Institute of Technology, Delhi	18	1.79
10	Indian Institute of Management Ranchi	17	1.69

Table III documents the most frequently used keywords by the authors of digital marketing research and their frequency number. The content of a research article can be summarized from the keywords the authors or the creators of databases chose to assign to those articles.

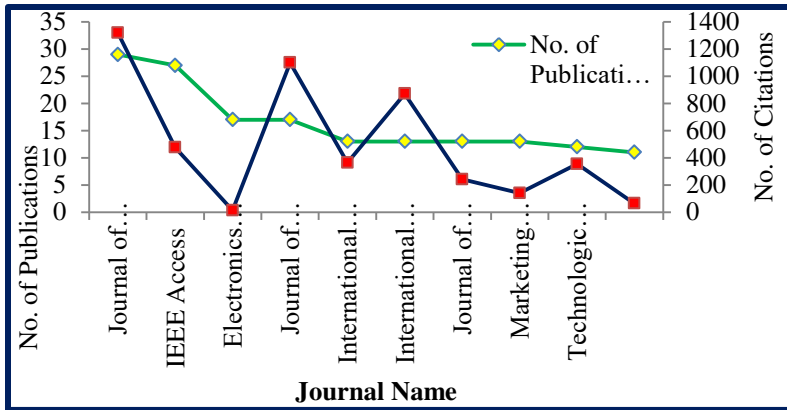


Fig. 6 Most productive journals in digital marketing research

TABLE III MOST FREQUENTLY USED KEYWORDS

Sl. No.	Author Keywords	No. of Occurrences
1	Impact	90
2	Internet	88
3	Model	69
4	Online	63
5	Management	57
6	Performance	55
7	Trust	44
8	Adoption	43
9	System	42
10	Information	41
11	Social Media	41
12	Technology	39
13	Word-of-Mouth	39
14	Design	37
15	Behavior	35
16	Framework	35
17	Satisfaction	34
18	Information-Technology	30
19	E-Commerce	27
20	Customer Satisfaction	26

From the above table, it has been identified that there were 20 keywords used or appeared in more than 25 times in the Web of Science database as per the author keywords analysis. The keyword ‘impact’ has appeared 90 times and occupied top position followed by internet (88), Model (69) and online (63). The remaining keywords like ‘management’, ‘performance’, ‘trust’, ‘adoption’, and so on has appeared less than 60 times in the documents retrieved from the database.

The idea of co-occurrence analysis of keywords was to explore the association among the keywords used in the data extracted which will help us to discover the hot topics and enable the current researchers to grasp the current scientific requirements. Vosviewer was used to analyze the co occurrence network of keywords and visual network map has been presented in fig. A total of 4203 keywords were investigated, out of which 101 met the threshold of minimum appearance of at least 5 times. The nodes in different colors exhibits clusters of different types, the size of each node corresponds to the incidence of keywords, and the connecting line thickness showed the

association between the keywords. The top three keywords were “internet of things” with 37 occurrences, link strength=59; “machine learning” with 33 occurrences, link strength=49, and “market research” with 17 occurrences, link strength=42.

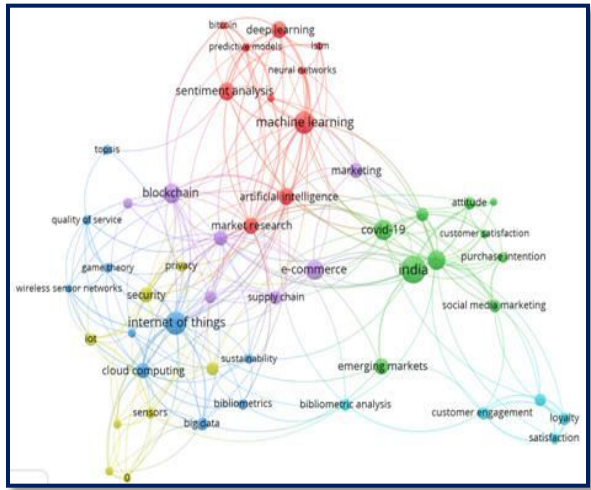


Fig. 7 Co-occurrence analysis of keywords

A Co-citation network is formed when two or more authors, papers, and journals are cited by another in papers concurrently by the researchers in journals. The researcher have again used the Biblioshiny application to present the co-citation network of journals, the distance between each node, and attempted to indicate the similar characteristics that formed the co-citation network in the below Fig 8. Different colors are used to classify the journals into clusters that are cited regularly. There were two clusters formed based on the values of the measures betweenness, closeness and page rank. Red Color Cluster 1, Blue Color Cluster 2; label size indicates how frequently each journal has been cited together. The same cluster of journals is listed in the following table 4. The number of nodes was limited to 20 yielding a flexible maximum result.

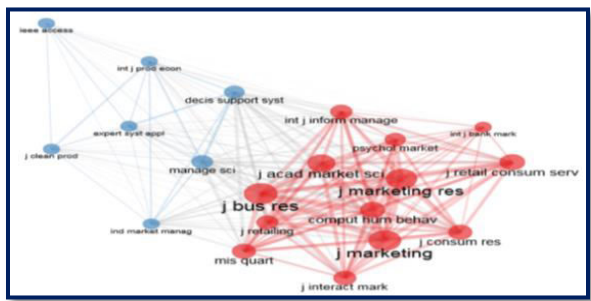


Fig. 8 Co-citation network visualization

According to the table 4 it found that with relative to closeness the two clusters have been formed which denotes that the Journal of business research has highest intermediation in cluster 1(Red Color) and International Journal of Information Management has the maximum intermediation in cluster 2(Blue Color). As per Fig.8 major contribution towards digital marketing research was published from Business & Economics (30%) followed by Computer Science (25%) and Engineering (22%). The other subject categories totally contributed 45% of the research output

Mapping the Indian Research Output on Digital Marketing during 1992-2022

which includes Telecommunication (11%), Information Science & Library Science (7%) and Science & Technology-Other Topics (5%).

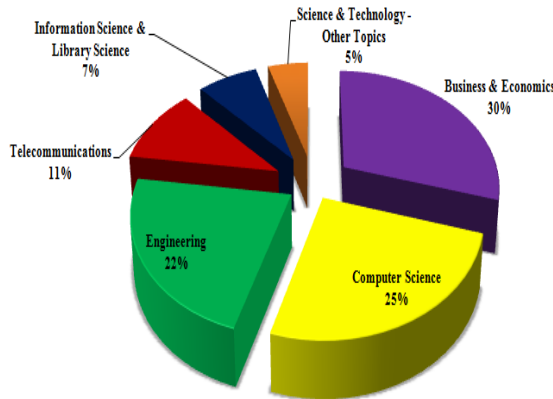


Fig. 8 Subject category wise distribution of research

TABLE VI CO-CITATION ANALYSIS FOR DIGITAL MARKETING RESEARCH

Sl. No.	Node	Cluster	Between's	Closeness	PageRank
1	Journal of business research	1	7.208049	0.034483	0.049798
2	Journal of marketing	1	5.216766	0.034483	0.049797
3	Journal of retail consumer services	1	3.631053	0.034483	0.049789
4	Journal of marketing research	1	5.051375	0.034483	0.049795
5	Computer human behavior	1	3.75394	0.034483	0.049788
6	Journal of the academy of market science	1	3.518726	0.034483	0.049793
7	Journal of consumer research	1	1.784548	0.034483	0.049787
8	Journal of retailing	1	1.696627	0.034483	0.049784
9	Journal of interactive marketing	1	2.035346	0.034483	0.049783
10	International journal of bank marketing	1	0.392759	0.034483	0.049737
11	Psychology & marketing	1	1.710811	0.034483	0.049782
12	International journal of information management	2	13.703	0.037037	0.050317
13	IEEE access	2	0.197162	0.037037	0.05013
14	Journal of cleaner production	2	0.578011	0.037037	0.050207
15	MIS quarterly	2	14.81542	0.037037	0.050316
16	International journal of production economics	2	1.171059	0.037037	0.050255
17	Management science	2	9.636676	0.037037	0.050308
18	Industrial marketing management	2	3.998734	0.037037	0.050269
19	Decision support system	2	9.450759	0.037037	0.050311
20	Expert systems with applications	2	1.449179	0.037037	0.050252

Findings and Discussion

The current study provided an outline of the conceptual growth of Digital Marketing research by examining 1006 articles extracted from Web of Science citation database. The results clearly indicate a rapid growth of literature in India only after the 21st century. About 84.99% of the research was produced during the last decade 2013 to 2022. This interprets that progressive of Information and Communication Technologies (ICTs) across all subject area during this period has been the key factor for the enormous contribution by the researcher. There were totally 533 citation recorded out of which the year 2021 had the highest number of 201 citations. As the digital marketing includes, all kinds of marketing aspects and this in turn increased the research to increase to analyze the application of ICT tools. It is also evidenced from the findings that journal articles have been preferred for publishing the research work on digital marketing. According to the research findings, multiple authors shared 91.85% of publications on digital marketing. Collaboration index was found to be 3.22 and co-authors per document was 3.86.

The most prolific author was found to be Kumar S from Malaviya National Institute of Technology who contributed 26 papers sharing 2.58 % of total publications under study with 568 citations (CPP=21.8). As our research is based on Indian Literature on Digital Marketing most of the top contributing academic institutions were from India except Swansea University from United Kingdom (UK). Meanwhile, the Journal of Retailing and Consumer Services ranked have 29 publications to its share with 1319 citations. The top three keywords were “internet of things”, “machine learning”, and “market research” which clarifies that emerging ICT tools have been playing a major role in marketing aspects. The co-occurrence network of keywords showed a structured and concentrated more into ranking the knowledge distribution and progressive components of Digital Marketing field. Journal of business research has taken the prominent position with the highest co-citation network which shows that the digital marketing facets are versatile in nature covering all major disciplines.

Conclusion

The present study was conducted with data from Web of Science citation database. Meanwhile analysis of data sources on the same topic from other databases such as Scopus, Google Scholar, Dimensions, etc primarily may provide varied outcomes. Abundantly the databases that are frequently used in bibliometric and scientometric studies undergo routine update and also the delay in publishing new research articles also constitutes a problem for the database. The digital marketing has revived in the marketing research area in the 21st century. It might potentially create a significant connection between each period of time. Hence, we find a need for an extensive research on digital marketing and the scholarly world needs to aware of how this area of research in developing across the world. The current study is believed to have provided a landmark on the evolution of digital marketing field. Eventually, this study takes the credit of providing clearer insights of existing developments in digital marketing research and hope that the marketing professionals and researcher working in the field would find it beneficial.

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Measuring the University's Research Production through Scientometric Methods: An Exploratory Study at Mother Teresa Women's University of Tamil Nadu

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Abstract

Scientometrics studies have nowadays increased rapidly and are being used to analyse the research performance of both scientists as well as institutions in terms of their research output. This is an exploratory study made at the Mother Teresa Women's University of Tamil Nadu to evaluate the research output of the faculty. The author analyzed the 211 research performances as documented in its annual evaluation during 2012-2021, which received 3655 citations and h-index 30 as indexed in the Web of Science. The year-wise distribution of publications indicates that there is a drastic decrease in the number of publications. Multi-authorship dominates among university faculties and there is no statistically significant difference between experience and productivity. The results show that most of the publications were in the domain of Chemistry and Physics. However, closely associated terms are materials science, spectroscopy, engineering, computer science, acoustics, and so on. In this context, the study suggests the need for expanding the research results of the Mother Teresa Women's University is improving the quality and impact of its research publications to compete with other competing universities at the National as well as international levels.

Keywords: Mother Teresa Women's University, Publication productivity, Trend analysis, Authorship pattern, Degree of Collaboration

Introduction

Mother Teresa Women's University (MTWU), the only Women's University of Tamil Nadu State Government is situated at Kodaikanal. The University, whose foundation stone was laid by the legendary Noble Laureate for peace, Mother Teresa, was established in 1984 under Act 15 of Tamil Nadu with the lofty vision of "Empowering Women through Education". MTWU aims to extend its service to women students of all communities. It provides for academic excellence and personality development and gives equal importance to the promotion of employment opportunities to young girls. Mother Teresa Women's University has secured an 'A' grade from the National Assessment and Accreditation Council (NAAC) in Cycle III with a CGPA of 3.1 according to the performance of academic and research activities.

During the last few years, scientometric applications are increasing rapidly and are being used to analyse the research performance of both the scientists as well as the institutions in terms of their research output along with identification of the emergence of various disciplines of science and measuring the performances of individual country and so on. The vital growth of this approach initiates the researchers to examine the nature of contributions made by them in a particular subject for a particular period of time by using primary or secondary information and reference sources related to their productivity. However, years of the 21st century the applications of scientometric applications are gained momentum because of the reason that institutional ranking agencies are insisting on the institutions for quality research output.

Review of Literature

Several scientometric studies have been published dealing with the research performance of various universities and institutions at the global level. Among them few are reviewed hereunder; Vivek Kumar Singh¹ presents a scientometric analysis of research publications of Tripura University from 2010 to 2014, indexed in Web of Science. Various scientometric indicators have been calculated to give a detailed insight into the research performance measured in terms of quality as well as quantity. Moreover, collaboration at different levels such as author, and institution is measured along with the status of collaboration at the international level. Sharad Kumar Sonka² highlighted the research contributions of nine central universities of India, in the field of science in the ten years, 2011-2020, as reflected through Web of Science. There were 53617 publications with 796,353 citations, 14.9 citations per publication. The Banaras Hindu University, Varanasi, contributed 23.4% of the total publications. RSC advances were the most popular journal among the researchers.

Bebi and Shailendra Kumar³ examined the research output of women faculty in physics in 10 central universities in India. The data was collected for the period of 2011-15 (5 years). A total of 36 women physics faculty members contributed 282 papers. The study focused on research output, citations, h-index, i10-index, place of women authors when writing papers jointly, the proportion of women authors per paper, and the central university with the highest number of women authors and papers. Prem Singh and Chandresh⁴ measured the performance of IITs based on their journal, conferences, reviews, and other publications. It involves precise measurement of bibliometric indicators like average citation, h-index, g-index, etc. The paper analyses the research work of IITs (established before 2015) and other Indian institutes in the Computer Science discipline based on citation data available in the Scopus database (till November 2018).

Santhakumar⁵ et al, evaluated the research productivity of the university of madras for a period of 10 years 2009-2018. A total of 3283 publications of the university are downloaded from the web of science database. The overall average for references for each article was 10.89 and the h-index of the university is 65. Major findings reported that university researchers preferred to publish their research papers in UK journals. Keshava⁶ et al, analysed the publication output of Tumkur University faculty and extracted data from the Scopus database from the period from 2005 to 2019 and a total of 646 records were retrieved. The study revealed that the average growth rate was 1.15 years while the mean doubling time was 0.88 years. The highest number of publications was 116 in the year 2015. Tumkur University faculty has collaborated with the university of Mysore in 127 publications.

Mallikarjun Kappi and Biradar⁷ studied the scientific research output of Kuvempu University and data extracted from web of science. This paper analysed the yearly output of research productivity, authors productivity pattern, types of documents, individuals authors productivity, a geographical collaboration of authors, and language-wise distribution of research output. Mulimani and Hadagali⁸ examined the research output of the Indian Institute of Toxicology Research (IITR) for the period 1993-2017 from the Web of Science database. The paper analysed the different aspects of the publications such as highly cited papers, national and international collaboration prolific degree of collaboration, most prolific authors, most preferred journals for communication, and citation impact of the publication.

Pandya⁹ et al. analysed that data retrieved from scopus database pertained to 3927 articles and published by 12 central universities which was established during 2010 - 2019 identified that there was a Substantiate growth in scholarly publication during the period. The Rajasthan central university had contributed maximum number of 765 articles among 12 universities and the highest

growth of publication was in chemistry. Jyoti Borghainet¹⁰ et.al studied the research output of Dibrugarh university. Data collected for study period 1982 - 2020, and total of 1642 documents were analysed. It was pointed out the year wise distribution of publication and find out Annual Growth Rate (AGR), the most prolific author on the basis of H-index, number of publications and the top collaborating nations.

Subhodip Bid and Sukumar Mandal¹¹ Studied two universities of the state West Bengal namely university of Burdwan (BU) and university of Kalyani underwent various parameters like publication size, authorship pattern, degree of collaboration, subject language, geographical distribution for the period of 2000 - 2019 (20 years) by using web of science as a source database. Saumendas¹² et al investigated of Mizoram university for a period of 17 years, from 2002-2018 from the established of the university. There was a total of 586 articles during the publication period of the study. It was found that analyse the authorship pattern, geographical distribution, types of document, prolific author. The study found that 2016 and 2017 were the most productivity year with 108(18.43%) and 84 (14.33%) publications.

Nagarajan¹³ studied the research output in social sciences by the faculty members of selected universities of Tamil Nadu. The study explored that a maximum number of 72 publications were published in the year 2011. Journal articles occupied first position with 388 publications and Annamalai University faculty members were published 196 publications. Surulinathi¹⁴ et al. Studied that total 2982 bibliographic records were derived from Web of Science and found that there was increasing publication trends in Bharathidasan University. Average output was 87 publications per year. Highest 269 items in 2013 and lowest in one item in 1981. It was also revealed that Bharathidasan University received total of 4763 citations during the period of 14 years. The average citation was 5.7 per item.

Shettar and Hadagali¹⁴ examined the research productivity of the National Institute of Technology established in India. Further, this study ranked NIT's based on TP, TC, ACP, H-index impact of collaboration. Impact of internationally collaborated publications and authorship pattern. Data retrieved from web of science database was used for the period from 2009 to 2018. The results of the study revealed that among all the NIT's, NIT Rourkela and NIT Trichy are the most prominent institutions. Rashmita Mohanty and Pushpanjali Jena¹⁵ analysed the growth of research publications in the field of engineering produced from IIT Bombay during the period 2006 to 2016. Analysis made the publication of output of IIT Bombay which was reflected in scopus database. The study was found that year wise growth of publications, preferred source of publication, national and international collaboration pattern and degree of collaboration.

Objectives of the Study

The objectives of the present study are as follows:

1. To study the forms publications
2. To identify the annual distribution and growth of literature
3. To identify the most prolific authors
4. To identify the collaborated countries in terms of research productivity
5. To examine the collaborative research output of highly prolific institutions
6. To identify the choice of the journals
7. Subject wise distribution of the publications
8. Identification of the highly cited papers

Methodology

In the study, we choose (Mother Teresa Women's University) address terms to search related papers such as Article, Review and Proceedings paper published in 2012-2021. A total of 211 papers were obtained after screening and elimination..The information for the documents that meet the requirements contained year of publication, language, journal, title, author, affiliation, keywords, document type, abstract and counts of citation which were exported into CSV format. The contents of the records were selected as full records and the last update date of the literature data searched above was July 25, 2020

Data Analysis

TABLE I FORMS OF PUBLICATIONS

S. No.	Title	Articles	Percentage	Citations	H Index
1	Articles	202	95.73	3593	29
2	Review Articles	5	2.37	58	2
3	Proceeding Papers	4	1.90	7	3
Total		211	100.00	3658	

The analysis of preference channels of communication by the productive faculties for publication output from Mother Teresa Women's University is a vital feature of scientometric analysis. Faculties have communicated their publications through a variety of communication channels. The 3 document types have brought out this University research output, such as articles, review articles and proceeding papers.

Table I shows the preferred type of publications by faculties of this university during the study. It is found that out of total 211 numbers of publications, the article is the most preferred type with 202 (95.73%) publications with 3593 citations, followed by Review articles with 5 (2.37%) publications with 58 citations and Proceedings papers with 4 (1.90%) publications with 7 citations respectively. Most faculties published their research papers in the format of journals. It could be recognized from this study that journal articles predominate over other sources of publications.

TABLE II YEAR-WISE DISTRIBUTION PUBLICATIONS

S. No.	Year	Publications	Citations	ACPP	H-Index
1	2012	9	90	10	4
2	2013	16	518	32.38	10
3	2014	28	1004	35.86	14
4	2015	25	415	16.6	10
5	2016	6	168	28	5
6	2017	10	437	43.7	8
7	2018	29	317	10.93	11
8	2019	29	366	12.62	11
9	2020	34	302	8.88	10
10	2021	25	44	1.76	3
Total		211	3658	17.34	

ACPP- Average Citation per Publications

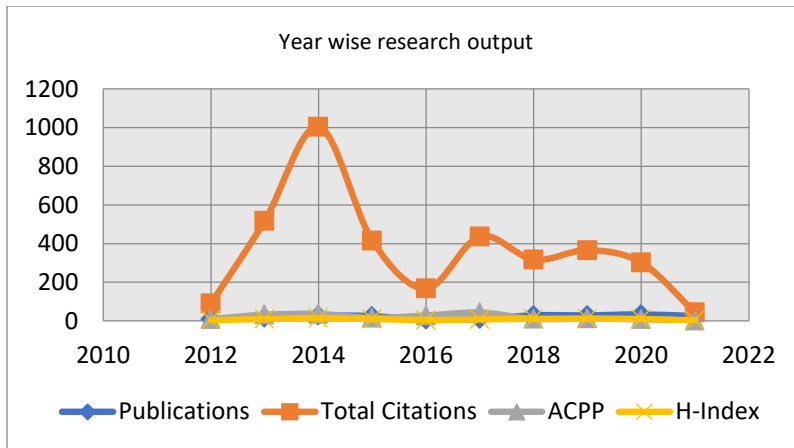


Fig. 1 Year-wise research output

Year-wise distribution of publications is an important indicator of a publication’s productivity of an institution. Table 2 and Figure 1 highlight the year-wise distribution of publications, citations, mean CPP, and h-index for Mother Teresa Women’s University of Tamil Nadu. A total of 211 papers were published by MTWU and is found that the most productive year in terms of publication count is 2020 with 34 publications and 302 citations, followed by 29 publications with 317 and 366 citations published in the year 2018 and 2019, 28 papers were published in the year 2014, and has got highest citations with 1004. The lowest number of articles i.e., 6 was published in the year 2017 with 168 citations. It shows that the citations per article; vary from 1.76 to 43.7 in different years; the trend shows fluctuations trend in the citations and the number of citations varies from article to article. These 211 articles have received 3,658 citations, with an average citation per paper being 17.34.

This is the best method for obtaining the trend values. It provides a convenient basis for obtaining the line of best fit in a series. Further the sum of the squares of these deviations would be the least as compared to the sum of squares of the deviations obtained by using other lines.

The straight line trend has an equation of the type: $Y = a + bX$, Where, Y represents the estimated values of the trend, X represents the deviations in time period; ‘a’ and ‘b’ are constants.

The equation of the straight line trend is $Y = a + bX$

Since $\sum X = 0$, therefore

$$a = \frac{\sum Y}{N} = \frac{211}{10} = 21.1$$

$$b = \frac{\sum XY}{\sum X^2} = \frac{557}{450} = 1.24$$

Thus, substituting the value of ‘a’ and ‘b’ in the straight line of the trend, we get

$$Y = a + bX \Rightarrow Y = 21.1 + (1.24) \times X$$

The estimate of 2031 will be calculated on the basis of $X = 31$

$$Y_{2031} = 21.1 + (1.24) \times 31 = 59.54$$

TABLE III COMPUTATION OF STRAIGHT LINE TREND BY THE LEAST SQUARES METHOD

Year	Actual value (Y)	Deviation	Multiply (X)	XY	X ²	Trend value
2012	9	-4.5	-9	-81	81	10
2013	16	-3.5	-7	-112	49	12
2014	28	-2.5	-5	-140	25	15
2015	25	-1.5	-3	-75	9	17
2016	6	1	1	6	1	22
2017	10	1.5	3	30	9	25
2018	29	2.5	5	145	25	27
2019	29	3.5	7	203	49	30
2020	34	4.5	9	306	81	32
2021	25	5.5	11	275	121	35
2022			13			37
2023			15			40
2024			17			42
2025			19			45
2026			21			47
2027			23			50
2028			25			52
2029			27			55
2030			29			57
2031			31			60
Total	211			557	450	710

With the use of the trend analysis, the trend values are calculated up to 2031. The trend line and actual line are presented in figure 4. And, it is seen from table 3, that the actual trend was standard in the year 2012 since then there is a fluctuation trend up to the year 2021. The trend value has increased from 10 in 2012 to 60 in 2031. It is interesting to note that there is an upward trend in the growth of the literature.

Table IV presents the list of top authors who have contributed 9 or more publications during the study period. According to AACR II rules, the first author is primarily responsible for any work. Therefore, only the principal author is considered for analysing the author. Among 476 authors, top ten most productive authors of Mother Teresa Women's University were identified.

Umadevi, M, with 75 publications from the Department of Physics, who tops the list of prolific authors by occupying the first rank among this university. Rajarajan, M, and Suganthi, A, Department of Chemistry occupies the 2nd position in the list each with 23 publications in this credit. The 3rd positions are being occupied by 'Parimaladevi, R, Department of Physics with 21 publications. The lowest rank i.e., 10th in the list is being occupied by 'Geetha, N, Department of Biotechnology with 9 publications.

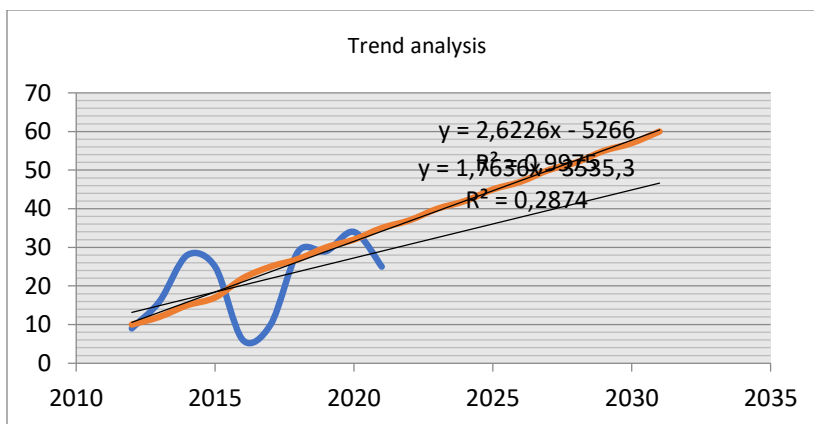


Fig. 2 Trend analysis

TABLE IV IDENTIFICATION OF MOST PROLIFIC AUTHORS

S. No.	Author	No. of publications	Percentage	Citations	ACPP	H-Index
1	Umadevi, M	75	35.54	1744	23.25	20
2	Rajarajan, M	23	10.90	418	18.17	14
3	Suganthi, A	23	10.90	418	18.17	14
4	Parimaladevi, R	21	9.95	153	7.29	8
5	Bindhu, M R	16	7.58	998	62.38	14
6	Terme, T	16	7.58	85	5.31	
7	Vanelle, P	16	7.58	85	5.31	5
8	Sathe, G V	15	7.11	110		5
9	Khoumeri, O	10	4.74	48		
10	Geetha, N	9	4.26	560	62.22	7

ACPP-Average Citation per Publications

On the basis of h-index Umadevi, M has highest value of 20 followed by Rajarajan, M, Suganthi, A and Bindhu, M R has similar h-index of 14. In the authorship pattern analysis, it is found that three authored papers are the highest. When all the multi-authored papers and single-authored papers are put together the total numbers of papers are 211. Multi authored papers are 174 and single authored papers are 37. The proportion of single Vs multi authored papers is 1:4.70.

TABLE V SINGLE AUTHOR VS MULTI- AUTHORED PAPERS

Authorship	No. of Documents	Percentage
Single Author	37	17.6
Multi Authored	174	82.4
Total	211	100.00

The collaboration Index means the number of authors per joint paper. Analysis in table 6 shows the variation in the Collaboration Index. It varies from 1.76 in 2019 and the highest collaboration notices in 2017 i.e. 2.80. The average collaboration is 2.35.

TABLE VI COLLABORATION INDEX

Year	No of Articles	No of Authors	Collaboration Index	Collaborative Coefficient	Degree of Collaboration
2012	9	21	2.33	0.41	0.66
2013	16	44	2.75	0.45	0.75
2014	28	65	2.32	0.44	0.75
2015	25	58	2.32	0.52	0.84
2016	6	16	2.67	0.55	0.83
2017	10	28	2.80	0.48	0.80
2018	29	63	2.17	0.48	0.79
2019	29	51	1.76	0.41	0.83
2020	34	76	2.23	0.41	0.70
2021	25	54	2.16	0.48	0.80
Total	211	476	2.35 (Average)	0.46 (Average)	0.77 (Average)

Table VI has been shaped with the assessment to give a better understanding of the collaboration coefficient during the period of study. The average collaboration coefficient of 0.46 has been counted during the year 2012-2021. The highest collaboration coefficient is counted in the year 2016 with 0.55, followed by the year 2015 with 0.52 and the lowest collaboration coefficient is in the year 2012, 2019, and 2020 each with 0.41.

The degree of collaboration based on this study, the result of degree of collaboration $C = 0.77$. i.e., 77 percent of collaborative author's articles are published in this study. During the year 2012 to 2015 the degree of collaboration was of a constant value of 0.66 and 0.84 and from 2016 to 2018 has shown the degrees of collaboration values is 0.83 to 0.79. It is seen clearly from the above that the degree of collaboration in producing research output on Mother Teresa Women's university research has shown a fluctuating trend during the study period.

Research collaboration is a growing phenomenon in research and development. The MTWU faculties have collaborated with 26 countries of the world during 2012 – 2021. Table 7 presents the data on the top ten countries that collaborated with Mother Teresa Women's University. It has been observed that the highest number of collaborative papers with Saudi Arabia 24 (11.37%) followed by South Korea with 18 (8.53%), France with 16 (7.58%), the United States with 11 (5.21%), and China with 6 (2.84%).

Table VIII presents the institutions that have contributed more than 10 publications during 2012-2021 and 213 collaborative institutions were involved. Madurai Kamaraj University topped the list with 38 (18.01%) publications followed by UGC Dae Consortium for Scientific Research with 26 (12.32%) publications, Thiagarajar College with 22 (10.43%) publications, King Saud University with 17 (8.06%) publications, Aix Marseille Universite and Udice French Research Universities each with 16 (7.58%) publications respectively.

The Table IX provides the rank list of the top 10 journals which have been used by this university to publish their research output along with their impact factor. The leading journal in terms of the number of articles was the 'Spectrochimica Acta Part A Molecular and Biomolecular

Spectroscopy' published by Elsevier, Netherlands, which published a total of 22 articles (accounting for 10.43% of the total publication output between 2012 and 2021).

TABLE VII PREFERRED COUNTRIES FOR COLLABORATION

S. No.	Country	Publications	S. No.	Country	Publications
1	Saudi Arabia	24	6	Egypt	3
2	South Korea	18	7	South Africa	3
3	France	16	8	Taiwan	3
4	USA	11	9	Turkey	3
5	China	6	10	Nam	3

TABLE VIII HIGHLY COLLABORATIVE INSTITUTES

S. No.	Institutions	No. of Publications	Percentage
1	Madurai Kamaraj University	38	18.01
2	UGC- DAE Consortium for Scientific Research	26	12.32
3	Thiagarajar College	22	10.43
4	King Saud University, Saudi Arabia	17	8.06
5	Aix Marseille University, France	16	7.58
6	Udice French Research Universities, France	16	7.58
7	Centre National De La Recherche Scientifique CNRS, France	12	5.69
8	University of Madras	12	5.69
9	Anna University	11	5.21
10	American College	10	4.74
11	Periyar University	10	4.74

TABLE IX SOURCE TITLE OF PUBLICATIONS

S. No.	Source Title	No. of Publications	Percentage	Impact Factor
1	Spectrochimica Acta Part A Molecular and Biomolecular Spectroscopy	22	10.43	4.098
2	Materials Letters	14	6.63	3.423
3	Journal of Cluster Science	6	2.84	3.061
4	Ultrasonics Sonachemistry	6	2.84	9.336
5	Applied Surface Science	5	2.37	6.707
6	Cluster Computing the Journal of Networks Software Tools and Applications	4	1.90	1.809
7	Australian Journal of Chemistry	3	1.42	1.32
8	Journal of Inorganic and Organometallic Polymers and Materials	3	1.42	3.543
9	Journal of Materials Science Materials in Electronics	3	1.42	2.478
10	Journal of Molecular Liquids	3	1.42	6.165

It was followed by Materials Letters published by Elsevier, Netherlands stands 2nd rank with a total share of 912 (2%). Journal of Cluster Science, Springer New York, USA stands 3rd rank with 6 (2.84%), Ultrasonics Sona Chemistry, Elsevier, Netherlands stands 4th most prolific journal with a share of 6 (2.84%) publications, and Applied Surface Science, published by Elsevier, Netherlands stands 5th rank with 5 (2.37%).

TABLE X HIGH PRODUCTIVITY SUBJECT AREAS

S. No.	Subject	No. of Articles	Percentage
1	Chemistry	68	32.23
2	Physics	53	25.12
3	Materials Science	51	24.17
4	Spectroscopy	25	11.85
5	Engineering	21	9.95
6	Science Technology	20	9.48
7	Computer Science	17	8.06
8	Biotechnology Applied Microbiology	9	4.26
9	Acoustics	6	2.84
10	Biochemistry Molecular Biology	6	2.84

The Mother Teresa Women's University produces its research output in 40 subject areas of science and technology. Table 10 summarizes the data on the subject-wise distribution of publications for ten years. The highest number of publications has been produced in 'Chemistry' with 68 documents and can be said as the strongest subject area among the university under study.

This is followed by Physics with 53 documents and 'Materials science' with 51 documents. The top three disciplines contributed close to 81.82 % of the total publications. It is inferred from the study that lab-oriented subjects have more publications that have international coverage.

The top 11 most-cited papers in the MTWU were published between 2013 and 2017. The maximum frequency of top-cited articles published in a single year was 4, which occurred in 2014. The number of articles published in the top 10 cited articles was 8 during 2012–2016, and 2 during 2017–2021.

Among these publications, the top 10 most globally cited publications are listed in table 11. The top two most globally cited articles from Bindhu, M R, *Spectrochimica Acta Part A-Molecular and Biomolecular Spectroscopy* received the highest citations of 180 and 161 in the year of 2015 and 2013. A total of 5 authors as first authors and 10 as co-authors have contributed to the top 10 most-cited papers in Mother Teresa Women's University.

The maximum contributions were made by Bindhu, M R ($n = 5$), followed by Venkatachalam, P ($n = 2$) and 3 other authors made one publication each in the top 10. Overall, these highly influential articles offered a rapid way to catch an overview of this university and broaden researchers' horizons.

TABLE XI HIGHLY CITED PAPERS

S. No.	Paper	Citations	Impact factor
1	Bindhu, MR And Umadevi, M. Antibacterial and Catalytic Activities of Green Synthesized Silver Nanoparticles, <i>Spectrochimica Acta Part A-Molecular and Biomolecular Spectroscopy</i> , 2015, 135, Pp. 373-378	180	4.098
2	Bindhu, M R and Umadevi, M. Synthesis of Monodispersed Silver Nanoparticles using Hibiscus Cannabinus Leaf Extract and its Antimicrobial Activity, <i>Spectrochimica Acta Part A-Molecular and Biomolecular Spectroscopy</i> , 2013, 101 , Pp.184-190	161	4.098
3	Jeeva, K, Thiyagarajan, M and Venkatachalam, P. <i>Caesalpinia Coriaria</i> Leaf Extracts Mediated Biosynthesis of Metallic Silver Nanoparticles and their Antibacterial Activity Against Clinically Isolated Pathogens, <i>Industrial Crops and Products</i> , 2014, 52, Pp.714-720	154	6.40
4	Mariselvam, R, Ranjitsingh, A J A and Selvakumar, P M. Green Synthesis of Silver Nanoparticles from the Extract of the Inflorescence of <i>Cocos Nucifera</i> (Family: <i>Arecaceae</i>) for Enhanced Antibacterial Activity, <i>Spectrochimica Acta Part A-Molecular and Biomolecular Spectroscopy</i> , 2014, 129, Pp.537-541	134	4.098
5	Venkatachalam, P, Jayaraj, M and Sahi, S V. Zinc Oxide Nanoparticles (Znops) Alleviate Heavy Metal-Induced Toxicity in <i>Leucaena Leucocephala</i> Seedlings: A Physicochemical Analysis, 2017, <i>Plant Physiology and Biochemistry</i> 110 , Pp.59-69	110	4.27
6	Venkatachalam, P, Priyanka, N and Sahi, S V. Enhanced Plant Growth Promoting Role of Phycocomplexes Coated Zinc Oxide Nanoparticles With P Supplementation in Cotton (<i>Gossypium Hirsutum</i> L.), <i>Plant Physiology and Biochemistry</i> , 2017, 110, Pp.118-127	109	4.27
7	Bindhu, M R, Umadevi, M and Al-Dhabi, N A. Structural, Morphological and Optical Properties of Mgo Nanoparticles for Antibacterial Applications, <i>Materials Letters</i> , 2016, 166, Pp.19-22	106	3.423
8	Bindhu, M R and Umadevi, M. Silver And Gold Nanoparticles For Sensor And Antibacterial Applications, <i>Spectrochimica Acta Part A-Molecular and Biomolecular Spectroscopy</i> , 2014, 128, Pp.37-45	100	4.098
9	Bindhu, MR and Umadevi, M. Antibacterial Activities of Green Synthesized Gold Nanoparticles, <i>Materials Letters</i> , 2014, 120, Pp.122-125	96	3.423
10	Umadevi, M And Christy, A J. Synthesis, Characterization and Photocatalytic Activity of CuO Nanoflowers, <i>Spectrochimica Acta Part A-Molecular and Biomolecular Spectroscopy</i> , 2013, 109, Pp.133-137	87	4.098

Findings

1. A total of 211 publications were published during the study period. The average number of publications published per year was 21.1. It is found from the study that over the 10 years a fluctuating trend is observed in publications.
2. Total of 211 records were observed, and 4 document types are identified. Journal articles predominate over the other (four) sources of publications.
3. 476 faculties have produced 211 articles and contributions scattered over 127 journals. "Umadevi, M" from the Department of Physics has published 75 (35.54%) articles and it is the highest publication with the first rank position.
4. Multi-authored papers are 174 and single-authored papers are 37. The proportion of single Vs multi-authored papers is 1:4.70.
5. Collaboration Index varies from 1.76 in 2019 and the highest collaboration notices in 2017 i.e. 2.80. The average collaboration is 2.35.

6. The average collaboration coefficient of 0.53 has been counted during the year 2000-2021. The highest collaboration coefficient is counted in the year 2002 with 0.58.
7. The Degree of collaboration is 0.77. i.e, 77 percent of collaborative authors' articles are published in this study.
8. University faculties collaborated with 26 countries. It has been observed that the highest number of collaborative papers with Saudi Arabia 24 (11.37%) followed by South Korea with 18 (8.53%) articles.
9. The leading journal in terms of the number of articles was 'Spectrochimica Acta Part A Molecular and Biomolecular Spectroscopy' published by Elsevier, Netherlands, which published a total of 22 articles (accounting for 10.43% of the total publication output between 2012 and 2021).
10. The highest number of publications has been produced in 'Chemistry' with 68 documents and can be said as the strongest subject area among the university under study.

Conclusion

For this study, the data was retrieved from the Web of Science database. The quantity and quality of the science and technology output of Mother Teresa Women's University have been analysed. Based on these data, it has been concluded that the research output of this university is a drastic decrease during the period 2012-2021. Publications written in collaboration with multiple authors are more acceptable than publications written by a single author. Contributions from other faculties such as Arts, Commerce, Management, and Social sciences are less compared to Science faculties. The authors of such faculties need to be proactive in publishing their research outcomes in reputed journals. Mother Teresa Women's University has also improved its quality and quantity of publications to get more citations and a higher h index. Science and technology faculties prefer to work in groups to get better output from the research studies. It should be required to motivate and encourage faculties and researchers to carry out research to recognize the impact of research output.

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Knowledge Management for Farmer's Outreach Activities in Karnataka State

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Abstract

This article explores the concept of knowledge management and its potential to bridge the gap between research and practice in Karnataka's agricultural sector for transforming farmers' outreach activities. We argue that by effective Knowledge Management within outreach programs, agricultural productivity and resilience can be significantly improved. The framework emphasizes the significance of farmer-centric approaches, leveraging local knowledge, and utilizing ICT tools to bridge the knowledge gap between researchers, extension agents, and farmers. The discussion highlights the role of technology in fostering knowledge exchange, building social networks, and creating participatory learning environments. Finally, we emphasize the need for a farmer-centric approach and context-specific strategies to ensure the effectiveness of knowledge management within outreach programs.

Keywords

Knowledge Management (KM), Information dissemination, Agricultural Extension in Karnataka, Farmers' outreach activities, ICT for agriculture.

Introduction

Agriculture is the base of civilization, foundation of culture and heritage of India. Agriculture in India is a complex mixture of diverse agro-climatic conditions, differentiated by climatic, soil, vegetation and other natural conditions. Knowledge management is all about process of organizing, capturing, sharing, and utilizing knowledge relevant to agriculture in a way that benefits farmers and improves their farming practices. It's about linking farmers to the knowledge they need to be more productive, sustainable, and profitable. Information Systems being crucial should provide authentic & timely information to farmers to help them in their decision making.

Karnataka, having prosperous biodiversity conditions and rich agricultural heritage, plays a vital role in India's food security. However, farmers face numerous challenges like low yield, fragmented landholdings, and limited access to knowledge and information resources. This article deals with the theoretical framework of effective knowledge management (KM) strategies for farmers' outreach activities in Karnataka state and its potential application for enhancing farmers' lives. The farmers outreach activities in Karnataka can be categorized into two main areas: those undertaken by the government viz. Department of Agriculture/Horticulture Indian Council of Agricultural Research (ICAR) Institutes, All India Co-Ordinated Research Project on Integrated Farming Systems (AICRP), State Agricultural Universities etc, and those conducted by private organizations and NGOs.

Types of knowledge

1. Scientific knowledge: Research findings, new technologies, best practices developed by agricultural experts.

2. Traditional knowledge: Indigenous practices, local wisdom passed down through generations, specific knowledge of the local environment and crops.
3. Experiential knowledge: Practical skills and insights from individual farmers' experience.

Knowledge sharing platforms

1. Digital platforms: Online databases, mobile apps, social media groups dedicated to sharing agricultural information.
2. Traditional channels: Farmers' meetings, field days, workshops, extension services.
3. Interpersonal communication: Farmer-to-farmer exchange through peer learning networks, informal conversations, and collaborations.

Benefits of knowledge management

1. Increased productivity and yields: Farmers can access and apply best practices for crop management, pest and disease control, soil health, etc.
2. Improved sustainability: Knowledge of sustainable practices like water conservation, organic farming, and integrated pest management can help reduce environmental impact.
3. Enhanced resilience to challenges: Farmers can adapt to changing weather patterns, market fluctuations, and other risks through access to relevant information and support networks.
4. Greater income and profitability: Improved decision-making based on knowledge can lead to higher yields, better quality produce, and increased market access.

Methodology

This article will employ a theoretical framework based on a qualitative research approach, reviewing of existing literature, government reports, and case studies of successful knowledge management initiatives in agriculture. A discussion with farmers, agricultural extension officers, is carried out to gain insights into current practices and challenges. Data analysis will involve thematic coding and content analysis to identify key themes and patterns.

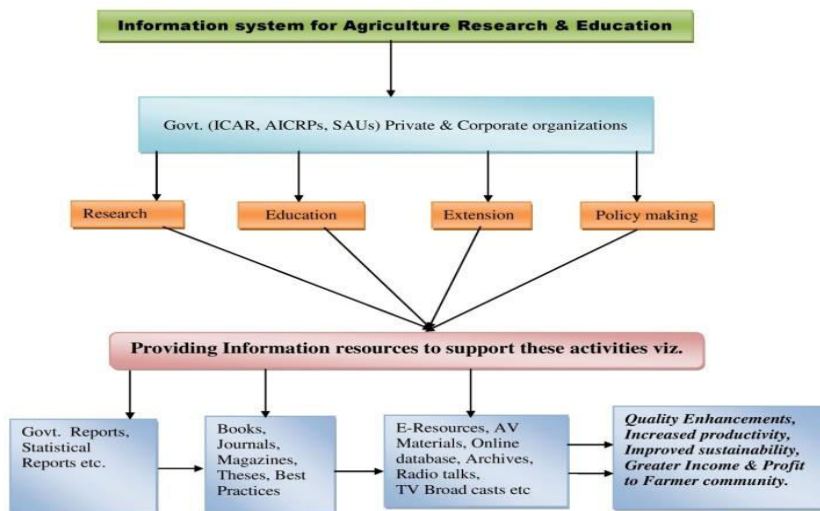


Fig. 1 Information system for Agricultural Research

All ICAR Schemes/Projects are classified into 12 projects which consist of 25 Key Performance Indicators (KPIs). Out of these 12 projects, Mobile Agro-advisories, Farmer’s Training and

Extension Activities are dynamic and district level data has been pushed to this system from KVK Portal using API.

The Indian Council of Agricultural Research (ICAR) is an autonomous body under the Department of Agricultural Research and Education (DARE), Ministry of Agriculture and Farmers Welfare, Government of India. ICAR is the apex body for agricultural research in India, with a network of 101 research institutes, 49 agricultural universities, 22 ICAR-DARE regional research stations, and 711 KrishiVigyanKendras (KVKs) spread across the country.

The All India Coordinated Research Projects (AICRPs) are a network of 49 research projects on major crops, livestock, and fisheries, implemented through a network of collaborating centers located at ICAR institutes, SAUs, KVKs, and other agricultural research institutions. The AICRPs play a vital role in developing and disseminating improved technologies for farmers.

The State Agricultural Universities (SAUs) are autonomous institutions established by the respective state governments. There are 59 SAUs in India, with one in each state and two in Uttar Pradesh. The SAUs conduct research, education, and extension activities in agriculture and allied sciences.

The *KrishiVigyanKendras (KVKs)* are the frontline extension units of ICAR. There are 711 KVKs located in different districts across the country. The KVKs act as a bridge between research and extension, and they play a vital role in disseminating improved technologies to farmers.

ICAR, AICRPs, and SAUs use a variety of methods to disseminate information to farmers, including:

1. *Printed Materials:* ICAR, AICRPs, and SAUs publish a large number of books, bulletins, leaflets, and folders on various agricultural topics. These materials are distributed to farmers through KVKs, agricultural extension officers, and other channels.
2. *Electronic Media:* ICAR, AICRPs, and SAUs have websites and social media pages where they provide information to farmers. They also produce and telecast agricultural programs on radio and television.
3. *Training Programs:* ICAR, AICRPs, and SAUs organize training programs for farmers on various agricultural topics. These programs are conducted at KVKs, agricultural colleges, and other venues.
4. *Demonstrations:* ICAR, AICRPs, and SAUs conduct demonstrations of improved technologies on farmers' fields. These demonstrations help farmers to see the benefits of adopting new technologies.
5. *Farmer-to-farmer extension:* ICAR, AICRPs, and SAUs promote farmer-to-farmer extension, where farmers learn from each other's experiences. This is an effective way to disseminate information and to encourage the adoption of new technologies.

In addition to these methods, ICAR, AICRPs, and SAUs also use a variety of other innovative methods to disseminate information to farmers, such as mobile apps, toll-free helplines, and kisanmelas (farmer fairs).

The use of information and communication technologies (ICTs) has revolutionized the way agricultural information is disseminated to farmers. ICTs have made it possible to reach a wider audience of farmers with more timely and relevant information. For example, ICAR has developed a mobile app called "Kisan App" that provides farmers with access to a wealth of agricultural information, including market prices, weather forecasts, and pest and disease advisories.

The use of ICTs has also made it possible to provide farmers with more personalized information. For example, KVKs can now use mobile apps to send farmers text messages or voice messages with information that is specific to their needs and location.

The use of ICTs is still in its early stages in India, but it has the potential to revolutionize the way agricultural information is disseminated to farmers. ICAR, AICRPs, and SAUs are committed to using ICTs to improve the lives of farmers in India.

KrishiBhavan: KrishiBhavan is the headquarters of the Department of Agriculture in Karnataka. They often publish reports and documents on various agricultural topics, including farmer outreach activities.

ATMA (Agricultural Technology Management Agency): ATMA is a decentralized agency that implements various agricultural development programs in India.

Land Records Management System (LRMS): ICAR-Land Records Management System (LRMS) is an integrated system which provides land record information of all institutions along with their Regional Stations. User of the system can login to LRMS at <http://lrms.icar.gov.in> through his/her ICAR email Id and password.

KisanSarathi - Agri-information Resources System Transmission and Hub Interface for Technology: On the 93rd Foundation Day of ICAR, "KisanSarathi," an information, communication, and technology (ICT) based interface solution, was developed to serve this growing need for multimodal and multilingual communication among diverse agricultural stakeholders. Implementing an effective internet platform to promote local agriculture from a national viewpoint is the project's ultimate goal. Over 3,600 agricultural scientists and subject matter experts have registered with KisanSarathi, and 731 KVKs in total are enrolled in the system.

ICAR-Network Program on Precision Agriculture (NePPA): The ICAR-Network Program on Precision Agriculture was initiated by the Council initially with 16 ICAR Research Institutes with IARI as Lead. The program is focused on exploring potential applications of recent developments on technologies related to sensor, IoTs, Drone and ICTs for precision smart agriculture.

Low Cost Smartphone-based Precision Nitrogen Management An Android app named as Pusa N-manager has been developed for nitrogen management based on image taken from smart phone.

Development of Drone based Vertical Water Sampler One Drone based Vertical Water Sampler has been developed and field validated by team at ICAR-CIFRI in collaboration with ICAR-IARI.

IoT and sensor-based fertigation system for greenhouse tomato Development of Robotic Soil Sampler and Applicator for VRT applications Media and Information: Media and Information Unit assists in press coverage and public relations showcasing the ICAR technologies through national and international exhibitions and production of documentary films.

Extension staff: Through 5,049 courses around the nation, 1.62 lakh extension staff members' capacities were developed. 30.90% of the participants in these programs were female. These trainings included a variety of extension workers who support the growth of the agricultural sector in the nation, working for both non-governmental and government organizations. The trainings primarily concentrated on agricultural technologies with the goal of improving knowledge in field crops (12.96%), integrated pest management (13.49%), integrated nutrient management (9.24%),

protected cultivation technology (5.69%), information networking among farmers (1.13%), and women and child care (4.56%). Additional topics covered in these training sessions included information management of farm animals, women and child care, livestock feed and fodder production, protected cultivation technologies, and IT applications. Greater percentage

Extension Programmes

KVKs across the nation are actively involved in organizing various extension programs to shorten the time lag between technology generation at the research institution and its transfer to farmer fields for sustained increases in production, productivity, and income from the agriculture and related sectors. This is because, in the current information era, appropriate technology and its dissemination are equally important. A total of 5.68 lakh extension programs were organized by KVKs in 2022–2023 using a variety of techniques and means, including advisory services, diagnostic and clinic services, celebration of significant days, exhibitions, exposure visits, ex-trainees' sammelan, field days, film shows, group meetings, kisanghosthi, kisanmelas, lectures given as resource persons, mahilamandal conveners' meetings, methoddemonstrations, workshops, visits by scientists to farmers' fields, self-help group meetings, soil health camps, campaigns to test the soil, and other events where the newest technologies in agriculture and related fields were shared with 160.85 lakh participants, of which 157.79 lakh were farmers and 3.07 lakh were extension workers. Additionally, KVKs have organized 2.27 lakh extension activities in the form of TV shows, radio talks, CDs/DVDs, extension literature, newspaper coverage, popular articles, research articles, training manuals, technical bulletins, leaflets, folders, books/bibles, and other materials for the benefit of a large number offarmers, extension personnel, and other stakeholders. They are leading the way in the effective use of print and electronic media to have wider coverage of technology dissemination.

Agricultural Technology Information Centre (ATIC)

There are 47 Agricultural Technology Information Centers (ATICs) across the nation that serve as a single point of contact for all things agricultural-related. They do this vital job by giving farmers access to technology-related information, consulting services, and inputs. In 2021–2022, 4.33 lakh farmers went to ATICs to buy essential farm inputs and get answers to their agricultural issues.

MeraGaonMera Gaurav

An innovative initiative MeraGaonMera Gaurav aimed to promote the direct interface of scientists with the farmers to hasten the lab to land process. The objective of this scheme is to provide farmers with required information, knowledge and advisories on regular basis by adopting villages particularly small and marginal farmers. During interaction with scientists farmers put forth their issues apropos technological availability, loans, market price, extension programmes and support provided by different agencies, etc. The programme was implemented by 127 institutions (ICAR institutes and SAUs) through 1,054 groups of 4,315 scientists during the reporting period. They covered 3,680 villages, conducted 37,982 field activities including awareness, demonstrations, training, meetings, etc. and 27,958 message advisories sent by which 5,05,303 farmers benefited.

Farmer FIRST: The Farmer FIRST Program is ICAR's flagship initiative that aims to improve the farmers-scientists interaction while advancing smallholder agriculture, moving beyond production and productivity. It also prioritizes the majority of farmers' complex, diversified, and risk-prone realities. During the reporting year, 79,731 farm families were covered in all modules, 2,649 extension programs were arranged, 36,496 demonstrations were carried out, and 54,492 animals (poultry and cattle) were benefited.

Knowledge System and Homestead Agriculture Management in Tribal Areas:The goal of Knowledge System and Homestead Agriculture Management in Tribal Areas (KSHAMTA) is to manage homestead agriculture in tribal areas by channeling the ICAR institutions' Tribal Sub Plan fund toward the development of tribal agriculture. Through KVKs, KSHAMTA is being implemented in 125 tribal districts across the nation.

Nutri-sensitive Agricultural Resources and Innovation:This programme is a flagship programme initiated by ICAR at national level. Nutrientsensitive agriculture is an important part of ending malnutrition through multi-sectoral action. Nutrientsensitive agriculture puts nutritionally rich foods, dietary diversity, and food fortification at the heart of overcoming malnutrition and micronutrient deficiencies.

Scheduled Castes Sub Plan (SCSP): SCSP is sponsored by the Ministry with the objective to ensure flow of targeted financial and physical benefits for the development of Scheduled Castes.

Integrated Farming System (IFS): It commonly refers to agricultural systems coupled or integrated with livestock, fisheries etc. and this is also referred to as integrated bio-systems

Agriculture Department's New Schemes: Secondary Directorate of Agriculture will be set up to create more market opportunities for these products by using Farmer Producer Organizations to add value to the primary products of agriculture. "Raita Shakti" Scheme to encourage farmers to use farm machinery and reduce the burden of fuel cost by giving diesel subsidy of up to Rs.250/- per acre for a maximum of five acres. And in order to encourage women farmers in agriculture and to attract other women to agriculture, new schemes are being formulated and implemented to award separately Krishi Award and KrishiPandit Award. (Government of Karnataka, Agriculture Department. (2022-23). *Annual Report*)

Horticulture Department plays a major role with activities like:

1. Training and capacity building: through KVKs, FFSs, and training centers on topics like crop selection, cultivation techniques, pest management, etc.
2. Demonstration farms: showcasing best practices and new technologies.
3. Farmer producer organizations (FPOs): encouraging formation for better bargaining, resource sharing, and market access.
4. KisanMitra Helpline: providing information and advice on horticultural issues.
5. Market linkages: through information systems, trade fairs, and direct marketing initiatives.
6. Subsidies and financial assistance: on inputs, processing units, infrastructure, and crop insurance.
7. Agriculture Department: Similar to horticulture, the Agriculture Department conducts training, demonstration farms, FPO formation, and provides subsidies for crops like paddy, maize, pulses, etc.
8. Other Departments: Additional departments like Animal Husbandry, Fisheries, and Sericulture also offer training, subsidies, and support programs for their respective sectors.

Independent Organizations and NGOs

1. Isha Foundation: Launching a farmer outreach program in the Cauvery basin districts to promote tree-based farming and connect farmers with government schemes.
2. Outreach India: Organizes health camps, nutrition programs, tank renovation, and social forestry initiatives to support farmers.
3. CUTS CITEE: Conducts workshops and discussions on trade & economic issues impacting farmers, like WTO regulations.
4. Numerous other NGOs: Focus on specific areas like organic farming, water conservation, climate-resilient agriculture, and women empowerment in rural communities.

Community-based Initiatives

1. Farmer cooperatives and self-help groups: Sharing knowledge, resources, and negotiating better prices for produce.
2. Farmers' markets and local food movements: Promoting direct marketing and connecting farmers with consumers seeking local and sustainable food.

Additional considerations

1. *Reach and effectiveness*: Some programs focus on specific crops or regions, while others aim for wider coverage. Their success depends on factors like funding, communication strategies, and farmer participation.
2. *Technology adoption*: Many outreach activities promote the use of mobile apps, online platforms, and digital resources to disseminate information and connect farmers with markets and services.
3. *Farmer needs and challenges*: Understanding the specific needs and challenges faced by different farmer groups, such as small and marginal farmers, women farmers, and those in drought-prone areas, is crucial for designing effective outreach programs.

Overall, the farmers' outreach activities in Karnataka aim to

1. Enhance farmers' knowledge and skills to adopt improved agricultural practices.
2. Increase productivity and profitability of farms.
3. Improve market access and fair prices for farmers' produce.
4. Promote sustainable and climate-resilient agriculture.
5. Empower farmers and build resilient rural communities.

Knowledge management (KM) is a decisive means for farmer's empowerment and improving agricultural outcomes. We can summarize the key findings and draw conclusions based on the results and discussions.

Results

1. **Improved Access to Information**: KM initiatives like farmer information centers, mobile apps, and online platforms have facilitated access to essential agricultural information, including market prices, weather updates, best practices, and government schemes. This has empowered farmers to make informed decisions and improve their productivity.
2. **Improved Communication and Collaboration**: KM platforms have fostered communication and collaboration between farmers, extension workers, researchers, and other stakeholders. This has led to better exchange of knowledge, identification of local solutions, and improved responsiveness to farmer needs.
3. **Increased Adoption of Innovation**: Effective knowledge sharing has encouraged farmers to adopt new technologies and practices, leading to improved crop yields, resource efficiency, and sustainability.
4. **Strengthened Farmer Communities**: KM initiatives have fostered a sense of community among farmers, enabling them to share experiences, learn from each other, and collectively address challenges.

Discussions

1. The effectiveness of KM systems in Karnataka highlights its potential to transform agricultural practices and improve farmer livelihoods.
2. Addressing the challenges of digital access, language barriers, and capacity building is crucial for ensuring inclusive and equitable knowledge sharing.
3. Embracing emerging technologies can further enhance the reach and impact of KM initiatives in agriculture.

Conclusion

KM has the potential to revolutionize farmer outreach activities in Karnataka by providing farmers with timely and relevant information, facilitating communication and collaboration, and promoting innovation. However, successful implementation requires addressing challenges like sustainability, localization, integration, and capacity building. By overcoming these challenges and leveraging the power of KM, we can empower farmers in Karnataka to improve their livelihoods and contribute to a more sustainable and prosperous agricultural sector. Adoption of Artificial Intelligence tools and success stories of farmers, providing recommendations for policymakers will definitely enhance the KM initiatives in Karnataka.

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A Study on Determinants and Outcomes of Brand Attachment with Special Significance to Higher Education Sector in Rajasthan

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Introduction

Branding has been an effective carrier of functional and symbolic information about the goods and services and experiences allowing customers to develop personal connection with the company's product (Oh et al., 2020). Recently this term brand attachment has received much attention because of the growing competition in domestic and international markets. With an outbreak of relationship marketing era, a new term has emerged 'brand attachment' or cognitive attachment with the brand which is believed to impact the behavior of the customer towards the product or brand. This term is gaining immense applauds by the team of researchers, marketers, and academicians to consider it as a new paradigm shift in the field of branding. The marketing literature has to some extent defined brand attachment as an emotional connection and liking towards the intended brand (Sheeraz & Qadeer, n.d.).

Brand attachment is an inclination towards a particular brand it has various components of affection, connection and passion which determines consumer's bonding with the brand (Ghorbanzadeh & Rahehagh, 2021a), (Rodoula Tsotsou, 2010), (Park et al., 2008). The studies have revealed that brand attachment incites a sense of happiness and aspire to prolong the relationship with the brand which results in the repurchase of the brand. (Shimul et al., 2019). Brand attachments hold a special emotional bond of the customers with the brand which encourages them to advocate about the brand. These brand advocates also bring along their friends and fellow people to follow the brand (Oneto, 2020).

Brand attachment in higher education sector

The emotional attachment which has been an eminent concept in the field of psychology has been recently extended to the field of marketing also. This concept is completely innovative in the discipline of higher education where the consumers are students (Abdullah et al., 2015). With the onset of 21st century, the concept of competitive advantage has not been aliening to the higher education, rather it has been significant to recognize that commercialization of the education describes that there are surviving in a marketplace and would require investment in their quality (Oldfield and Baron, 2000).

Despite of their acknowledgment and willingness to provide quality some institutes fail to provide the same because of not understanding the requirements of the customers (Zeithaml and Berry, 1993). The higher educational institutes are considered as the quasi commercial (Brookes 2003), therefore the applications of marketing concepts come appropriate.

This study would like to throw some light on the requirement of studying brand attachment in the field of higher education. This sector has immense scope these days especially in this state of Rajasthan where there are varied range of educational institutes right from coaching institutes to the higher education institutes prevails. This study prospects to develop a model where factors causing positive brand attachment and impact of brand attachment strength are associated.

Literature Review

Researchers have suggested that brand attachment is connected with the varied range of emotions (Khan & Hussain, 2019). The term attachment has also been defined as a psychological erratic which divulges a continuous affectionate relationship and evokes emotional disturbance if consumers tend to separate from those brands (Aggarwal & McGill, 2012). The literature over brand attachment hinges over the psychological and marketing field yet there has been no consensus over its definition but there is some literature which provides the radius of its concept. Brand attachment encompasses three dimensions of the emotions i.e., affection, passion, and connection (Park et al., 2008). This idea is furthered with the service industry as this industry entails the experience of an individual with the personnel who is providing the service, the connection, intangibility, inseparability, variability, and it perish ability which drive a researcher to investigate the importance of connection, affection, and passion with the brand (Taghipourian & Bakhsh, 2016).

The theory of brand attachment is pioneered by the Bowlby, 1980 who has defined it as a bond with an object or person which is loaded with emotions. The original concept of it used to axis over was over mother newborn relationships and individual to individual relations, but over the years it has spread its wings over brand supporting behavior. The emotional connect with a brand is quite unlike to material possession as they differ in the exclusiveness and post-acquisition use (Kleine and Baker, 2004, Abdullah et al., 2015)

Gaps in Existing Research

A good deal of research has been already performed on measuring the university perceived quality, and reputation but a limited work has been performed on establishing a connection between various aspects of university quality and attributes of university performance such as emotive attachment. Considerable research is done on the brand equity but there is limited research available on brand attachment which is the emotional connect with the higher education institute.

Most work has been done on the university quality are done on the satisfaction. Understanding the strength of customers' emotional attachment towards a corporate brand (higher education institute) can be explained through attachment theory. The attachment towards a brand can be seen in his motivational and behavioral implications. The willingness to defend and invest in the attachment object can be explained by the brand attachment in this field. In addition to it, the extant literature does not highlight the role of total experiences of a student based upon his demographic profiling.

Motivation

The higher education market in the India especially in Rajasthan have taken a toll after the emergence of private universities. There are around 250 colleges and 1700 private colleges and around 10 lakhs students who are enrolled in these institutions (Report, college education, 2018) which give a motivation to identify how many of them are attached to the institute they have been part of. Rajasthan provides an interesting statistic that according to a report of Annual Status of Higher Education in India' called ASHI 2021, Rajasthan holds number 1 position when it comes to the highest number of general universities (source Times of India, 2021) in the country. The demand for higher education in Rajasthan is growing and this sector is enduring considerable changes. This has introduced concept of competition in the higher education institutes as each institute has to build their own brand to connect with the market. This will be interesting to know about the factors which drives a student to be attached by his/her institute and does he/she carry that brand longing with them to further propagate the name and the institute's brand.

Objectives

1. To find out the different factors causing positive brand attachment in the higher education sector
2. To find out the relationship between brand attachment strength and a student's demographic profile
3. To find out the impact of brand attachment factors on the student retention and readmission

Methodology

1. To investigate this study questionnaire will be distributed to the pupils at private higher education institutes from major cities of Rajasthan. The private higher education institutes will be chosen as the funding of these institutes is not dependent on the government. Therefore, it will be interesting to assess the distribution of their expenses on infrastructure, facilities, and teaching and non-teaching staff.
2. A sampling from different cities of the Rajasthan's higher education institutes will be collected. The study will adopt judgement sampling where only students who have information will be surveyed. The respondents will be from final year to ensure that they are aware of the institute's policy and procedures.

Attachment Theory and The Higher Education Sector

Brand's perceived quality

Quality in education is characterized by the process adopted by the educational institutes to provide satisfaction in building customers capability and capacity to perform (Abdullah et al., 2015). Although the notion of quality is subjective in nature but, as far as service sector is concerned some attributes like interpersonal skills of the service providers (staff) and attitude of customer (student) impacts the reliability of the quality (Kotler, 1982). Most researches have focused on the quality of course and pedagogy (Athiyaman, 1997; Bourner, 1998; Cheng and Tam, 1997; McElwee and Redman, 1993; Soutar and McNeil, 1996; Yorke, 1992). Nevertheless, the emotional segment cannot be ignored in the service sectors as consideration of service quality is an emotive issue (Oldfield and Baron, 2000). Perceived quality is not the actual quality of a product but how a consumer acknowledges it (Zeithaml, 1988). It is very much analogous to brand association where a consumer prefers a brand over another. The literature provides that in case of the educational sectors it demonstrates that elements of a brand, such as perceived quality (in the case of a professor), influence students' attachment strength, and hence satisfaction, commitment, and brand equity. It further adds to the notion that brand's perceived value and reputation leads to build feelings for the brand, directs the satisfaction relationships and also contributes in building brand equity. (Ghorbanzadeh & Rahehagh, 2021, Carrol and Ahuvia, 2006; Thomson et al., 2005). The brand commitment has also been a product of perceived value and reputation of the brand. The nurturing relationships with the stakeholders (students, alumni and teachers) through various social media platforms, customized clothing and other networking campaigns builds the foundation of brand commitment (Dennis et al., 2016).

Brand Reputation

Reputation has been defined as an overall assessment of the brand in a long run with constructs like consumer satisfaction. It is considered more as an extrinsic construct which evolves with the time (Selnes 1993, Loureiro et al. 2017). The reputation creates favorable perceptions in the minds of the consumers and is also a reflection of institutions history and credibility for its target consumers (Kaushal & Ali, 2020). A company's reputation has significant impact on the revenues generated by it. Therefore, integrated marketing communications must be adopted to build good reputation in the market (Kim 2001, Edmiston-Strasser 2009).

Brand Personality

The personality of brand can be described as a brand’s design, identity, communications, and the environment in which it is dealing with the other entities in the market. (Brakus et al., 2009). The consumers tend to gain the brand experience i.e., sensation, feelings, cognition through the interaction with the brands and the brand communications act as a stimulus for the consumers to build viewpoints and image for the brand. It also provides the personality goals for the consumers and that attraction towards the brand leads to the brand attachment (Reihani et al., n.d.). Brand personality provides the consumers who they really wish to be like. (Salimi & Khanlari, 2018).

Personality is the social image and positioning of the brand in the market (Mourad et al., 2011). By creating strong universities brands the higher educational institutes can have a significant impact in the market (Chen, 2008). The attributes like honesty, sincerity, etc. which are the significant notions of the brand personality have a positive impact on the brand equity (Mourad et al., 2011). Copious research is available on higher education marketing, but literature is fallen short to provide a robust model for the higher education institute personality branding which influences students’ perception about the institute (Tournois 2015).

Student Satisfaction

Satisfaction can be termed as the judgement about a product or service which provides a pleasurable level of fulfillment (Oliver 1997). However, the term could be subjective in nature and would depend upon varied range of factors (Letcher and Neves, 2010). The student satisfaction can be considered in line with the customer satisfaction depending upon their subjective concerns of outcomes and experiences (Kaushal & Ali, 2020). A key role is played by a customer in service creation , in this arena the customer is a student so therefore, it becomes apparent to identify the student satisfaction. Satisfaction leads to the positive word of mouth, in marketing strong proof supports the idea that if a customer is satisfied then he will spread positive information (Özer et al., 2021), Brown et al., 2005, Hultman et al. 2015)

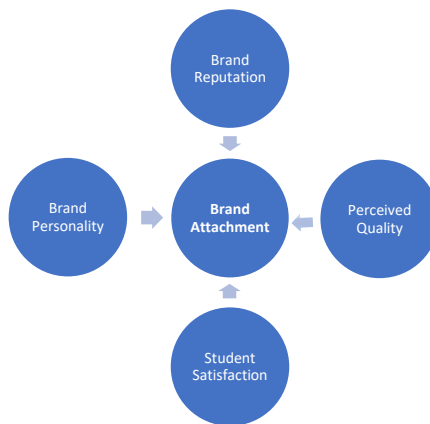


Fig.1 Conceptual framework of Brand attachment

Conclusion and Future Scope

Brand attachment elicits a strong emotional connect with the consumer and it is a crucial part of brand management process. In this study besides elaborating the concept of brand attachment an attempt has been made to reveal the various aspects of brand attachment which needs to be further detected to identify their strength. The various components of brand attachment brand personality, brand reputation, student satisfaction, brand perceived quality paves a road to associate a

consumer (student) towards a particular brand (higher educational institute). The literature provides enough scope to further study the role brand perceived quality and reputation of the brand in playing a significant role in developing the attachment. In addition to it the role of brand perceived quality, student satisfaction works significantly in the educational sector. Conspicuous literature is available on the brand attachment but there is not much literature available on the brand attachment in context of higher education. The extant literature available was only restricted to the abroad universities or a few universities of the country but there is no significant research was found out about the brand attachment in higher educational institutes in Rajasthan. Therefore, to study this topic for further investigation will be crucial to contribute to the novice field of brand attachment in higher education institutes especially in the Rajasthan.

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Evaluating Global Research Productivity and Patterns on Archaeological Research Output: A Scientometric Analysis Using Web of Science

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Abstract

This research article provides a comprehensive analysis of global research output in the field of Archaeology from 2018 to 2022 based on findings from the Web of Science Core Collection Database. The study reveals that the highest numbers of publications were observed in 2021 (23.41%) and 2020 (21.19%), with a substantial positive growth rate of 10.47% recorded in 2021. Notably, in 2019, the relative growth rate reached its peak at 0.74%, while the lowest was observed in 2022 at 0.17%. Eren MI emerges as the top contributor with 23 publications, constituting 0.62% of the total. The analysis of authorship patterns indicates that 32.39% of publications are single-authored, while two, three, and four-authored papers constitute 20.28%, 14.27%, and 9.65%, respectively. Publications with more than four authors contribute 23.41%, showcasing the prevalence of multi-authored publications. The Degree of Collaboration (DC) for each year shows the highest value in 2020 (0.70), followed closely by 2021 (0.69) and 2022 (0.67), with an average DC of 0.68. Collaborative Coefficient (CC) and Modified Collaborative Coefficient (MCC) exhibit an increasing trend in 2021, reaching 0.47 and 0.471, respectively. The Collaborative Index (CI) peaks at 2.81 in 2021, maintained in 2022.

Keywords: Scientometrics; Web of Science (WoS); Research Productivity; Research Pattern; Author Productivity; Archaeology.

Introduction

Archaeology plays a vital role in reconstructing the human narrative, contributing to our understanding of cultural evolution, technological advancements, and societal development over time. It is a dynamic and evolving field that continues to uncover discoveries, challenging and refining our perceptions of the past.

As a multidisciplinary field, Archaeology has witnessed significant growth and diversification in global research activities. Understanding the landscape of global research productivity and identifying emerging patterns is crucial for advancing the field and informing future directions of archaeological inquiry. This study undertakes a comprehensive scientometric analysis utilizing the Web of Science platform to evaluate and characterize the worldwide output of archaeological research. This research aims to provide insights into the current state of global archaeological scholarship, shedding light on key contributors, influential works, and emerging themes. Such a scientometric approach not only offers a quantitative assessment of research productivity but also contributes to a deeper understanding of the dynamics shaping the contemporary landscape of archaeological research.

Review of literature

In a comprehensive exploration of diverse research domains, recent scientometric studies from various subject fields have provided valuable insights into the dynamics of academic output and collaboration patterns. Hadagali et al. (2022) delved into the realm of Nanotoxicology literature in India, uncovering a profound shift towards mega authorship and robust collaborative practices.

The study underscored significant partnerships with Saudi Arabia and the USA, revealing key research hotspots centred around metal and metal oxides in nanoparticle studies. In a parallel investigation, Das, Zimik & Verma (2021) conducted a thorough analysis of scientometrics literature in India from 2001 to 2020, pinpointing 2020 as a pinnacle year for publications. Noteworthy collaboration with the USA and distinctive authorship patterns highlighted the evolving landscape of scientometric research. Meanwhile, Chaturbhuj & Motewar (2021) scrutinized the research output of Savitribai Phule Pune University from 2001 to 2019. Their findings identified physics as a specialized subject and showcased high-priority sub-subjects, shedding light on the strengths and weaknesses within major disciplines. Shifting the focus to biodiversity, Meyyar & Chandrakasan (2020) navigated through Web of Science data from 1991 to 2017, unravelling intricate patterns in Indian biodiversity research. The study explored author productivity, collaboration degrees, and the application of scientific laws, contributing to a nuanced understanding of India's biodiversity research landscape. Verma & Das (2020) conducted a detailed scientometric analysis of Tripura University's research publications spanning a decade (2010-2019). Unveiling productive years in 2017 and 2019, notable collaborations with Jadavpur University, and the identification of prolific authors, the study provided a holistic perspective on the university's scholarly contributions.

These scientometric studies collectively offer a panoramic view of academic landscapes, revealing collaborative trends, subject specialization, and key research priorities in diverse domains, contributing significantly to the understanding of the Research Productivity and Patterns

Objectives

The research objectives for this study are to analyze global research productivity and identify patterns in archaeological research output. Specifically, the research centres on:

1. Explore the literature growth trends of Archaeological research.
2. To locate the Relative Growth Rate (RGR) and Doubling Time (Dt.) of articles.
3. Identify the most prolific authors.
4. To study the Authorship distributions of Publications.
5. Analyse the co-authorship index and collaborative measures in publications.

Methodology

For the study's methodology, data extraction utilized the Web of Science Core Collection Database. The dataset, crucial for the current research, was acquired using the search strategy (TS="Archaeology" or TS="Archeology") AND WC="Archaeology" for the period 2018-2022, exclusively focusing on articles. This strategy yielded 3,742 results. Subsequently, the data was exported in the preferred text format (e.g., Excel, Plain text file) to facilitate various analyses aligning with the study's objectives. Before tabulation for analysis and interpretation, the downloaded data underwent necessary editing and filtering procedures.

Degree of Collaboration (CD): Introduced by Subramanyam (1983), the Collaboration Degree is a metric designed to assess the degree of collaboration in scholarly papers, distinguishing between single-author and multi-author contributions. The formula for CD is expressed as follows:

$$CD = \frac{N_m}{N_s + N_m}$$

Where:

N_m = the number of multi-authored papers; N_s = the number of single-author papers

The Collaboration Degree ranges from 0, indicating exclusive single-authorship, to 1, signifying complete multi-authorship. This metric offers a straightforward calculation and easy interpretation, providing valuable insights into the collaborative nature of research publications.

Collaboration Coefficient (CC): Ajiferuke et al. (1988) introduced the Collaboration Coefficient (CC) formula as follows:

$$CC = 1 - \frac{\sum_{j=1}^A (1/j) f_j}{N}$$

Where:

f_j denotes the number of research papers with j authors,
 N denotes the total number of research papers published, and
 A is the maximum number of authors per paper.

Ajiferuke observed that the CC value tends toward zero when single-authored papers predominate, indicating a higher probability of multi-authored papers with an increasing CC value.

Modified Collaborative Coefficient (MCC): distinguishes between single and multiple authors. Addressing a limitation of the traditional Collaboration Coefficient (CC), which falls short of reaching 1 for maximal collaboration unless the number of authors is infinite, Savanur and Srikanth (2010) rectified this issue by introducing a correction factor of $(1 - 1/A)$ to CC, formulating it as:

$$MCC = (A/A-1) * \left\{ 1 - \frac{\sum_{j=1}^A (\frac{1}{j}) f_j}{N} \right\}$$

Collaboration Index (CI): The Collaboration Index (CI), calculated using Lawani's (1980) formula, serves as a straightforward metric in literature exploration, representing the mean number of authors per paper. The formula is expressed as:

$$CI = \frac{\sum_{j=1}^A j f_j}{N}$$

Where:

f_j denotes the number of research papers with j authors,
 N denotes the total number of research papers published, and
 A is the maximum number of authors per paper

Co-authorship Index (CAI): Introduced by Schubert and Braun (1986), and later, Garg and Padhi (1999) proposed a formula for its computation:

$$CAI = \frac{N_{ij}}{N_{oj}} \div \frac{N_{io}}{N_{oo}} \times 100$$

Where:

N_{ij} represents the number of publications with j authors for a specific block,
 N_{io} is the total output for that particular block,
 N_{oj} denotes the number of papers with j authors across all blocks, and
 N_{oo} is the total number of papers for all authors and all blocks

The CAI value of 100 signifies the average number of publications within a co-authorship pattern. If CAI is greater than 100, it indicates that the number of publications is higher than the average, while a CAI below 100 suggests that the number of publications is lower than the average.

Data Analysis

TABLE I DISTRIBUTION OF PUBLICATIONS WITH ANNUAL GROWTH RATE

Publication Year	Publications	%	Annual Growth Rate
2018	697	18.626	-
2019	774	20.684	9.95
2020	793	21.192	2.45
2021	876	23.41	10.47
2022	602	16.088	-31.28
Total	3742	100	

Table I illustrates the publication distribution within the field of Archaeology for the years 2018-2022, revealing non-uniform growth patterns across these years. Notably, the highest numbers of publications were observed in the year 2021 (23.41) and 2020 (21.19), succeeded by 2019, 2018, and 2012. The table further presents the annual growth rates of Archaeological research publications, showcasing varying rates each year. Notably, the most substantial positive growth rate, reaching 10.47, occurred in 2021.

TABLE II RELATIVE GROWTH AND DOUBLE TIME OF PUBLICATION

Publication Year	Publications	Cumulative Growth	Relative Growth Rate	Doubling Time (Dt.)
2018	697	697	-	-
2019	774	1471	0.74	0.94
2020	793	2264	0.43	1.61
2021	876	3140	0.33	2.10
2022	602	3742	0.17	4.07
Total	3742	-	-	-

Table II provides insights into the relative growth and doubling time of publications in the field of Archaeology from 2018 to 2022. In 2018, there were 697 publications, setting the baseline for cumulative growth. The relative growth rate, calculated as the percentage increase from the previous year, was not applicable in 2018. In 2019, the publications increased to 774, resulting in a cumulative growth of 1471 and a relative growth rate of 0.74. The doubling time (Dt.) for this period was calculated at 0.94, signifying the time taken for the publication count to double. The trend continued in 2020 with 793 publications, contributing to a cumulative growth of 2264. The relative growth rate decreased slightly to 0.43, and the doubling time increased to 1.61. It was observed that in the year 2019, the relative growth was highest (0.74) and the lowest was seen in the year 2022 having a relative growth rate of 0.17. The maximum doubling time was observed in the year 2022 and the lowest was observed in the year 2019.

Table III highlights the foremost contributors among authors, showcasing those who have each contributed a minimum of 10 articles. Eren MI secures the top position with an impressive 23 publications, constituting 0.62% of the total. Following closely are Buchanan B with 17 (0.45%), Hofman CL with 16 (0.43%), O'Connor S with 13 (0.35%), Bebbler MR and Veth P each with 12 (0.32%), and Ward I with 11 (0.29%). Additionally, Blue L and Thompson VD are notable contributors with 10 publications each, accounting for 0.27% of the total.

TABLE III TOP MOST PROLIFIC AUTHORS

Authors	Publications	%	Rank
Eren MI	23	0.62	1
Buchanan B	17	0.45	2
Hofman CL	16	0.43	3
O'Connor S	13	0.35	4
Bebber MR	12	0.32	5
Veth P	12	0.32	5
Ward I	11	0.29	6
Blue L	10	0.27	7
Thompson VD	10	0.27	7

TABLE IV AUTHORSHIP PATTERNS OF PUBLICATION

Authorship	Years					Total	%
	2018	2019	2020	2021	2022		
Single	241	262	240	272	197	1212	32.39
Two	157	149	189	166	98	759	20.28
Three	91	118	116	120	89	534	14.27
Four	65	72	67	96	61	361	9.65
More than four	143	173	181	222	157	876	23.41
Total	697	774	793	876	602	3742	100

TABLE V DEGREE OF COLLABORATION (DC)

Year of Publications	Single Author Paper (Ns)	Multiple Author Paper (Nm)	Total Number of Publication (Ns + Nm)	DC
2018	241	456	697	0.65
2019	262	512	774	0.66
2020	240	553	793	0.70
2021	272	604	876	0.69
2022	197	405	602	0.67
Total	1212	2530	3742	0.68
				(mean/avg.)

Table IV illustrates the distribution of authors' publications across various authorship patterns within the chosen study field. Notably, 32.39% of the publications are single-author papers, while two-author publications constitute 20.28%, three authors contribute 14.27%, and four authors account for 9.65%. The remaining 23.41% of publications involve more than four authors, indicating a substantial contribution from collaborative efforts. This table emphasizes the prevalence of multi-authored publications, surpassing the number of single-author papers.

Table V displays the Degree of Collaboration (DC) for each year, revealing that 2020 boasts the highest DC at 0.70. Following closely, 2021 and 2022 exhibit DC values of 0.69 and 0.67, respectively. The calculated average DC across these years is 0.68.

TABLE VI COLLABORATIVE COEFFICIENT (CC)

Year of Publications	Authorship Pattern					Total no. of papers	Collaborative Coefficient (CC)
	Single	Two	Three	Four	More than four		
2018	241	157	91	65	143	697	0.44
2019	262	149	118	72	173	774	0.45
2020	240	189	116	67	181	793	0.28
2021	272	166	120	96	222	876	0.47
2022	197	98	89	61	157	602	0.46
Total	1212	759	534	361	876	3742	0.46

Table VI displays the Collaborative Coefficient (CC) for each year, indicating the degree of collaboration within various authorship patterns. The Collaborative Coefficient is calculated by considering the number of single-authored papers, two-author papers, three-author papers, four-author papers, and papers with more than four authors. In 2018, the total number of papers was 697, and the CC was 0.44. This suggests a moderate level of collaboration, where each paper has a collaborative coefficient of 0.44. The subsequent years show variations in the Collaborative Coefficient. In 2019, the CC increased slightly to 0.45, indicating a continued moderate level of collaboration. However, in 2020, there was a notable decrease in CC to 0.28, suggesting a reduced level of collaboration compared to previous years. In 2021, there was a significant increase in CC to 0.47, indicating a higher degree of collaboration. This level was sustained in 2022, with a CC of 0.46. The total CC across all years is calculated as 0.46, reflecting an overall moderate degree of collaboration within the specified authorship patterns over the given time period.

TABLE VII MODIFIED COLLABORATIVE COEFFICIENT (MCC)

Year of Publications	Authorship Pattern					Total no. of papers	Modified Collaborative Coefficient (MCC)
	Single	Two	Three	Four	More than four		
2018	241	157	91	65	143	697	0.441
2019	262	149	118	72	173	774	0.451
2020	240	189	116	67	181	793	0.280
2021	272	166	120	96	222	876	0.471
2022	197	98	89	61	157	602	0.460
Total	1212	759	534	361	876	3742	0.460

Table VII presents the Modified Collaborative Coefficient (MCC) for each year. Modified Collaborative Coefficient is calculated considering the number of single-authored papers, two-author papers, three-author papers, four-author papers, and papers with more than four authors. In 2018, the total number of papers was 697, and the MCC was 0.441. This indicates a moderate level of collaboration, with an average Modified Collaborative Coefficient of 0.441 per paper. The subsequent years show variations in the Modified Collaborative Coefficient. In 2019, the MCC increased slightly to 0.451, indicating a continued moderate level of collaboration. However, in

2020, there was a notable decrease in MCC to 0.280, suggesting a reduced level of collaboration compared to previous years. In 2021, there was a significant increase in MCC to 0.471, indicating a higher degree of collaboration. This level was sustained in 2022, with an MCC of 0.460. The total MCC across all years is calculated as 0.460, reflecting an overall moderate degree of collaboration within the specified authorship patterns over the given time frame.

TABLE VIII COLLABORATION INDEX (CI)

Year of Publications	Authorship Pattern					Total no. of papers	Collaborative Index (CI)
	Single	Two	Three	Four	More than four		
2018	241	157	91	65	143	697	2.59
2019	262	149	118	72	173	774	2.67
2020	240	189	116	67	181	793	2.70
2021	272	166	120	96	222	876	2.81
2022	197	98	89	61	157	602	2.81
Total	1212	759	534	361	876	3742	2.71

Table VIII presents the Collaboration Index (CI) for each year, indicating the extent of collaboration within different authorship patterns in the field of Archaeology. The CI is calculated by considering the number of single-authored papers, two-author papers, three-author papers, four-author papers, and papers with more than four authors. In 2018, the total number of papers was 697, and the CI was 2.59. This suggests that, on average, each paper had a collaborative index of 2.59, reflecting a moderate level of collaboration. The trend continued in subsequent years, with the CI values showing a slight increase. In 2019, the CI was 2.67, and in 2020, it further rose to 2.70. The year 2021 saw a more notable increase, reaching a CI of 2.81, and this level was maintained in 2022. The total CI across all years is calculated as 2.71, indicating a consistent moderate level of collaboration in the field. The data suggests that, on average, each publication involves approximately 2.71 authors, reflecting a cooperative research environment within the specified authorship patterns over the given time period.

TABLE IX CO-AUTHORSHIP INDEX (CAI)

Year of Publications	Authorship Pattern										Total no. of papers
	Single	CAI	Two	CAI	Three	CAI	Four	CAI	More than four	CAI	
2018	241	1.07	157	1.11	91	0.92	65	0.97	143	0.88	697
2019	262	1.06	149	0.95	118	1.07	72	0.96	173	0.95	774
2020	240	0.94	189	1.18	116	1.02	67	0.88	181	0.98	793
2021	272	0.94	166	0.93	120	0.96	96	1.14	222	1.08	876
2022	197	1.00	98	0.80	89	1.04	61	1.05	157	1.11	602
Total	1212		759		534		361		876		3742

Table IX displays the Co-authorship Index (CAI) for each year, offering an evaluation of collaboration across different authorship patterns. Notably, a decreasing trend is observed in the CAI values for single-authored papers (i.e., 1.07 to 1.00) and two-authored papers. Conversely, an increasing trend is noted in three-authored papers (i.e., 0.92 to 1.04) and articles with four or more authors throughout the study period. This suggests a progressive rise in the prevalence of three, four, and more than four-authored papers each year.

Findings of the Study

The highest numbers of publications were observed in the year 2021 (23.41) and 2020 (21.19), succeeded by 2019, 2018, and 2012. Notably, the most substantial positive growth rate, reaching 10.47, occurred in 2021. It was observed that in the year 2019, the relative growth was highest (0.74) and the lowest was seen in the year 2022 having a relative growth rate of 0.17. The maximum doubling time was observed in the year 2022 and the lowest was observed in the year 2019. Eren MI secures the top position with an impressive 23 publications, constituting 0.62% of the total. 32.39% of the publications are single-author papers, while two-author publications constitute 20.28%, three authors contribute 14.27%, and four authors account for 9.65%. The remaining 23.41% of publications involve more than four authors, the prevalence of multi-authored publications, surpassing the number of single-author papers. The Degree of Collaboration (DC) for each year, reveals that 2020 boasts the highest DC at 0.70. Following closely, 2021 and 2022 exhibit DC values of 0.69 and 0.67, respectively. The calculated average DC across these years is 0.68. In 2021, there was a significant increase in CC to 0.47, indicating a higher degree of collaboration. In 2021, there was a significant increase in MCC to 0.471, indicating a higher degree of collaboration. The year 2021 saw a more notable increase, reaching a Collaborative Index (CI) of 2.81, and this level was maintained in 2022. A decreasing trend is observed in the CAI values for single-authored papers (i.e., 1.07 to 1.00) and two-authored papers. Conversely, an increasing trend is noted in three-authored papers (i.e., 0.92 to 1.04) and articles with four or more authors throughout the study period. This suggests a progressive rise in the prevalence of three, four, and more than four-authored papers each year.

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Identifying Hotspots Across Indian Research

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Abstract

In this study, the author keyword analysis was used to identify the themes that have remained the focus of funding agencies. The keywords present in the funded articles published in a three year period were analysed using bibliometric software "VosViewer". The study shows that the keywords such as "India", "apoptosis" and "oxidative stress" are highly prevalent in the funded studies. Further, the dominance of nations' respective name in the funded research indicates that the topics of local importance are a priority for funding.

Keywords: Research themes, funded research, Funding Acknowledgment, Author keywordnetwork

Introduction

Funding of research is essential for research advancement, discipline growth, career of scientist, as well as socio-economic progress of a country (Lane, 2009). It not only fosters research and scientific production, but also develops human resource competence and encourages links with academic institutions, Research and Development (R&D) institutions and industrial establishments (Garg et al., 2005). However, the funding framework and research result production is an intricate process which is affected by the multitude of factors which also include research policies, peer-review, collaboration and prestige of the researchers/scientists among others. Research funding involves core funding as well as project funding that determines the R&D in the country (Owusu-Nimo & Boshoff, 2017). It is now seen as the area heavily influenced by the government policies (Jefferson, 2008) and is an important influencing factor that motivates researchers to devote more time to the research, employ highly trained research aides and ensure wide dissemination of results by attending more international conferences.

Also, nations put special efforts to frame and execute systematic strategies and procedures for the efficient fund distribution among the highly prolific researchers for the novel works with competitive edge to improve scientific growth (Ebadi & Schiffauerova, 2015). A large number of resources are provided by governments, research institutions and universities to support R&D. However, countries vary considerably in the investment of R&D and in the efficiency of converting funds into research output. There is also a great deal of differences in the schemes of funding and in disciplinary allocations (Leydesdorff & Wagner, 2009). In this context, the study tries to identify the themes across the different subjects that have remained the main focus of the funding institutions.

Methodology

The funding information field (FO) of the Web of Science (WoS) was used to identify the funded articles. The below mentioned query was used to download the funded articles across the first 10 subject fields categorized under Essential Science Indicators of InCites database.

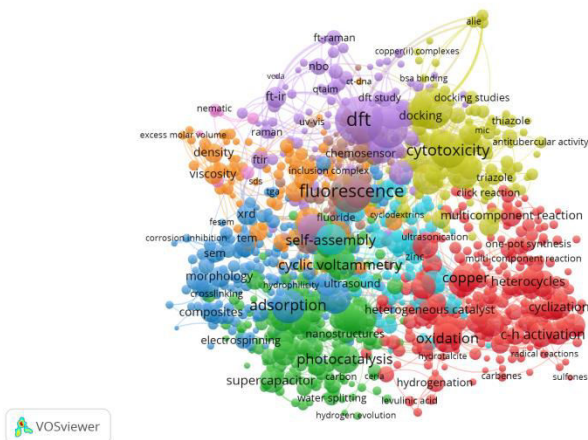


Fig. 3 Author-keywords network in chemistry (India)

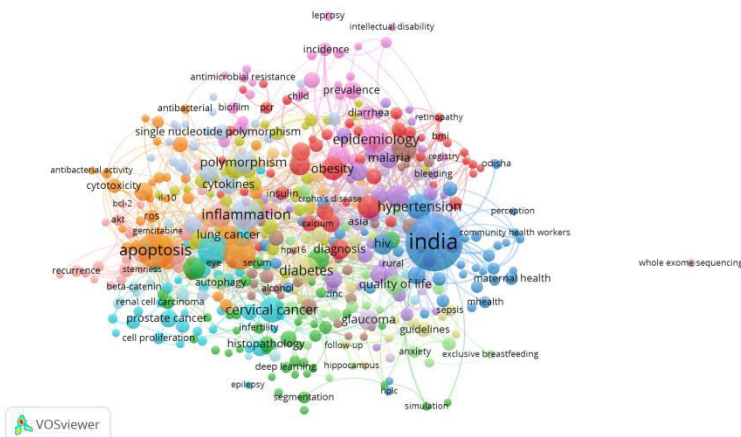


Fig. 4 Author-keywords network in clinical medicine (India)

In computer science, 2399 funded publications are published; of which 2285 have author keyword information. Moreover, there are 8865 keywords, of which 7551 (85.2%) occur only once, 779 (8.8%) twice, 246 (2.8%) thrice, and 289 (3.3%) more than three times. Also, 196 keywords meet the minimum threshold of 5 occurrences, and the entire corpus of 196 was selected for analysis. The keywords group in 12 clusters and the top 10 highest frequency keywords include *security* (53, 2.32%), *authentication* (52, 2.27%), *cloud computing* (47, 2.06%), *wireless sensor networks* (33, 1.44%), *cognitive radio* (31, 1.36%), *energy efficiency* (31, 1.36%), *molecular docking* (31, 1.36%), *genetic algorithm* (30, 1.31%), *internet of things* (29, 1.27%), *machine learning* (29, 1.27%), *clustering* (24, 1.05%), *docking* (23, 1%), *classification* (21, 0.92%) and *wireless sensor network* (21, 0.92%) (**Figure 5**). It is to mention that 12 keywords contribute over 1 percent of funded research, with *security* at the lead in gaining the attention of funded research in computer science.

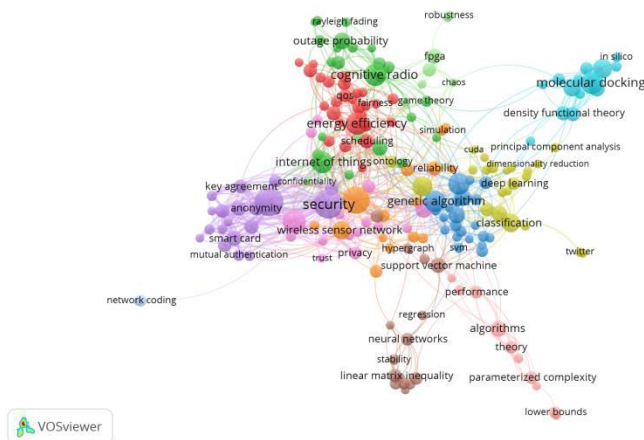


Fig. 5 Author-keywords network in computer science (India)

There are 282 funded publications, of which 220 are with author keyword information. The funded articles include 997 keywords, which comprise 929 (93.2%) keywords that occur only once, 51 (5.1%) twice, 10 (1%) thrice, and 7(0.7%) more than three times.

Moreover, 7 keywords meet the minimum threshold of 5 and were selected for analysis. The keywords make up 2 clusters and the top 10 keywords that have highest frequency are *India* (29, 13.2%), *innovation* (8, 3.64%), *international trade* (4, 1.82%), *emerging markets* (4, 1.82%), *customer relationship management* (4, 1.82%), *corruption* (4, 1.82%), *corporate governance* (4, 1.82%), *welfare* (3, 1.36%), *social capital* (3, 1.36%), and *satisfaction* (3, 1.36%) (Figure 6). All the 10 keywords contribute over 1 percent, with *India* highly predominant by covering over 13 percent of funded research.

A total of 9991 funded publications are in engineering, of which 9363 are with author keyword information and are assigned 32780 keywords. However, 26520 (80.9%) keywords exist only once, 3356 (10.2%) exist twice, 1170 (3.6%) thrice, and 1734 (5.3%) more than three times.

Also, 1176 keywords meet the minimum threshold of 5 occurrences and were selected for final analysis. The keywords make up 15 clusters and the top 10 keywords with highest occurrences are *adsorption* (159, 1.70%), *optimization* (122, 1.30%), *kinetics* (108, 1.15%), *biodiesel* (91, 0.97%), *heat transfer* (66, 0.70%), *surface roughness* (62, 0.66%), *nanofluid* (62, 0.66%), *photocatalysis* (59, 0.63%), *response surface methodology* (55, 0.59%), *hydrogen* (55, 0.59%), *stability* (53, 0.56%), and *graphene* (48, 0.51%) (Figure 7). Thus, it is clear that only 3 keywords have remained the focus of 1 percent of funded research, with other keywords covering less than 1 percent.

The subject area of environment and ecology has 4191 funded publications, of which 3968 are with the author keyword information. There are 13076 keywords, of which 10475 (80.1%) exist only once, 1357 (10.4%) twice, 487 (3.7%) thrice, and 757 (5.8%) more than three times. Moreover, 538 keywords meet the minimum threshold of 5 occurrences and were selected for further analysis. The keywords form 14 clusters and the top 10 keywords with highest frequency are *India* (180, 4.54%), *climate change* (110, 2.77%), *heavy metals* (109, 2.75%), *adsorption* (103,

2.59%), oxidative stress (88, 2.27%), groundwater (78, 1.96%), arsenic (62, 1.56%), conservation (52, 1.31%), bioremediation (49, 1.23%), and remote sensing (48, 1.21%). Thus, funded studies in environment and ecology have remained much more focussed on India compared to other areas (Figure 8).

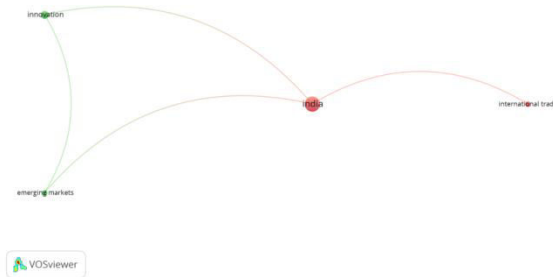


Fig. 6 Author-keywords network in economics and business (India)

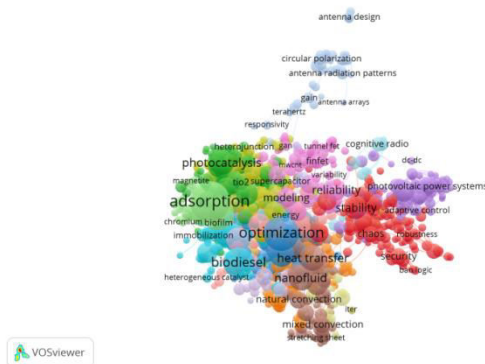


Fig. 7 Author-keywords network in engineering (india)

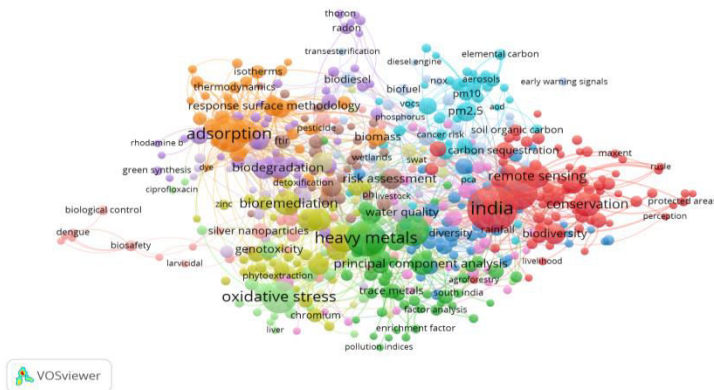


Fig. 8 Author-keywords network in environment and ecology (India)

There are 3627 funded publications, of which 2792 are with author keywords amounting to 9578. The keywords that occur only once is 7877 (82.2%), whereas 890 (9.3%) are present twice, 316 (3.3%) thrice, and 495 (5.2%) more than three times. Moreover, 336 keywords occur at least 5 times and were selected for further analysis. The top 10 keywords with highest concentration are *India* (146, 5.23%), *remote sensing* (68, 2.43%), *climate change* (65, 2.32%), *geochemistry* (56, 2%), *bay of Bengal* (50, 1.79%), *Indian summer monsoon* (48, 1.72%), *Himalaya* (48, 1.72%), *monsoon* (33, 1.18%), *precipitation* (31, 1.11%), *Arabian sea* (30, 1.07%) and *Indian ocean* (29, 1.04%) (Figure 9). All the keywords attract more than 1 percent of funded research, with *India* as the main focus by covering over 5 percent.

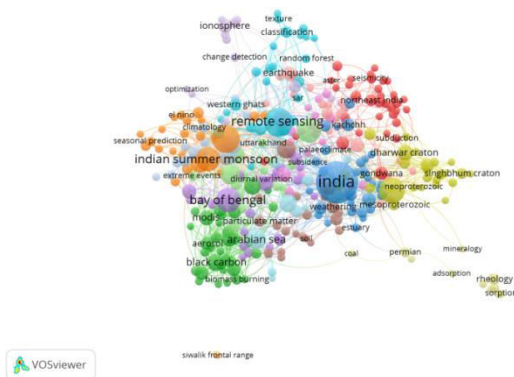


Fig. 9 Author-keywords network in geosciences (india)

There are 1777 funded publications, of which 1349 have author keyword information. Also, there are 4519 keywords, of which 3652 (80.8%) are present only once, 458 (10.1%) twice, 162 (3.6%) thrice, and 247 (5.5%) more than three times. Moreover, 181 keywords occur at least 5 times, and the keywords group in 11 clusters. The top 10 keywords with highest concentration are *India* (81, 6%), *hiv* (61, 4.52%), *tuberculosis* (59, 4.37%), *inflammation* (50, 3.71%), *cytokines* (45, 3.33%), *mycobacterium tuberculosis* (42, 3.11%), *immunogenicity* (33, 2.45%), *biofilm* (32, 2.37%), *vaccine* (29, 2.15%), *children* (24, 1.78%) and *safety* (24, 1.78%) (Figure 10). All the 11 keywords have remained the focus of over 1 percent of funded research, with *India* highly prevalent than other keywords by covering 6 percent.

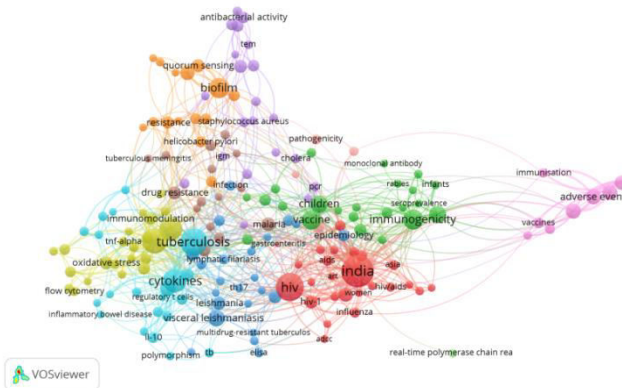


Fig. 10 Author-keywords network in immunology (india)

Conclusion

The keyword “India” is highly prevalent in many funded areas, including clinical medicine, economics & business, environment/ecology, geosciences, and immunology. In biology & biochemistry, the persistent theme is “apoptosis”. Similarly, the most common terms in engineering, agricultural sciences, chemistry, and computer science are “adsorption”, “antioxidant”, “dft”, “and “security” respectively. Across all the 10 subject areas, the most prominent keyword that remains the focus of sponsored research is “India”, followed by “apoptosis” and “oxidative stress”. The keyword analysis of the author keywords reflects the prevalence of nations' respective names in the funded research, signifying the topics of local importance are a priority for funding.

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Evaluating Student Contentment in Higher Education Using Sentiment Analysis

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Abstract

After the COVID, education took on a new dimension. Higher education has completely shifted from offline to entirely online education, and this abrupt transformation has had a significant impact on students' perceptions of education. Thus, recognizing the demands of students is required to improve the institution's teaching and learning in the upcoming educational environment. To understand or extract the student's needs, comprehensive information needs to be collected and analyzed efficiently to acquire meaning. Thus, in this study, we examine student data using sentiment analysis to get and comprehend student perception. The sentiment analysis result was neutral, and the accuracy of machine learning methods such as NaiveBayes, multilayer perceptron, logistic regression, and SVM were compared, with multilayer perceptron having the highest accuracy of 96%. As a result, today's students have become disenchanted with the current educational system. As a result, the institution must seek to improve learners' fulfilment to create a better educational community.

Keywords: Sentiment Analysis, Student Feedback, Student Contentment, Educational Data

Introduction

The academic environment of higher education has experienced a considerable transformation because of technology. Thereseachers emphasize the different ways that modern technologies improve educational institutions. Technology has made it possible for teachers, pupils, and parents to communicate effectively, boosting interaction and sharing of data through educational institutions. In teaching and learning the use of technology can enhance learner learning results, increase utilization of higher learning, and boost learner motivation [1].The technological era has shifted the educational institution into a new light. In recent years, artificial intelligence has made inroads into the realm of education. AI is gradually being utilized by educational institutions to improve methods of instruction and learning. Artificial intelligence-powered tools offer personalized feedback, continuous reach and accessibility for educational resources, reduced expenses, improved interpersonal habits, and impact on learner performance [2]. In these current enhancements in education where students favor or oppose these changes, their opinions are not taken into account. Thus, acquiring and analyzing student feedback is critical to understanding student opinion. While gathering feedback from pupils is not that difficult, analyzing that data is tedious. Because the manual study of learner comments takes time, sentiment analysis can be utilized to analyze this data accurately [3].The purpose of this article is to investigate how satisfied learners are with the current educational system by gathering input from students and analyzing the data using sentiment analysis to determine the maximum level of perception.

Literature Study

Feedback is a critical component of institutions for improving the performance and learning of learners [4]. Student feedback is vital for assessing the effectiveness of educators and instructional quality [5]. The feedback responses can be leveraged to improve the standard of the current process of learning, allowing the educational goals to be met [6]. Feedback is extremely important

for enhancing pupil's educational experiences. This has a substantial impact on the professionalization of higher education teaching. The majority of professors continue to use the traditional form of feedback. This type of feedback is frequently insufficient to fulfill the needs of students in terms of increasing their learning experience [7]. Thus, proper data collection procedures can further improve the feedback collection process. There are several methods for gathering feedback from learners, including Google Forms, open-ended questions, and real-time feedback apps. Later analysis of feedback can be done in a more advanced approach, making it more effective and allowing for a proper study of students' requirements and contentment. When analyzing student feedback, instructors could utilize natural language processing (NLP) and sentiment analysis technologies. These approaches can assist instructors in analyzing gathered feedback data more swiftly and effectively, offering a significant understanding of student preferences and requirements. Sentiment analysis, especially employing natural language processing (NLP), is becoming more prevalent in the research of student feedback for comprehending their ideas and feelings, which may assist in enhancing instructional and educational tactics [8][9]. In the past decade, there has been an increasing interest in applying NLP approaches to analyze the emotions of learners who participate in MOOCs (Massive Open Online Courses) [10].

Sentiment Analysis in Education

Sentiment analysis is extracting subjective information from text data. It entails determining if a text's sentiment or emotional tone is favorable, negative, or neutral. Natural language processing (NLP) methods and machine learning models are used in sentiment analysis approaches that detect content based on its sentiment [11]. Some studies emphasize the utility of sentiment analysis in detecting the progress of learners' curves, comprehending their demands, and forecasting their academic achievement [12].

The researcher from India performs a study to gather learner views from feedback and then categorize them as good, negative, or neutral using supervised learning algorithms. Researchers took a dataset of student comments obtained from an Indian institution and classified it using several supervised learning algorithms such as Naive Bayes, Support Vector Machine, and Random Forest. In regards to accuracy, the researchers discovered that the technique known as Naive Bayes outperformed the other algorithms [13].

Another researcher proposes a hybrid method for learner sentiment analysis based on classroom feedback gathered via Google survey forms and WhatsApp social media. Their research team classified the feedback as good, negative, or neutral using several sentiment analysis approaches such as TextBlob, VADER, and Naive Bayes. The research discovered that following the COVID-19 epidemic, the sentiment of learners shifted, with a fall in positive sentiment and a rise in negative emotion [14].

Another author collects the dataset of 700 written evaluations from Turkish learners and analysed them using sentiment analysis techniques to recognize and categorize user feelings as positive, negative, or neutral. To identify the feedback, the researchers employed several machine learning methods such as Naive Bayes, Support Vector Machine, and Random Forest. In terms of accuracy, the study discovered that the Naive Bayes method outperformed the other algorithms [15].

One of the researchers developed an innovative method for summarizing and organizing students' comments by applying machine learning sentiment analysis to analyze their attitude regarding a course as an aspect of language. The authors created a summative student course evaluation tool

that can improve opinions' effectiveness in life science courses. The authors proposed that using machine learning sentiment analysis to provide more precise and valuable feedback to teachers might help enhance the quality of teaching and learning [16].

Methodology

Sentiment analysis has been growing in popularity over the past decade for analyzing and interpreting feedback from students. Numerous studies have been undertaken on the sentiment analysis of student feedback including a literature review [10]. A model for sentiment analysis constructed with TF-IDF and lexicon-based features [17]; and a study that employed sentiment analysis to analyze qualitative student responses [18]. The fundamental goal of this research is to gather important information about pupils' general contentment, concerns, and feelings toward various areas of their academic experience. Sentiment analysis may be utilized to quantify overall sentiment throughout an educational programme as well as to study how students feel about learning and their views towards a course [19].

Data Collection

Around 748 responses were received using the questionnaire given in Fig. 1 and Fig. 2, with 702 authentic responses from learners. The results are divided into population groupings based on demographics in Table

TABLE I DEMOGRAPHIC DISTRIBUTION OF SAMPLES

S. No.	Demographic	Population (Total-748)
1	Gender (Male)	403
2	Gender (Female)	345
3	Urban	382
4	Rural	366
5	Bachelor Degree	354
6	Advanced Degree	292
7	Other Degree	102

Data Preprocessing

Raw information undergoes processing to eliminate noise, data that is unimportant, and individually identifying data. Text cleaning techniques like tokenization, stemming, and lemmatization are used to standardize the textual data.

Sentiment Analysis Technique

The objective of the study is to create an automated feedback analysis system that uses NLP and sentiment analysis to identify the polarity of pupil feedback. The sentiment analysis tools used for this kind of analysis are NLTK and spaCy. Sentiment polarity is measured on a positive-negative scale and can be categorized as extremely favourable, either positively or negatively negative, or extremely negative, but in this study, we have worked on positive, negative, and neutral sentiments. The study extracts significant characteristics, phrases, or words from feedback entries to better comprehend the factors influencing student attitudes. Sentiment analysis data are visualized with charts, graphs, and visual aids to help grasp sentiment trends more clearly. This technique is consistent with the highest standards for visualizing sentiment and tendency data, which may give rapid insights, improve decision-making, and increase engagement.

Result and Discussion

The sentiment analysis of student responses produced informative results about their perspectives and experiences. The dataset, which included comments from a variety of sources, was submitted to natural language processing algorithms to assess the sentiment represented in each item. The sentiment analysis classified answers as favourable, negative, or neutral, offering a quantitative summary of the entire feedback environment.

Sentiment Analysis Results

A machine learning system based on a labelled dataset was used to perform sentiment analysis on the student feedback dataset. The sentiment analysis results indicated the overall sentiment generated by students about course design and instruction. Positive, negative, and neutral sentiments were assigned to the sentiment scores. Several methods were utilized in the response classification analysis. Each algorithm was examined, and the results were almost neutral. In sentiment analysis, algorithms such as Naive Bayes, Logistic Regression, SVM, and Neural Networks were utilized to classify replies. The neural network achieved the highest level of accuracy in classification when compared to the other methods, as seen in Table 2.

TABLE II ACCURACY OF CLASSIFICATION ALGORITHM

Algorithm	Naive Bayes	SVM	Logistic Regression	Neural Networks
Accuracy	0.9533	0.9533	0.9533	0.9633

Precision, recall, F1-score, and support are essential measures used to assess the efficacy of machine learning classification systems. Precision represents the correctness of the classifier's positive predictions, whereas recall measures the classifier's capacity to locate all positive instances in the dataset. The amount of data points in each class in the test set is represented by support, which aids in understanding the dataset's class distribution. The distribution of the value for the classification algorithm is shown in Table 3.

TABLE III PRECISION, RECALL, AND F1 SCORE VALUES FOR THE CLASSIFICATION ALGORITHM

Algorithm	Sentiment	precision	recall	f1 score	support
Naive Bayes	negative	0	0	0	5
	neutral	0.96	1	0.98	126
	positive	0.89	0.89	0.89	19
SVM	negative	0	0	0	5
	neutral	0.96	1	0.98	126
	positive	0.89	0.89	0.89	19
Logistic Regression	negative	0	0	0	5
	neutral	0.95	1	0.97	126
	positive	1	0.89	0.94	19
Neural Network	negative	1	0.6	0.75	5
	neutral	0.98	0.98	0.98	126
	positive	0.85	0.89	0.87	19

According to the research, 70% of the overall feedback received displayed neutral emotion, suggesting a lack of strong positive or negative opinions, while roughly 28% had a positive

sentiment, reflecting students' favorable view of the course structure and teaching. Approximately 2% of the input was negative, showing regions of concern by students or dissatisfaction shown in Fig. 14.

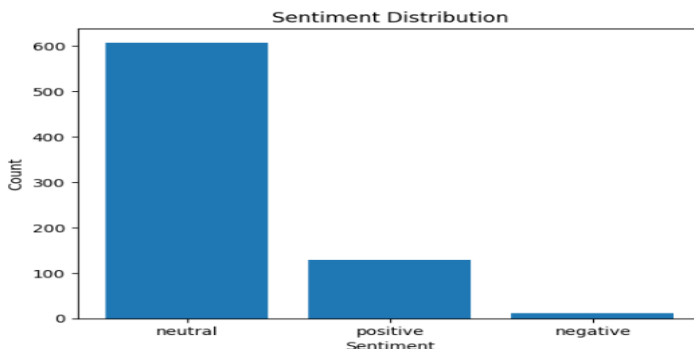


Fig. 3. Sentiment analysis in limitation of current course

Feedback is an essential element of education in raising student learning and performance [4]. Student feedback is crucial for evaluating the performance of teachers and the quality of teaching [5]. The results of the feedback can be used as input in improving the quality of the existing learning process so that learning objectives can be achieved [6]. There is a great importance of feedback in improving the learning experience for the students. This has also a significant effect in professionalizing teaching at the higher education level. However, feedback is considered a difficult issue in this arena. Most of the lecturers are continuing with the traditional form of feedback. This form of feedback often unable to satisfy the students in improving their learning experience.

Conclusion

Sentiment analysis of student comments found that 70% of replies were neutral, reflecting ambivalence. However, 28% of the comments were positive, highlighting the necessity of identifying and strengthening the factors that contribute to student contentment. Conversely, 2% of the input was unfavorable, emphasizing the importance of addressing issues to enhance the student experience. The study discovered that neural network models combine other methods, with an accuracy of 96%, indicating their dependability in estimating satisfaction levels. These insights not only offer light on the present level of student contentment, but also serve as a platform for targeted changes and interventions, which are critical for fulfilling the academic their changing demands.

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Collection Management of Electronic Information Resources for Academic Libraries

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Abstract

In today's age of information technology, the majority of information is accessible in a digital format. Various organisations are building and developing digital libraries. Compared with traditional libraries, digital libraries need a distinct set of skills and abilities to manage digital their holdings. The collection development approach has witnessed an actual shift in the realm of digital content, mainly due to the numerous and easily available digital materials found on the internet. This study aims to highlight the importance of collection development policy, the creation of web-based collections, and the difficulties faced in developing collections in the digital age.

Keywords: Collection Development, Collection Development Policy, Digital Age, Digital Library, Electronic Resource Management, Electronic resources.

Introduction

Academic libraries are using advanced technologies to improve their collections, which include both physical and digital resources, utilising new web technologies that offer users an enhanced, dynamic, and inviting environment that is interactive and visually appealing, complete with multimedia collections and services. Several academic libraries are actively expanding their collection of full text documents in digital form and persevere in using multiple online databases. Electronic resources are becoming more accessible, which has helped increase their market share. Libraries also included E-resource modules to their management systems. However, every management must carefully examine factors like selecting and acquiring electronic resources to meet user information demands. Considering changing user demands, libraries are shifting towards emerging technologies for their overall growth. Electronic Resource Management enables libraries to oversee their e-resources authorization and procurement details using a unified system, speeding workflows and eliminating the need for maintaining separate databases.

Review of Literature

Ngurinkhuma (2015) discusses collection development components, challenges and their importance for the e-resources implementation. To maintain the library's digital credibility, librarians and other authorities must accept the challenge. Panage & Bonde (2016) in their article it provides an in-depth examination of the significance of digital resources, digital libraries, and collection development. The article focuses on the process of creating a digital collection, specifically in relation to born digital and in-house digital resources.

Kaur et. al. (2017) they have highlighted the importance of collection development policy, the development of internet-based collections, and the challenges faced in developing collections in the digital age. This article also examines the trends and requirements for collection development in the digital age. Bala (2021) in his article he has covered e-collection policy, selection criteria, bibliographic concerns, digital preservation, perpetual access, and context. This paper concludes by urging users and staff to adapt to this e-environment by enhancing information, literally user communication, and highlighting e-collection management at all levels.

Ram et. al. (2022) researchers highlighted digital collection creation challenges and management. The study concluded that library staff should take extra effort to provide an even-handed collection that raises standards.

Electronic Resource

Electronic resources refer to digital information that may be accessed via devices such as computers, smartphones, tablets, and e-readers. The items included are e-books, e-journals, online databases, and multimedia materials. Their popularity comes from their accessibility, cost-effectiveness, efficiency, and eco-friendliness. Electronic resources have completely altered the way information is accessed and distributed in the fields of education, research, healthcare, and business. Electronic resources will remain essential in the digital era as technology advances. The following are the types of electronic resources which are most commonly used in libraries: E-books, E-conference proceedings, E-databases, E-journal E-lectures, E-magazines, E-news, etc.

Impact of E-resources and services on higher education and research

The integration of electronic resources and services has brought about a revolutionary transformation in higher education and research. Access to a vast and diverse repository of digital information has dismantled geographical barriers, providing scholars and students with unprecedented opportunities to explore a global landscape of knowledge. This accessibility has not only expedited the research process but has also enhanced research productivity by enabling swift and comprehensive information retrieval. Collaborative research opportunities have flourished as scholars globally can now engage in joint projects, share resources, and contribute to interdisciplinary endeavors through digital platforms. Moreover, the customization and personalization afforded by e-resources have empowered learners and researchers to tailor their educational experiences, focusing on specific topics and formats that align with their unique preferences and goals. While these advancements offer immense benefits, challenges such as the digital divide, accessibility issues, and the need for enhanced digital literacy must be addressed. As higher education adapts to evolving pedagogical approaches and embraces the possibilities of digital technologies, the impact of e-resources continues to shape a dynamic and innovative landscape for academia.

Collection Development in Digital Age

Collection development in academic libraries has significantly transformed in the digital age, with the increasing inclusion of toll-based electronic resources and the need to evaluate and integrate open access electronic scholarly content. Librarians who vet materials and organize collections create the foundation for academic services and outreach efforts. The prevailing attitude is that all information will eventually be free on the web, but the library must retain its relevance as collections move to digital formats. Collection development librarians can identify new digitization initiatives, seek grant funding, and leverage collaborations to maximize the availability and dissemination of open web scholarly research materials. They add value by integrating valuable open web contents alongside traditional library materials, organizing available quality scholarly materials through weblists, research guides, LibGuides, course management systems, and integrated library systems.

Key Components for Digital Library Development

For digital libraries to succeed, several challenges must be addressed. Digital library management identifies and implements problems at different stages of development and usage. The following categories describe the main digital library components. The elements are briefly discussed.

Collection Management of e-Resources

Collection management combines print and digital resources. Collection management and development are often similar. Collection development involves choosing resources based on institution goals, user needs, and budget. Collection development and management involve selecting, acquiring, preserving, weeding, cancelling, and giving access to serials/journals. The e-collection development process is a systematic approach to building library collections using electronic devices like computers. This process is based on meaningful information rather than subjective choice and involves selecting current and retrospective information, materials, and evaluating existing e-collection materials. The goal is to satisfy the information requirements of users. As a result, libraries are re-orienting their collections and policies to incorporate e-resources, transforming not only the process of collection development but also the role of librarians.

Collection Development Policy

Libraries should adopt an explicit collection development policy to ensure they select the right electronic resources for their mission. This policy prevents haphazard unfocused groupings and helps avoid resistance to change. Most libraries are still in their infancy, so they should proceed in a structured way. A fully integrated collections policy will be appropriate when print and electronic resources reach a balance. The policy should be flexible, sensitive to local needs, priorities, and culture, and part of an institutional Information Strategy. The collections policy should balance user wants and needs for electronic information resources. Academics often prioritize improved journal collection and better access to external electronic databases. An explicit collections policy prevents haphazard unfocused groupings of resources and helps avoid resistance to change within the institution. Most libraries are still in their infancy when it comes to providing access to electronic information, so selection decisions should be made within an explicit collection development policy. A fully integrated collections policy will be appropriate in time, but it is important to present major moves into electronic resources as part of an agreed library strategy with institutional support. Policy statements should be flexible and sensitively interpreted within local needs, priorities, and culture.

Selection Criteria

Selecting electronic resources requires careful consideration of factors such as authority, accuracy, currency, and relevance. Collaborative decision-making involving librarians, faculty, and students ensures that the collection aligns with academic goals and supports research endeavors.

Licensing and Access

Negotiating licenses for electronic resources involves understanding the terms and conditions set by vendors. Access management, including authentication and authorization protocols, is essential to ensure seamless access for authorized users while safeguarding against unauthorized use.

Budgetary Considerations

Managing budgets for electronic resources requires a balance between acquiring new resources, renewing existing subscriptions, and exploring cost-effective alternatives. Libraries must stay vigilant in assessing the return on investment and explore consortia purchasing for cost savings.

Preservation and Archiving

Preserving electronic resources involves planning for potential disruptions, ensuring data integrity, and considering digital archiving solutions. Collaboration with other institutions and leveraging initiatives like LOCKSS (Lots of Copies Keep Stuff Safe) enhances the longevity of digital collections.

Usage Assessment and Analytics

Tracking the usage of electronic resources is vital for informed decision-making. Utilizing analytics tools helps libraries understand user behavior, assess the popularity of resources, and identify areas for improvement or reallocation of funds.

Training and Support

Providing training and support for users is essential to maximize the benefits of electronic resources. Librarians should offer workshops, tutorials, and guides to help users navigate and utilize these resources effectively.

Challenges of Using EIR by Academic Libraries

A lot of individuals prefer electronic resources, yet there are several challenges to their widespread adoption. E-resources have provided huge advantages above paper resources in library organisation. However, smart libraries encounter multiple challenges in order to continue providing important services to their users. Igun (2005) felt that libraries and information centres' challenges in establishing electronic resources include managing current e-instruments, metadata data for ordering e-resources, e-journal expertise, and URL maintenance. Inadequate PCs, insecure internet connection, and lack of mobility capabilities limited students' utilisation of electronic resources for information and care.

Issues and Challenges among the Librarians

Harish Chandra (2012)'s challenges as described below highlight e-resource issues related to management. Even if it's difficult, librarians have to include new technology-based services to maintain the library's appearance.

1. Identification of suitable sources for electronic resources.
2. Building enough infrastructure to provide e-resource services.
3. Training skilled personnel to manage the electronic resources.
4. Examining methods to implement a content management service in place of a document management service.
5. Facilitating user education via technological commutes and training to maximize library resources.
6. Delivering high-quality library services in the field of information and communication technology.
7. The approach to convincing the authorities to allow electronic collections in the library.
8. Encouraging library professionals to collaborate in the new endeavor.
9. Providing professionals with knowledge and skills in the use of technology.

The advantages of digital collections

1. Global Accessibility.
2. 24/7 Availability.
3. Efficient Searchability.
4. Cost-Effective Storage.
5. Enhanced Interactivity.
6. Customization.
7. Collaborative Opportunities.
8. On-Time Updates.
9. Integration With Emerging Technologies.
10. Accessibility For Diverse Audiences.

The disadvantages of digital collection

1. Access Inequality
2. Preservation and archiving for a long term
3. Security and Privacy Risks.
4. Dependency on Technology.
5. Costs and Resource Intensity.
6. Quality and Authenticity Concerns.
7. Accessibility Issues.
8. Licensing and Copyright Complexity.
9. Lack of compatibility among different publishers
10. Data loss due to technological failures or cyber threats.

Conclusion

In light of the aforementioned factors, the landscape of librarianship is poised to become significantly more challenging in the future, necessitating adaptation and acceptance of the myriad challenges posed by 21st-century technology. Firstly, the proliferation of new databases and digital libraries presents librarians with the task of navigating and managing an ever-expanding array of digital resources. Secondly, the exponential growth of information places immense pressure on librarians to effectively curate, organize, and disseminate vast amounts of data to meet the diverse needs of users. Furthermore, the dynamic nature of information demands requires librarians to constantly evolve and respond to changing user expectations and preferences. Additionally, the construction of library collections must be agile and responsive, tailored to the specific requirements and interests of users across various disciplines. Moreover, amidst financial constraints, librarians must contend with the challenge of accomplishing more with limited budgets, necessitating strategic resource allocation and cost-effective solutions. Ensuring the library's workforce remains highly skilled and competent is paramount in the face of evolving technological advancements and complex information environments. Furthermore, maintaining rigorous quality control and assurance mechanisms is essential to uphold the standards of library services in an increasingly digital age. The availability of a diverse range of electronic resources presents both opportunities and challenges, requiring librarians to adeptly navigate and integrate various formats to meet user needs effectively. Moreover, the establishment and management of digital repositories necessitate robust infrastructure and expertise to preserve and provide access to digital content. Additionally, librarians play a crucial role in fostering knowledge retrieval skills among users and promoting information literacy in navigating the complexities of the digital landscape. Finally, providing equitable access to the internet within library spaces is essential in facilitating universal access to information and promoting digital inclusivity. In sum, the multifaceted nature of these challenges underscores the imperative for librarians to embrace innovation, adaptability, and lifelong learning in order to navigate the complexities of 21st-century librarianship successfully.

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Transformative Pedagogies: Exploring the Dynamics of E-Learning and Virtual Learning Environments

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Abstract

This conceptual research study explores the various facets of virtual and e-learning and looks at how they affect student engagement, pedagogical techniques, and the educational environment as a whole. Rapid technology breakthroughs are changing the face of education, and digital platforms are playing a major role in this revolution. In this paradigm, virtual and e-learning have become essential elements that present fresh chances for interactive, adaptable, and accessible learning. The purpose of this conceptual study article is to investigate the various aspects of virtual and e-learning, as well as their possible effects on pedagogies.

Keywords: E-learning, Virtual Learning, Pedagogies

Introduction

Most foreign colleges across the world have incorporated e-learning as a tool into their curriculum. "Any learning that involves using the internet or intranet" is the definition of "e-learning." With the introduction of digital technologies, traditional educational approaches have been completely transformed, and a new era of learning has begun that is not limited to traditional classroom settings. Virtual and e-learning are two cutting-edge methods that use technology to overcome geographic limitations and give students a dynamic, interesting educational experience. The purpose of this essay is to examine these modes' intellectual underpinnings and potential effects on education in the future. Technology breakthroughs have caused a paradigm shift in education in the twenty-first century. Virtual learning, which includes immersive and interactive online experiences, and e-learning, which is defined by the use of electronic media and devices for educational delivery, has emerged as essential elements of this shift. This essay aims to investigate the theoretical foundations of these approaches and how they might come together to completely transform the field of education. With the introduction of e-learning and virtual learning, education is changing. Traditional classroom environments are making way for digital platforms that provide students with a variety of interaction and learning possibilities as technology advances. This essay seeks to envision the combination of virtual and e-learning as a comprehensive approach to education, taking into account the advantages and disadvantages of each.

Theoretical Framework

This part develops a theoretical framework that unifies virtual and e-learning, drawing on well-known educational theories like constructivism, connectivism, and the community of inquiry model. The framework investigates the ways in which various modalities can enhance one another to promote learner engagement, teamwork, and knowledge acquisition. Examine connectivism's function as a theoretical framework for comprehending how students interact and pick up information in the digital era. Talk about the value of developing digital literacy and networked learning environments. Constructivism: Analyze the well e-learning and virtual learning aligns with constructivist ideas, placing special emphasis on how learners actively construct knowledge via interactive and group experiences. The theoretical foundations for virtual and e-learning will be covered in this part. This research aims to investigate the ways in which pertinent educational

theories, such as constructivism, connectives, and the SAMR model, can aid in the development and execution of efficient e-learning environments.

Background

With the incorporation of virtual and e-learning, the traditional educational model is undergoing a paradigm shift. An outline of the historical background is given in this part, with a focus on the elements that have accelerated the uptake of these digital platforms. The widespread adoption of digital technology in education has led to the emergence of e-learning and virtual learning environments, which have significantly transformed conventional teaching approaches. An overview of the development of VLEs and e-learning, as well as their historical context, is given in this section.

Virtual learning

A VLE provides engages the student through different activities like observation, thinking, listening, reading, acting, doing and it therefore caters to wide range of student learning styles as compared to traditional learning methods. The students in VLE settings are usually self-directed which leads to development of goal-setting skills, persistence and self growth.

Worldwide platforms for e-learning

E-learning platforms are interactive online services that offer information, tools, and resources to trainers and students to improve and assist the administration and delivery of education. Online platforms known as virtual learning environments provide instructors and students with digital tools to improve the learning process. E-learning is a type of education in which instruction and training are delivered via digital resources. Using virtual reality and other technology, virtual learning is a more interactive and immersive style of education. Users can use a range of synchronous and asynchronous e-learning platforms in individual, commercial, and educational settings. These robust software packages facilitate online training and digital learning by offering courses, PowerPoint presentation features, online tests, and data analysis on student performance. These platforms include, but are not limited to, Schoology, Moodle, Sakai, Canvas, and Anthology for Business.

Social media

Social media offers helpful e-learning resources. These platforms facilitate the sharing of e-learning materials among learning groups. Examples of how they can be helpful are as follows:

Users on Facebook can form groups to exchange ideas and information, and members of these groups are free to talk about the shared content. Users on LinkedIn can form groups that are similar to one another and may be seen as more credible because members list their professional qualifications on their profiles. Moreover, LinkedIn offers over 4,000 business courses on its LinkedIn Learning paid e-learning platform. These courses cover a range of subjects, including digital marketing and web development. To keep their skills current, business professionals can take these courses by paying a monthly subscription.

For education

Coursera

A popular online education platform that offers courses from top education providers around the world.

Docebo

A collaborative learning platform mostly used in formal learning.

Moodle

An open-source learning platform that offers a comprehensive range of features for teachers, students, and administrators.

Pluralsight

An online learning platform for higher education that provides a comprehensive library of courses and resources.

Massive open online courses Independent learners can also take advantage of massive open online courses (MOOCs) on the web. MOOCs are made available through popular platforms like Coursera and edX to large groups of people over the internet, usually for free. Often, these courses are modeled on ones taught by top-tier universities, which is great for learners who want quality training content for free. Users can log into a MOOC's website and sign up for a given course. Certain MOOC programs, such as edX's certificate programs, charge a student looking to earn a specific certificate for the completion of their coursework. Other platforms, such as Udemy and Skill share, are similar to MOOCs in that they are available online and can accommodate large groups of learners.

Impact on Education

Inclusivity and Accessibility: Talk about how online and blended learning may solve accessibility concerns and provide education to a larger and more varied student body. **Lifelong Learning:** Examine how digital education may help people learn continuously throughout their lives and adjust to the changing needs of the knowledge economy.

Learners' active engagement

Technology integration in the classroom does not ensure motivated students. In fact, the student-teacher relationship has become less intimate as a result of online instruction. Teachers must convert the classroom into an online setting. Teachers must comprehend the reasons behind their students' motivations. While most students enroll in online courses with the goal of passing them, there are a variety of reasons why these courses fail. One factor that may have contributed to the success or failure of online instruction is the motivation of the students.

Teachers should,

1. Remember that students' motivation needs to be nurtured in order to engage them.
2. Elucidate to their pupils the potential applications of the virtual space.
3. Promote communication and teamwork among their pupils.
4. Establish study groups to prevent pupils from studying alone.
5. Encourage pupils to connect with one another online by setting them up with other students.
6. Engage with their students by keeping an eye on their online personas and providing them with ongoing feedback.

Technological Infrastructure

Digital Platforms and Tools: Look at the wide variety of digital platforms and tools used in virtual and e-learning. Examine how interactive multimedia, virtual classrooms, and learning management systems (LMS) can improve the educational process.

Accessibility and Inclusivity: Talk about how crucial it is to guarantee that all students have equal access to online learning opportunities and how to handle any potential inclusivity-related difficulties. Consider the ways in which technology can be used to break down barriers and advance educational equity.

Technological advancement

We will look at the technology infrastructure needed to make e-learning and virtual learning projects successful. Talks about learning management systems, online learning environments, multimedia materials, and the incorporation of cutting-edge technologies like augmented reality (AR) and virtual reality (VR) are covered in this.

Examine how learning management system (LMS) systems support assessment, student engagement, and material delivery in online and hybrid learning contexts. Examine how immersive technologies, such as augmented and virtual reality, can improve the learning process by enabling students to interact with material in three-dimensional environments.

Pedagogical approaches

We will examine the pedagogical tactics used in virtual and e-learning settings, with a focus on learner-centred approaches, collaborative learning, and the facilitator role of instructors. The article will also examine how learning experiences can be tailored and made more unique to meet the needs of different types of learners. Examine how traditional in-person education can be combined with online learning elements to create blended learning, with a focus on the advantages that come from integrating online and offline learning. Examine how synchronous and asynchronous interactions in digital contexts support dynamic and adaptable learning as you examine the idea of virtual classrooms.

Challenges

This section addresses the difficulties in integrating virtual and e-learning, covering topics such learner preparedness, technology limitations, and the necessity of good instructional design. Additionally, methods for overcoming these obstacles are examined. A thorough analysis of the difficulties posed by online and hybrid learning will be done, covering topics like digital inequality, cyber security, and the possible loss of in-person communication. The study will also address the advantages that these difficulties bring, such as improved scalability, adaptability, and accessibility. Although there is a lot of potential for e-learning and virtual learning to be integrated, this section discusses the difficulties that teachers, institutions, and students could run into. Concerns about cyber security, digital inequality, and the necessity of faculty training are examined. The report simultaneously draws attention to the chances for creativity, teamwork, and improved learning outcomes that result from successfully tackling these issues.

Future directions and implications

Artificial Intelligence in Education: Make predictions on how AI technologies will be incorporated into virtual and e-learning environments, as well as how they will affect customized learning and adaptive assessment. Moral Aspects to Take into Account: Draw attention to any potential moral dilemmas brought on by our growing reliance on digital platforms, such as those with data security, privacy, and the digital divide. Future Directions and Implications: The paper's discussion of prospective advancements in e-learning and the integration of virtual learning come to a close. It looks at new pedagogical ideas, trends, and technology that could improve this blended learning model's efficacy even further. It also takes into account the larger effects on the educational environment, including suggestions for future study and policy issues. Emerging technology: Take into account the possible effects of cutting-edge technology like augmented reality, artificial intelligence, and immersive simulations on educational practices as you forecast future developments in e-learning and virtual learning.

Implications for Policy: Consider the policy ramifications of e-learning and virtual learning's broad adoption. Think about the requirements for professional development for teachers,

regulatory frameworks, and approaches to potential ethical dilemmas. Examine the cognitive and affective facets of student involvement in virtual learning environments. Examine variables that affect participation, motivation, and focus in online learning while taking the psychological effects of distance learning into account.

Social Interaction and Collaboration: Analyze how social interaction and group projects fit into online courses and virtual learning environments. Talk about how group activities, discussion boards, and online communities help students feel more connected to one another. Integration into curriculum: Evaluate the methods used by academic institutions to include virtual and e-learning into their conventional curriculum. Examine the difficulties educators encounter while modifying their pedagogical approaches for use in digital setting. Evaluation and Assessment: Talk about cutting-edge evaluation techniques that are appropriate for online and hybrid learning, addressing concerns about fairness, authenticity, and dependability. Analyze how well evaluation techniques measure the results of learning. Reflections on the potential future paths of virtual and e-learning are included in the paper's conclusion. In order to strengthen the mutually beneficial link between various modalities and create a more inclusive, interesting, and successful educational paradigm, it makes recommendations for future research directions, technology developments, and pedagogical innovations.

Conclusion

Instructors need to understand their student motivations when teaching online classes. However, it can be difficult to assess student motivations for online learning due to the lack of personal contact between the students and instructor. One way to avoid this is to have the students complete an online assessment form on motivation. Most importantly, it should be noted that more technology does not necessarily lead to better learning outcomes. It is expected that improvements in Internet technology are likely to increase the use of multimedia in education. Moreover, it is expected that technology would most influence the delivery of online learning. It is planned to use other Multimedia tools of the e-learning in future studies. Highlight the revolutionary potential of virtual and e-learning in transforming the educational landscape in your summary of the main findings. Stress the importance of continued study and cooperation in order to fully utilize these technologies' potential to create inclusive and productive learning environments. Write a summary of the most important discoveries and realizations from the investigation of transformational pedagogies in online and virtual learning settings. Emphasize the necessity of continued research and collaboration to harness the full potential of digital technology in defining the future of education. The amalgamation of virtual and e-learning signifies a revolutionary change in the field of education. Educators and institutions can leverage the combined capabilities of various modalities to give learners a dynamic and adaptable educational experience by conceiving and implementing a unified framework. This study adds to the current conversation on how education is changing in the digital era and provides stakeholders with useful advice for navigating this revolutionary path.

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Moodle and Its Role in English Language Teaching

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Abstract

Moodle is a free and open source learning management system. It enables to create powerful, flexible, and engaging online learning experiences. It creates active learning environment filled with different kinds of student-to-student and student-to-teacher interactions. It facilitates to learn from one another as Moodle framework is structured to maximize interactivity with other students and the content itself. English instructors make use of Moodle effectively to impart English language skills to the learners. As Moodle enables to add several kinds of static course material, separate courses can be created. In Moodle, the Forum is the key tool. Besides this Moodle enables to use a scale to rate student's work. Moodle accommodates all kinds of learning needs and settings. Thus, English instructors can create highly effective courses that help them to create a truly dynamic and exciting learning environment to the learners.

Keywords: Moodle, English Language Teaching, Interactive, Forum

Introduction

The 21st century classroom is filled with a vibrant assortment of learners. Students come from different socio-economic backgrounds, with culturally diversified experiences, and learning styles, and preferences unique to each individual. These dynamics create a challenge for teachers as they attempt to accommodate the needs of all learners within the various academic settings. English teacher has to be smart enough to transform the style of teaching as per the needs of the student.

In the present scenario, it is a universal agreement that technological implementation in educators contributes significantly to improve teaching and learning leading to greater achievements. Technology has become an integral part of educational system around the world and it can be challenging to measure the effects of technology alongside other factors that may influence teaching and learning. Moodle, a free, open source learning management system is one of the products of technological that enables to create powerful, flexible, and engaging online learning experiences.

Review of Literature

Moodle is the name of a software package that can convert a learning medium into a web form (Foster, 2008). Moodle is a complex platform for designing and managing courses, assessing student attendance and performance, organizing quizzes and assignments, and conducting surveys, as detailed by Alessi & Trollip (2001). Rad (2018) found that online Moodle-based implied the more contemporary version of distant education or an updated rendition.

Kyeong-Ouk Jeong (2017) asserted that the use of Moodle and flipped instruction could help to promote not only students' English communicative competence but also their interactional and sociocultural competence. Kozlova and Tryszak (2021) emphasised that Moodle is a great teaching supplement to traditional classroom education and a supportive companion for blended (or hybrid) course forms, but it cannot replace the brick-and-mortar classroom. English lecturers may utilize a variety of social interaction and collaboration tools in Moodle, which was built with social constructivism in mind. These tools include Wikis, forums, chats, blogs, and workshops. Subgroups (visible or hidden) may be formed, and learners can engage in synchronous chat activities with each other.

Prasetya (2023) opined that Moodle encompasses all the usual features that English instructors foresee from a learning management system, incorporating assignments, forums, quizzes, and collaborative activities like glossaries and wikis. English instructors and language learners could communicate and participate using Moodle Forums. Kucirkova (2019) affirmed that English lecturers might be considering appointment-based options because not everyone will be able to attend the live session.

Juhaňák *et al.*, (2019) explained that the Learning Management System could implement different styles and tools. The primary objective is to generate the administrative procedure, virtually paper-based system, and online assessment (assessment), including the various English language learners' tests or assessments of communicative competence. Ruiz-Molina *et al.*, (2018) defined independent learners as individuals who take ownership of their education. Autonomous learners take the initiative and monitor and assess their progress. Thus, increasing learner autonomy in formal educational situations creates superior learning in an online classroom regarding reflection and self-awareness.

Aikina and Bolsunovskaya (2020) justified that the Moodle-based online learning English content timetable, for example, needs to specify exactly when students are to acquire material, synthesize it, seek instructor guidance, and eventually execute the delivery. Selvaretnam and Belkhatir (2019) affirmed that resources must be contextualized to establish their relevance and significance in the context in which they are learned. For the knowledge collected from multiple sources, materials must be recontextualized. Scholars found that this setting is a practical way to get a fresh perspective on each other and the topic at hand (Bulaeva *et al.*, 2017). Other scholars argued that the internet's asynchronous nature favors discussion forums (Dascalu *et al.*, 2020).

Recently, Moodle's use in English instruction has been researched extensively. Although much research has been done on investigation, determination, characterization, and practical categorization (Acar & Kayaoglu, 2020); (Bataneh & Mayyas, 2017), little has been done on personalizing Moodle-based English education. Apoki (2021) concluded that students and instructors frequently encountered opposition regarding the English language pedagogy process. Some technical and pedagogical obstacles must be overlooked when using the Moodle platform in the classroom. Gundu and Ozcan (2017) asserted that the most significant obstacles that English language instructors challenges are fundamentally technological. These include computer literacy, training, and sophisticated new technologies that were regularly unmanageable for English lecturers to discover and implement. The affirmation of learners' identities during online testing and the problem of handling errors involves determining which types of mistakes should be noted and how to provide relevant feedback to other students about their errors.

Objectives of the Study

The objectives of this paper are

1. To study the tools of Moodle
2. To research the usage of various tools of Moodle
3. To make use of the tools of Moodle for English language teaching

Methodology

Type of the research conducted by the researcher is descriptive method. Data was collected by procuring information from the researchers and the data collected was analysed. Various tools of Moodle that are useful in English Language Teaching are researched and most of which are personally used by the researcher.

Discussion

Moodle incorporates a wide range of instructional materials and applications, all of which can help the instructor to expand the ways to engage the learners and encourage them to interact with each other. Videos, audio files, presentations, and animations in addition to documents and graphics can be included. Another benefit of using Moodle is the simplicity of a forum-based structure that allows to keep the ultimate goals in mind and to clearly match the materials with the outcomes. Once selected the instructional materials, Moodle makes it very easy to get started and create a structure that flows nicely from topic to topic and facilitates the teaching and the learning process.

Moodle is designed to support a style of learning called social constructionism. This style of learning is interactive. The social constructionist philosophy believes that people learn best when they interact with the learning material, construct new material for others, and interact with other students about the material. Moodle enables to add several kinds of static course material. This is the course material that a student reads but does not interact with, such as Web pages, Links to anything on the web (including material on the Moodle site), Folder of files, and Label that displays any text or image.

Moodle enables the instructor to add even more kinds of interactive and social course material. This is the course material that a student interacts with, by answering questions, entering text, or uploading files, which includes Assignment (uploading files to be reviewed by the teacher), Choice (a single question), Lesson (a conditional, branching activity) and Quiz (an online test). Moodle also offers activities in which the students interact with one another. These are used to create social course material, such as Chat (live online chat between students), Forum (can have several online bulletin boards for each course), Glossary (students and/or teachers can contribute terms to site-wide glossaries), and Wiki (this is a familiar tool for collaboration with the students).

Creating the learning environment is crucial in English Language Teaching. There are a few tried and tested ways to optimize the interactive forum experience such as providing timely feedback and make sure to maintain a positive and productive tone; ensuring to provide positive, encouraging suggestions; posting questions that are engaging and which tie to learning objectives; encouraging individuals to connect the course material to personal experience, and then post about it; making participation in the forums a part of the students grades; and modelling positive forum behaviour by showing open-mindedness.

Some activities in Moodle are almost always individual. When students complete these activities, they have a reasonable expectation that their work will not be shared with the class. For example, when students answer a quiz question, they reasonably expect that what they wrote will not be shared with the entire class. Other activities do not carry this expectation of privacy. For example, when students post to a forum, they expect that posting to be read by the rest of the class. Students feel good when they see their work acknowledged. They also feel confident when they know what is expected. We can use the forum to answer students' questions, but there are other ways to use the forums to acknowledge work and to help the students develop an "I can do it" attitude.

The students can see how other students often students in the past approached their work. They can get a good idea of how to get started, and they can feel less intimidated by fear of the unknown. One of the biggest challenges in using forums for an online class is keeping discussions focused on the topic. This becomes even more difficult when students are allowed to create new topics in a forum. Moodle offers two tools that can be used to help keep discussions on track—custom scales and splitting discussions. Moodle enables to use a scale to rate student's work. A scale offers something other than a grade to give the student as feedback. Scales can be used to

rate forum postings, assignment submissions, and glossary entries. Another tool, Glossaries are good to use for vocabulary lists, because they help to keep an easily-accessible, permanent record; they are searchable; they can be categorized; they can be sorted by author, category, and word; auto-link words from texts in the courses to the glossary can be linked, so that students can look up difficult words easily; and recordings of words can be included.

Conclusion

To conclude, online learning experience connotes a more active, engaging role for students and teachers. Moodle can be explored in any order, courses with live chats among students and teachers, forums where users can rate messages on their relevance or insight, online workshops that enable students to evaluate one another's work, impromptu polls that let the English instructor conduct to evaluate what students think of a course's progress, and Moodle provides platform to upload and to share the files. All these features create an active learning environment, full of different kinds of student-to-student and student-to-teacher interactions. This is the kind of user experience that Moodle excels at for English Language Teaching. Moodle encourages exploration and interaction among students and teachers. There are many tools at the disposal of the instructor which will make the teaching - learning experiences as interactive as possible. Creating courses with forums, peer-assessed workshops, surveys, and interactive lessons is more work than creating a course from a series of static web pages. However, it is also more engaging and effective, and it worths the effort to use Moodle's many interactive features.

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Education 2030: A Roadmap to E-Learning Excellence

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Abstract

The "Education 2030: A Roadmap to E-Learning Excellence" is a strategic plan to optimize e-learning for success in a rapidly changing world. It focuses on technological integration, inclusive access, pedagogical innovation, global collaboration, data-driven decision-making, lifelong learning, and ethical design. The plan aims to bridge the digital divide, promote critical thinking, creativity, and collaborative problem-solving among learners. It encourages international partnerships, enables data-driven decision-making, and supports flexible education systems for skilling and reskilling throughout careers. The goal is to make e-learning synonymous with excellence, empowering learners of all ages to thrive in a rapidly changing world.

Keywords: E-Learning, decision-making, data-driven, lifelong learning

Introduction

A. Background and Context

The 21st century presents challenges for traditional educational models due to technological advancements, globalization, and constant change. The shift towards digital learning methodologies, such as online resources and virtual classrooms, has become essential. However, traditional models struggle to accommodate diverse learning styles and preferences. E-Learning offers flexibility, accessibility, and personalized experiences.

Global educational disparities persist due to economic, geographical, and social factors, creating a digital divide. Educational innovation and adaptation are needed to foster skills like critical thinking, collaboration, and adaptability in a knowledge-driven economy.

B. Significance of E-Learning in the 21st Century

E-learning is a technology-driven approach to education that offers flexible, personalized learning experiences, promoting global connectivity and collaboration. It uses advanced technologies like artificial intelligence, virtual reality, and interactive simulations to reduce costs and environmental impact.

E-learning facilitates continuous professional development through online courses, webinars, and virtual training programs. It can bridge educational gaps, promote inclusivity, and provide data-driven insights for effective teaching methods.

C. Purpose of the Roadmap

The "Education 2030: A Roadmap to E-Learning Excellence" is a strategic guide for the 21st-century education sector, aiming to address gaps in e-learning, promote equity and inclusion, encourage technological innovation, optimize learning outcomes, prepare for lifelong learning, facilitate global collaboration, and empower learners for 2030 and beyond.

It encourages the integration of emerging technologies like AI, virtual reality, and adaptive learning systems, promoting ethical use and data-driven decision-making.

Technological Integration

A. Overview of Emerging Technologies

Emerging technologies such as AI, ML, 5G, blockchain, quantum computing, augmented reality, IoT integration, biotechnology, robotics, cybersecurity, renewable energy, edge computing, voice assistants, and smart materials are making significant strides in various fields. AI and ML are advancing in applications like natural language processing, while 5G offers faster communication and IoT integration. Blockchain technology is being explored in finance, supply chain, and healthcare. Quantum computing solves complex problems faster than classical computers, and IoT integration is growing in smart homes and cities.

B. Integration Strategies for AI, VR, and Personalized Learning Platforms

The integration of AI, VR, and personalized learning platforms can improve educational experiences through strategies like data-driven personalization, adaptive learning, gamification, VR simulations, natural language processing (NLP), collaborative learning, real-time progress monitoring, interactive content creation, accessibility features, professional development, and feedback mechanisms. These technologies enhance communication between students and learning platforms.

C. Impact on Educational Outcomes

The integration of AI, VR, and personalized learning platforms in education can significantly improve learning outcomes by catering to individual student needs, enhancing engagement, understanding, and mastery of subjects, optimizing resource allocation, enhancing critical thinking and problem-solving skills, identifying learning gaps in real-time, and fostering teamwork and interpersonal skills. However, challenges like professional development, equitable access, and privacy concerns need to be addressed.

Inclusive Access

A. Addressing the Digital Divide

The digital divide requires strategies to ensure equitable access to technology and the internet. Short-term measures include investing in infrastructure, providing devices, establishing Wi-Fi hotspots, implementing digital literacy programs, collaborating with private sector entities, introducing subsidized internet programs, conducting community outreach, expanding technology access in public libraries, and advocating for government policies to close the digital divide. Long-term strategies involve local communities, educational institutions, and policymakers for sustained efforts and effective solutions.

B. Initiatives for Widespread Access

Short-term initiatives to address limited access to technology and the internet should focus on quick and efficient solutions. These include public Wi-Fi hotspots, mobile data subsidies, device lending programs, community technology centers, zero-rating educational content, digital literacy workshops, emergency connectivity funds, partnerships with NGOs, school bus Wi-Fi, local business involvement, government subsidies, and internet access vouchers. Coordination between governments, private sector entities, NGOs, and local communities is crucial for success. These initiatives aim to empower individuals, reduce financial barriers, and work towards a more inclusive digital future.

C. Equitable Distribution of Resources

Equitable distribution of resources is essential for fair and inclusive access to opportunities and services in sectors like education, healthcare, and technology. Strategies to promote equitable distribution include needs assessments, targeted funding, community engagement, transparent

allocation processes, equitable educational opportunities, affordable healthcare services, digital inclusion, workforce development programs, social safety nets, infrastructure investment, cultural sensitivity, periodic evaluation, legal and policy frameworks, and international cooperation. These strategies ensure transparency, accountability, and support for underserved communities, while also promoting social justice and collaboration across sectors.

Pedagogical Innovation

A. Innovative Teaching Methods in E-learning

E-learning methods, such as gamification, interactive simulations, virtual reality, flipped classroom models, peer teaching, microlearning, adaptive learning systems, video-based learning, storyboarding, AI, multimodal content delivery, social learning platforms, storytelling, and mind mapping, can enhance engagement, promote active learning, and cater to diverse learning styles. Regular assessment and feedback can refine and optimize these methods over time, ensuring a more engaging and effective learning experience.

B. Fostering Critical Thinking and Creativity

Critical thinking and creativity are essential for overcoming complex challenges and fostering innovation. To promote these skills, educators should encourage questioning, problem-based learning, diverse perspectives, Socratic methods, collaborative learning, creative exercises, reflection, metacognition, open-ended assignments, analytical writing, cross-disciplinary learning, technology integration, inquiry-based learning, continuous learning, constructive feedback, and real-world applications. These strategies foster analytical rigor and innovative solutions, empowering individuals to approach challenges with analytical rigor and innovative solutions.

C. Collaborative Problem-Solving Approaches

Collaborative problem-solving involves bringing together individuals with diverse skills and perspectives to tackle complex challenges. Strategies include team diversity, clear problem definition, design thinking, brainstorming sessions, structured collaboration tools, role assignment, active listening, iterative problem-solving, fostering a positive team culture, regular check-ins, decision-making protocols, cross-functional collaboration, prototyping and testing, risk-taking, celebrating success, and providing training and skill development. Team diversity enhances creativity, while design thinking principles involve empathizing with end-users, defining problems, and prototyping. Regular check-ins assess progress and adjust the collaborative process.

Global Collaboration

A. Importance of International Partnerships

International partnerships are vital for tackling global issues, promoting economic growth, cultural exchange, and innovation. They pool resources, expertise, and perspectives to tackle complex issues, stimulate growth, and foster tolerance. They facilitate education, especially in developing countries, promoting sustainable development. They also help address global health challenges, improve healthcare infrastructure, and foster peace and diplomacy. These partnerships demonstrate shared responsibility, prevent inequality, and strengthen international bonds.

B. Creating a Global Learning Community

A global learning community is a network of individuals sharing knowledge, skills, and experiences across different cultures. It promotes cross-cultural exchange and knowledge-sharing. Key steps include defining the community's purpose, using online platforms, promoting cultural sensitivity, establishing clear communication channels, scheduling virtual meetings, encouraging collaborative projects, providing multilingual support, facilitating peer-to-peer mentoring, establishing a centralized repository, and rewarding active participation.

C. Overcoming Geographical and Cultural Barriers

To foster global collaborations and inclusive environments, organizations and communities should overcome geographical and cultural barriers. Strategies include using virtual communication tools, providing multilingual support, conducting cultural sensitivity training, establishing clear protocols, implementing cross-cultural team-building activities, appointing cultural liaisons, promoting diversity in leadership, conducting regular check-ins, providing educational materials, incorporating cultural exchange activities, offering flexible work arrangements, establishing shared knowledge exchange platforms, promoting inclusive decision-making processes, and providing ongoing cultural competency training. These strategies help bridge geographical gaps and promote inclusivity across borders.

Data-Driven Decision-Making

A. Role of Data Analytics in Education

Data analytics in education is crucial for improving learning outcomes and processes. It aids in decision-making, creating personalized learning paths, identifying students at risk, and implementing targeted interventions. Predictive analytics helps identify factors contributing to dropout rates and optimizes educational resources. Data-driven insights guide teacher professional development, support budgeting, and promote transparency. Adaptive learning technologies adjust content and difficulty levels based on individual student performance.

B. Tailoring Learning Experiences Based on Data

Data-driven learning is a strategy that uses student data, feedback, and performance metrics to personalize educational content and strategies. It enhances engagement and success by providing individualized support. Data can be used in analytics, assessment data, adaptive learning platforms, personalized learning paths, feedback analysis, and gamified learning. This approach addresses individual learning needs and improves overall educational outcomes.

C. Optimizing Educational Outcomes Through Data

Data in education can significantly improve teaching and learning processes, decision-making, and program effectiveness. Key strategies include learning analytics, early intervention systems, individualized learning paths, formative assessment data, professional development insights, curriculum evaluation, resource allocation, predictive analytics, technology integration, parental involvement metrics, student retention strategies, inclusion and equity metrics, a continuous improvement culture, and benchmarking. These strategies track student performance, identify at-risk students, adjust teaching strategies, inform professional development, and ensure curriculum alignment.

Lifelong Learning

A. Recognizing the Importance of Continuous Learning

Continuous learning is crucial for personal and professional success, involving the acquisition of knowledge, skills, and competencies throughout one's life. It boosts competitiveness, industry trends, innovation, creativity, critical thinking, and personal growth. In the digital age, it ensures relevance, promotes cultural intelligence, collaboration, resilience, communication skills, job satisfaction, and community contributions. Lifelong learning also has cognitive health benefits, reducing age-related cognitive decline.

B. Flexible Education Systems to Support Lifelong Learning

Flexible education systems are essential for lifelong learning, allowing individuals to adapt their education to changing needs. Key elements include modular credentials, credit transfer, online and blended learning options, personalized learning plans, competency-based education, flexible

scheduling, open resources, career pathways, continuous professional development, collaboration with employers, mobile learning platforms, peer learning, community learning centers, and lifetime learning accounts.

C. Up-skilling and Re-skilling Strategies

Upskilling and reskilling strategies are essential in today's job market. Organizations should conduct skills assessments, stay informed about industry trends, and use micro-credentialing, digital badges, online learning platforms, MOOCs, and collaboration with educational institutions. Cross-training, job rotation, on-the-job training, mentorship, gamified learning experiences, and continuous learning culture are also beneficial. Industry certifications validate skills and foster a supportive learning environment.

Ethical and Inclusive Design

A. Design Principles for E-learning Platforms and Content

E-learning platforms aim to provide engaging, accessible, and meaningful learning experiences through key design principles such as user-centered design, accessibility, mobile responsiveness, clear navigation, multimedia, personalization, interactive assessments, collaborative learning opportunities, gamification elements, clear learning objectives, bite-sized content, feedback loops, robust analytics, scalability, multilingual support, and continuous improvement. These platforms prioritize learners' needs, ensure accessibility, provide immediate feedback, and offer collaborative learning opportunities, with robust analytics tracking engagement and performance.

B. Cultural Sensitivity and Inclusivity

Cultural sensitivity and inclusivity involve recognizing, respecting, and valuing the diversity of cultures and individuals. It requires understanding and appreciating different backgrounds, traditions, and perspectives without imposing one's own beliefs or values. Inclusive practices promote a sense of belonging, equity, and equal opportunities for everyone, regardless of their cultural or social identity. Embracing cultural sensitivity and inclusivity fosters a more harmonious and understanding society where individuals feel accepted and valued for who they are.

C. Promoting Diverse Perspectives

Promoting diverse perspectives is crucial for creating an inclusive environment where individuals from diverse backgrounds feel valued and respected. This involves creating open dialogue spaces, ensuring diverse representation, fostering cultural competence, and encouraging open communication. Education and training on diversity can raise awareness and challenge biases. Celebrating cultural events and milestones promotes pride among diverse groups.

Recognizing the intersectionality of identities and challenging stereotypes can break down bias and discrimination. Collaborative initiatives and fostering a culture of continuous learning encourage individuals to seek new perspectives and stay informed about different cultures.

Conclusion

The study emphasizes the significance of promoting diverse perspectives in education, fostering an inclusive environment, promoting cultural competence, and encouraging open communication. It predicts a shift towards technology integration, globalization, lifelong learning, personalization, critical thinking, flexibility, interdisciplinary approaches, social and emotional learning, inclusivity, and environmental education. Stakeholders in education must ensure inclusive environments, embrace technology, support lifelong learning, foster critical thinking, promote global awareness, advocate for equity, and prioritize social and emotional learning.

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Total Quality Management and Its Principles for Success Organization

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Abstract

Total quality management (TQM) is a standard management practice wherein each employee within an organization continually analyzes its production processes to improve the manufacturing quality of products and services and enhance customer satisfaction. It involves conducting management training and implementing analytical methods to identify and remove problem areas in business operations. The eight principles of TQM are customer focus, employee involvement, integrated system, process-centric approach, systematic flow, continual efforts, fact-based decision-making, and relationship management. An organization must understand them to achieve excellence in manufacturing processes.

Introduction

TQM is a management approach for an organization, centered on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to all members of the organization and to society. “A management philosophy embracing all activities through which the needs and expectations of the customer and community, and the objectives of the organization are satisfied in the most efficient and cost effective manner by maximizing the potential of all employees in a continuing drive for improvement.”

Total Quality Management Tools

There is a wide range of TQM tools; the following is a list of widely used tools.

1. *Poke-A-Yoke*: This concept of the Japanese management philosophy is to make a process foolproof. The idea is to design the process in such a way that it is self checking or incorporates process steps that cause immediate detection and possible correction of any defect.
2. *Statistical Tools*: One of Deming’s major contributions to the quality movement was the introduction of statistically grounded approaches to the analysis of defects. Without the use of these tools, one can often make incorrect decisions regarding the cause of a problem. This can often lead to exactly the opposite effect of that being sought. Included in this set of tools are statistical process control (SPC) charts, Pareto Charts, and histograms.
3. *Force Field Analysis*: This tool asks one to diagram the forces (policies, culture, and so forth) that are resisting the desired change and the forces that support the change. This assists one in clearly determining the degree of difficulty of making a change and exactly where the effort will be needed. The supporting forces are places where assistance can be expected.
4. *Root Cause Analysis (Five Whys)*: The Japanese popularized this tool. It consists of asking a series of questions (whys) until one uncovers the root cause of a defective product. The objective is to determine why a defective product was produced; this is to be contrasted with the usual approach of just fixing the defective product or replacing it.

5. *Fishbone Diagram (Ishawaka Diagram)*: This tool is also called a cause-and effect diagram. It is used in a brainstorming session to examine factors that may influence a given situation or outcome. The causes are often grouped into categories such as people, material, method or process, and equipment.
6. *Loss Functions*: In many manufacturing situations, one creates tolerance limits for a product. Products that fall outside of the limits are defective and those that are inside the limits are deemed well. Several difficulties arise with this approach. First, there is always the temptation to reclassify products that are just outside the limits into the acceptable category, especially if there is a great push for quantity.
7. *The Plan-Do-Check-Act (PDCA) Cycle*: This tool is also known as the She hart Cycle. Deming popularized it in Japan; as a result the Japanese refer to it as the Deming Cycle. The tool emphasizes a new plan for change. It carries out tests to make the change on a small scale, observes the effects, and finally, studies the results to determine what has been learned. The cycle is repeated as needed.
8. *Brainstorming*: This process has become a staple of the TQM movement. The concept is to invite participants to suggest “solutions” to a problem without any evaluation of the usefulness or correctness of their ideas. Several approaches are possible, including open suggestions, rotating suggestions, or blind suggestions.
9. *Affinity Diagram*: The affinity diagram tool is used to organize large amounts of non-quantitative (ideas, opinions, issues, etc.) information into groupings based on natural relationships between the items. It is largely a creative rather than a logical process.
10. *Interrelation Digraph*: This tool takes complex, multi-variable problems, or desired outcomes, and explores and displays all of the interrelated factors involved. It graphically shows the logical and often causal relationship between factors.
11. *Tree Diagram*: This tool is used to systematically map out, in increasing detail, the full range of paths and tasks that need to be accomplished to achieve a primary goal and every related sub goal. Graphically, it resembles an organization chart or family tree.
12. *Prioritization Matrices*: Prioritization matrices are one of a group of decision making tools that help to prioritize tasks, issues, or possible actions based on agreed upon criteria.
13. *Activity Network Diagram*: This class of tools includes a wide range of project management tools used to plan the most appropriate schedule for a complex project. Several excellent computer programs exist for automating the work associated with this class of tools.

Total Quality Management Basic Principles

A. Leadership

1. Top management must realize the importance of quality
2. Quality is the responsibility of everybody, but the ultimate responsibility is CEO
3. Involvement and commitment to CQI

B. Customer Satisfaction

1. Customer is always right – in Japan customer is “King”
2. Customer expectations constantly changing – 10 years ago acceptable, now not anymore.
3. Delighting customers (Kano Model)

C. Employee Involvement

1. People – most important resource/asset
2. Education and training – life long, continuous both knowledge and skills
3. Suggestion schemes; Kaizen, 5S teams
4. Motivational programs, incentive schemes
5. Conducive work culture, right attitude, commitment.

D. Continuous Process Improvement

1. View all work as a process – production and business
2. Process – purchasing, design, invoicing, etc.
3. Inputs – PROCESS – outputs

E. Supplier Partnership

1. Substantial portion quality problems from suppliers
2. Need a partnership to achieve quality improvement – long-term purchase contract

F. Performance Measures

1. Managing by fact rather than gut feelings
2. E.g. Production measures – defects per million, inventory turns, on-time delivery
3. Service – billing errors, sales, activity times

Merits of Total Quality Management

1. Improved customer service as the TQM concept is totally customer centric
2. Improvement in staff motivations as TQM lays stress on empowering staff.
3. Elimination of wastage in terms of materials and staff time.
4. Reduction of user complaints.
5. Creation of tension free environment leading to improved human relationships at work.

Conclusion

In the field of total quality management, confusion arose worldwide with the scope of the TQM concept and the effects of TQM implementation. Much research dealing with the concept of TQM has been conducted. Researchers have adopted different definitions of TQM; thus far, it has come to mean different things to different people. After survey of literature related to TQM implementation in Indian manufacturing firms, it became evident that no case study research dealing with the implementation of TQM in automotive industry had been systematically conducted.

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Elevating Learning Horizons: Embracing Challenges and Opportunities in Contemporary Open Online Education in India

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Abstract

Since the inception of education, it has undergone unprecedented evolution, justifying its global significance alongside traditional learning. The conventional education system mirrors this model, delivering knowledge to learners through face-to-face discussions in lecture halls or via mediums like television and radio. Due to its dynamic nature, education is expected to continue evolving. Information and Communication Technology (ICT) has injected new vitality into the field, and one notable advancement is the unprecedented rise of online learning due to the massive penetration of the Internet and the help of Recorded video content, live classes and Open Online Courses (MOOCs) easily accessible through websites and mobile applications. India, ranking as the second-largest user of MOOCs after the US, has leveraged this platform to provide ample opportunities to diverse geographical regions, varied academic backgrounds, and professional pursuits. Despite being a massively diverse country, India faces challenges related to literacy levels and unemployment. To address these issues, there is a need to sharpen the skills of the youth and promote various indigenous projects, such as Skill India, Make In India, and Shine India, among others. While open online education has gained momentum in India, private ventures are currently leading the way, indicating that government initiatives still have a long way to go. This paper endeavours to explore the existing open online education systems and identify the challenges and opportunities within the online education system in India.

Keywords: Knowledge Transmission, Knowledge Building, Open Online Education, India MOOC; C-MOOC; X-MOOC; NPTEL

Introduction

The Indian education system, among the largest globally, serves millions of students across varied demographics and geographies. Examining its statistics unveils a captivating interplay of progress, challenges, and enormous potential. According to the UGC Annual Report 2022-23, “the number of universities recognised by the UGC rose to 1,085, comprising 56 Central, 465 State Public, 433 State Private, 127 Deemed to be Universities, 4 Institutions established under State Legislation, and 13,523 Colleges. Among these, 10,403 colleges and 3,120 under in the Higher Education sector.” According to the UGC Annual Report 2022-23, “in the academic session 2021-22, the total student enrolment (estimated on a simple average) across all courses and levels in both regular and distance education programs amounted to 41,843,704. In the year 2020-21, the actual foreign student enrolment was 48,035, and in 2021-22, the total number of pass-outs in all HEIs was 10,277,472.”

According to the UGC A R 2022-23, “during the same academic year (2021-22), out of a total of 1,510,957 teachers in HEIs, and 848,552 male teachers, 662,228 female teachers, and 177 transgender teachers. Additionally, out of 1,138,779 non-teaching staff, 635,502 were male, 502,951 were female, and 326 were transgender.” According to the UGC A R 2022-23 “in the financial domain, for 2022-23, Recurring Grant was released to 45 Central Universities amounting to ₹37,441.50 Lakh, Salary Grant (36) of ₹66,108.50 Lakh and Capital Assets (35) totalling ₹6,372.50 Lakh. Furthermore, grants of ₹21,000.00 Lakh, ₹2,625.00 Lakh, and ₹7,875.00 Lakh

were disbursed to the IMS, BHU, Capital Assets, and Salary, respectively. An additional ₹15,912.94 Lakh to Central Universities during 2022-23 for fellowship.”

Despite the extensive network of higher education institutions in India, the current education system falls short of serving the entire population of 1.40 billion. To address this gap, UGC has recognized “72 Higher Education Institutions (HEIs) to offer Open and Distance Learning (ODL) programs for the academic year 2022-23.” Noteworthy is the estimated growth of India's online learning space from \$4 billion to \$40 billion by 2030. In the 21st century, distance education has evolved into open online learning. The boom of online learning facilities and the development of online courses like e-PG-Pathshala of NFLBNET and MOOCs by the Ministry of Human Resource & Development, PM e-VIDYA, CWSN (Content for Children with Special Needs especially for the Visually and Hearing-impaired learners) along with app base initiatives like DIKSHA, and competitive exam support through IITPAL and E-Abhyas, showcase the dynamic landscape.

Many institutions, including premier ones like the IITs, IIMs and IISCs have provided courses on platforms like edX. All type of institutions, such as Dr BR Ambedkar Open University, JNU Delhi, DU Delhi, JMI Delhi, AMU Delhi, and Amity University has launched their distance courses in online mode. To meet the evolving needs, institutions like NCERT and CBSE are developing MOOCs for school education. NIOS has developed and maintaining "Virtual Open School" (VOS) for online courses and learning materials for distant learners.

Open Online Education in India

The genesis of Open Access initiatives can be traced back to 1976 with the inauguration of the Gutenberg Project by Michael Hart. Subsequent milestones include the advent of Project Muse in 1993, followed by the establishment of Internet Archives in 1996. The notable Wikipedia, initiated by Jimmy Wales, gained immense popularity in 2001. Open Online Education has emerged as a revolutionary force, reshaping the traditional landscape of education. With roots tracing back to early initiatives like MIT's Open Course Ware in 2001, the movement has evolved into a dynamic and accessible platform for learners worldwide. “Here's a glimpse into the current international data on OOE: Market Growth: The global OOE market is expected to reach US\$350 billion by 2025, with a CAGR of 16.5% from 2020 to 2025” (Global Market Insights). Future projection is the Asia-Pacific region will be the fastest-growing market, because of increasing internet penetration and a large population base.

One defining characteristic of Open Online Education is its unparalleled accessibility. It eliminates geographical constraints, enabling learners from diverse backgrounds to access a vast array of courses and resources. This accessibility is a game-changer for individuals facing barriers to traditional education, whether due to geographical remoteness or financial limitations. The flexibility offered by Open Online Education is another hallmark. Learners have the freedom to engage with course materials at their own pace, fostering a self-directed learning approach. This flexibility accommodates different learning styles and allows individuals to tailor their education to their specific needs and schedules. The noteworthy point is the transformative benefit of Open Online learning is cost-effectiveness. However, Open Online Education is not without its challenges. Ensuring the quality of online educational content remains a critical concern. Limiting the accessibility of online education to certain populations. Bridging this digital divide is crucial for realizing the full potential of open online learning. The impact of Open Online Education extends beyond individual learners. It has spurred technological advancements, leading to the development of innovative learning platforms, virtual classrooms, and interactive content. In the Indian context, the Open Access movement took root with the Digital Library of India (DLI)

project in 2002, signifying a significant stride toward making scholarly content freely accessible. This aligns with the broader international trajectory of Open Access initiatives, reflecting an ongoing commitment to fostering unrestricted access to knowledge.

Going beyond the inception of the Digital Library of India (DLI), India has experienced a flourishing ecosystem of Open Access initiatives. Notably, the Open Access India (OAI) forum, established in 2004, has played a pivotal role in facilitating discussions and collaborations among Indian scholars and librarians concerning Open Access. In 2014, a significant stride was taken with the implementation of the CSIR Open Access Policy, which mandates open-access publication for research supported by CSIR. Additionally, the national repository for e-theses and dissertations, Shodh Ganga launched in 2010, NDLI, launched in 2015, O A I, launched in 2016, J-Gate launched in 2018 and DOAS India etc. has been instrumental in promoting scholarly communication and knowledge sharing. According to UGC regulation 2020, “Online Model means a mode of providing flexible learning opportunities by overcoming the separation of teacher and learner using the internet, e-Learning Materials and full-fledged programme delivery through the internet using technology-assisted mechanism and resources; “

According to UGC regulation 2020, “The objectives and goals of Open and Distance Learning Platforms are delivering flexible learning using a variety of media, including print, electronic, online and occasional interactive face-to-face meetings with the learners or Learner Support Services to deliver teaching-learning experiences, including practical or work experiences.”

According to UGC regulation 2020, “Open university means HEIs which imparts education only through Open and Distance learning mode and/or Online mode using a variety of media including print, electronic, online, information and communication technology educational aids including OERs or MOOCs etc. and is not having any provision for offering higher education in a conventional mode in its Act or Memorandum of Association or other statutory documents governing HEIs”

TABLE I LIST OF HEIS TO OFFER OPEN AND DISTANCE LEARNING RECOGNIZED BY UGC-DEB FOR THE ACADEMIC YEAR 2022-23

ODL	No. of HEIs	ODL Programs	Nature of Universities	No. of HEIs category-wise
HEIs	72	911	Central University	09
			State University	27
			State Open University	16
			Deemed-To-Be-University	12
			Private University	07

TABLE II LIST OF HEIS TO OFFER PROGRAMMES THROUGH ONLINE MODE AS PER PROVISIONS STIPULATED UNDER UGC (OPEN AND DISTANCE LEARNING PROGRAMMES AND ONLINE PROGRAMMES) REGULATIONS, 2020

Online Learning	OL programs	Nature of Universities	No. of HEIs category-wise
HEIs	15	Central University	04
		State University	21
		Private University	14
		Deemed-To-Be-University	39

NDEAR (National Digital Education Architecture for India) is designed to fulfill the objectives outlined in the NEP 2020 by establishing a digital infrastructure that encourages innovation within the education ecosystem. It revolves around two core interactions: Learning Interactions and Administration Interactions, encompassing scenarios like Learn, Help Learn, and Manage Learn. The initiative identifies five key personas: Student (any learner), Parent (any caregiver), Teacher (anyone involved in formal/informal teaching), Administration (anyone managing), and Community Member (anyone from society, including market players).

Massive Open Online Courses (MOOCs)

MOOC, a modern term coined by Jabe Cormier in 2008, refers to Massive Open Online Courses designed to accommodate a large audience without stringent entry qualifications. Coursera, edX, Future learn, and Uda city are prominent MOOC platforms, each with distinct origins and orientations, such as for-profit and non-profit structures.

Originally, MOOCs aimed to provide free courses from elite institutions to a global audience, catering to individuals seeking education and professional skill enhancement. “Udacity”, founded by Sebastian Thrun, David Stavens, and Mike Sokolsky, stands out as a prominent private MOOC platform. MOOCs, initially serving students globally and those seeking personal or professional development, have evolved. Their incorporation into degree programs includes options for independent credit earning, local facilitation of publicly offered MOOCs, licensing for local delivery, and integration into hybrid courses.

Swayam, a significant venture in India's open online education landscape, boasts extensive offerings “as of March 2023. It provides a vast array of courses, totalling over 25,000 across diverse disciplines. The platform has garnered an impressive user base, with registered users exceeding 177 million as of January 2023. Among these users, over 35 million are actively engaged with the platform.” The top five subject categories on Swayam include Engineering & Technology, Humanities & Arts, Science, Commerce & Management, and Education. National Institute of Open Schooling (NIOS), “as of March 2023, boasts over 1.5 million enrolled students with a pass percentage of around 70% in 10th and 12th class exams for the 2022-23 session. It operates through 575 regional centres across India.”

Open Digital Learning Resources

In India, strides towards achieving equitable and affordable quality education for all have been made through initiatives such as Open Educational Resources (OER) and Open Courseware. The aim is to provide freely accessible educational content globally. The National Knowledge Commission continues to champion the creation and utilization of nationwide e-content, contributing to the dissemination of knowledge. Numerous OER websites have been established, offering free access to their educational resources. These platforms, which are continuously evolving, underscore India's commitment to making quality education universally accessible.

Digital education has emerged as a significant approach for both real-time and self-paced learning. In 2001, the Massachusetts Institute of Technology (MIT) initiated Open Course Ware with the aim of providing learning materials openly accessible through the Internet, setting a precedent for educational institutions worldwide. Here are some notable initiatives in the realm of internet-based learning: 02 Open Course Ware (OCW). Through 2019, OCW continued expanding its offerings, providing free access to a diverse array of educational materials. The platform adapted to new technologies and pedagogical approaches, staying in tune with the evolving landscape of online education. In 2021, MIT OCW reached its 20th anniversary, a testament to its significant contributions to open education and the global availability of educational resources. It remains a

cornerstone in the open education movement, inspiring institutions worldwide to share educational content openly. MIT OCW stands as a valuable resource, embodying MIT's commitment to disseminating knowledge for the benefit of learners, educators, and institutions globally. As of my last knowledge update in January 2022, there is no specific overarching timeline for Indian Open Courseware comparable to MIT's Open Course Ware initiative. However, there have been various developments and initiatives related to open education and online learning in India. Here are some key milestones that contribute to the landscape of open education in India:

iTunes U

iTunes U, a service provided by Apple Inc., facilitates the distribution of downloadable audio and video content free of cost, through the Apple Store. This database has been embraced by almost 1,200 institutions, notably, it hosts over 2,500 public courses and a multitude of private courses covering diverse fields. Prominent institutions like Duke, Yale, Cambridge, MIT, and Oxford have utilized iTunes U to extend their educational reach significantly. Most of them have enrolled almost 100,000 students in single iTunes U courses, showcasing the platform's global impact. Stanford University and The Open University, for instance, have surpassed 60 million content downloads, underlining the widespread accessibility and popularity of educational resources provided through iTunes U.

YouTube EDU

The YouTube EDU, a specific section of the YouTube portal or app, emerged in 2009 with a specific focus on educational learning videos developed by prestigious institutions, such as the University of Cambridge, Yale, Stanford, and MIT. The platform was designed to provide a centralized hub for educational content from a wide array of sources, aiming to make valuable learning resources easily accessible to a global audience. Over time, YouTube EDU integrated into the main YouTube platform, making educational content seamlessly discoverable alongside the wider array of videos available on YouTube. As with any digital platform, YouTube and its features, including YouTube EDU, were subject to changes and updates. To obtain the latest and most accurate information about YouTube EDU, including its current status and features, users were advised to check YouTube's official channels or announcements directly, ensuring awareness of any recent developments or alterations to the platform. Coursera: 87 million learners, 2,000+ universities and companies as partners, offering 4,300+ courses.

Other Learning Platforms

The online education landscape has experienced significant growth and impact, with several prominent platforms leading the charge. As of the latest available data:

edX: Boasts a user base of 25 million learners, collaborating with over 160 top universities and institutions to offer a staggering 3,000+ courses. The platform's mission, initiated in 2012 by MIT and Harvard University, revolves around increasing global access to high-quality education.

Future Learn: follows closely with 15 million learners and partnerships with 250+ universities and institutions, delivering a diverse array of 1,700+ courses.

Udemy stands out with a substantial 50 million learners and a vast pool of 75,000+ instructors contributing to a rich catalogue of 183,000+ courses. Udemy's approach involves a marketplace model where instructors create and offer courses directly to learners. In terms of course enrollments, over 20 million new learners registered for courses in 2021 on leading platforms like Coursera. Interestingly, emerging nations, including India, China, and Brazil, are witnessing the

fastest rate of growth in online learning, showcasing the global reach and impact of online education.

Indian Venture

Being one of the biggest educational hubs India started early adaptation to open distance learning as a result IGNOU stands as an eminent open university, with significant achievements and contributions to the education sector. As of December 2022, IGNOU boasts an impressive enrolment of over 3 million students, offering a diverse range of programs exceeding 250 across various disciplines. Established in 1985, IGNOU provides Self-Instructional Materials (SIM), which encompass comprehensive study materials such as textbooks, assignments, and other resources. The university actively promotes interactive learning through various methods, including audio and video programs, online learning platforms, and periodic workshops.

e- PG- Pathshala

The e-PG-Pathshala is a project managed by INFLIBNET, funded by the NMEICT of MHRD. The initiative is dedicated to developing comprehensive e-content for postgraduate students across 69 subjects. This rich repository of content is made available through open access, utilizing a Learning Management System (LMS) situated at the INFLIBNET Centre and the Sakshat portal. According to UGC Annual Report 2022-23, “The e-PG Pathshala website has 10344586 visitors, including international visitors: -USA: - 196924, UK: - 52,843, Australia: - 18,493, Russia: - 16,639, Pakistan: - 298,251, UAE: - 11,059, China: - 2861, New Zealand: - 2914, Japan: - 9,437, Germany: 26259. Apart from the total YouTube Users is 6878038”. Through these objectives, e-PG-Pathshala strives to enhance the educational experience of postgraduate students by providing them with accessible, interdisciplinary, and contextually relevant e-content. The project also emphasizes the importance of training subject experts and fostering the widespread use of e-content in the academic community.

NPTEL (National Programme on Technology Enhanced Learning)

Initiated in 1999, NPTEL has been a pioneering project supported by MHRD. This Open Courseware initiative is a collaborative endeavour involving the seven IITs and the IISc, funded by the MHRD. The development of curriculum-based video courses, involving the creation of 110 new courses and digitization of 109 existing courses, forms a key component of NPTEL. These courses are presented in digital video format. Additionally, the project has introduced 129 web-based e-courses.

e-Gyan Kosh

e-Gyankosh, a significant player in the educational landscape of India, this national repository stands as a testament to the transformative power of digital resources in fostering open knowledge and accessible learning. With an expansive repository comprising over 8.5 million resources, including text, images, videos, datasets, and simulations. The repository is a beacon of inclusivity, offering content in eight Indian languages, namely Hindi, Gujarati Marathi, Punjabi, Tamil, Telugu, Kannada, and Bengali, in addition to English. In terms of usage, e-Gyankosh has made a substantial impact, with over 170 million unique visitors showcasing its vast reach and influence. The platform has garnered more than 500 million page views. Indian initiatives such as INFLIBNET Learning Management Service (ILMS) and Vidya-Mitra contribute significantly to the education landscape. ILMS provides essential features like course creation, enrollment, assignment, assessment, and discussion forums. According to UGC AR 2022-23, “during the reporting period, ILMS was deployed for 28 institutions, hosting over 1000 courses.” On the other hand, According to UGC Annual Report 2022-23, “Vidya-Mitra, initiated in May 2014 under NMEICT, serves as an integrated e-content portal, hosting videos above 66,000 and e-text above

44,000". It's completed, INFLIBNET still provides free hosting services for digital content developed by faculties across Indian institutions upon request.

Prospects in Online Education

The advantages of online learning are numerous and extend beyond concise explanations. A notable benefit is the flexibility related to physical space and schedules. Online learning eliminates the necessity to attend a physical institution, requiring only a computer with internet access. This accessibility allows individuals to participate in classes from virtually anywhere. Traditional education often imposes restrictions on class access based on time and duration, whereas online learning offers flexibility for instructors to teach during non-traditional hours and from any location with internet connectivity.

Another significant advantage of online courses lies in the expanded range of subject choices compared to traditional settings. While the introduction of CBCS in traditional education aims to shift towards a student-centric approach, online learning provides students with more options to select materials that align with their knowledge level and interests.

Online learning fosters increased student engagement compared to traditional modes. Students who might not actively participate in face-to-face courses are more likely to engage in discussions and interact with peers during online learning. The asynchronous nature of online education allows students more time to reflect and provide thoughtful, researched responses to instructor queries. This dynamic enhances the depth of interaction between students and instructors in the learning process.

Challenges of Online Education

In the contemporary era marked by ubiquitous access to vast information, individuals should explore learning opportunities. The library serves as one of the central resource centre for social institution and provides academic support in distance learning. In the digital age, access to online education should be available, and academic libraries play a pivotal role in fostering information literacy. Despite the potential of online education, some challenges need addressing for its effective implementation. Addressing these challenges promptly will unlock the true potential of online education. Some key challenges in the Indian context include:

1. *Rural Population:* Approximately 70% of our total population resides in rural areas with a literacy rate around 60%, lower among women and minorities. Government, government-aided, and private institutions, of which only 40% are government institutions, currently provide education.
2. *Personalized Learning:* Traditional learning environments allow teachers to understand and connect with students on a personal level. Effective teaching involves a dialogue, understanding students intellectually, and facilitating their growth. Online education tends to be more one-size-fits-all, lacking the immediacy and personal connection found in traditional classrooms.
3. *Dialogue vs. Monologue:* Online education often leans towards a monologue rather than a real dialogue. Internet-based teaching, even with email interactions, lacks the immediate contact and sensitivity to unspoken cues that on-site teachers have. This hinders the depth of communication and engagement.
4. *Autodidact Bias:* Many online courses are designed with an inclination towards self-directed learners and advanced students. Novice learners who need institutional guidance may find themselves navigating the learning process largely on their own. This situation mirrors the

challenges faced by students in technically complicated courses delivered in lecture halls on campuses.

5. *Lack of Learning Architecture*: While online education providers emphasize on the quality of student knowledge enhancement through learning many courses lack behind. These challenges highlight the need to shift the focus from knowledge transmission to knowledge building in the open online education landscape in India.

From the Student's Vantage Point

Challenges in Online Education Implementation in India:

1. *Language Proficiency*: India's rich linguistic diversity, with over 300 languages spoken, poses a challenge in tailoring education to specific social segments. While some states use English in instruction, others prefer local languages. The coexistence of English and mother tongues can benefit bilinguals, but non-English speakers may face challenges in using English for learning, presenting a dilemma for instructors in online education.
2. *Learner Attitude*: Successful participation in online programs requires learners to focus and imply time management skills for consistency. In the absence of live contact with instructors and peers, students work independently in a virtual environment, potentially leading to feelings of isolation.
3. *Depth of Prior Knowledge*: Diversification in the enactment of uniform syllabi proposed by the Curriculum Development Committee has led to variations in the teaching of topics across Indian universities. The differing levels of prior knowledge among institutions make it challenging to create specialized online courses that resonate with a broad audience.
4. *Equity and Accessibility to Technology*: Despite widespread Internet access, there remains a knowledge disparity between rural and urban Indians in utilizing the Internet effectively. The success of online programs hinges on ensuring equitable access to technology. Economic or logistical constraints may exclude eligible students, particularly in rural and lower socioeconomic areas.
5. *Computer Literacy*: Basic computer knowledge is a must for both students and creators to function successfully in an online environment. Computer literacy is a fundamental requirement for effective engagement with online courses and contributes to the overall success of the online learning experience.

Facilitator's point-of-view

Inadequate Online Qualifications - While proficiency in traditional teaching methods may not necessarily ensure success in the online environment, educators need specific training in online delivery and methodologies. Effective communication skills in written form and proficiency in the language of instruction are crucial for success. The virtual classroom requires instructors to compensate for the absence of physical presence by establishing a supportive environment that encourages active student participation and assures accessibility. Instructors should possess a robust understanding of the learning management system and other web technologies, employing them strategically to enhance pedagogy. Engaging in training, workshops, and collaborative discussions with peers experienced in online teaching can help overcome any initial hesitations and contribute to effective online instruction."

Technological Observations

Currently, India is confronted with multifaceted challenges in achieving universal internet access and addressing digital literacy concerns. The nation grapples with foundational issues, including information literacy, and struggles to ensure the accessibility and affordability of computers and smartphones for all its citizens. Disparities persist, exacerbated by hindrances such as slow

internet connectivity, inconsistent electricity supply, and limitations on free time, which impede widespread digital participation. Furthermore, a dearth of robust support structures exacerbates the complexities associated with narrowing the digital divide in India.

The technological landscape in India presents additional hurdles, marked by obsolete and sluggish equipment, susceptibility to viruses and malware, cost-effective but substandard infrastructure, a prevalence of cyber fraud, and a pervasive lack of awareness. These collective challenges create an environment where the widespread adoption and effective use of technology are hindered, impacting various facets of digital engagement and security across the nation.

Copyright of contents -Teachers in & additional classroom teaching systems usually use copyrighted content in the course of their teaching, for which license or permission is rarely required. In a digital environment, it is logical, to not just suggest what the student should read, but make available to them a digital copy of the text. This can easily be accomplished by scanning documents instead of photocopying them. Copyright issues arise when a library wants to scan or digitize content for use in an online course. Many resources that are published are owned by teachers or their respective institutions. It is common for teachers, to want to use materials that are owned by an organization such as a publisher, which is called 'third party material' due to it being owned by neither the author nor the institution but a 'third party'. While some teachers might be keen to create all their content to provide students but this is rarely practical or desirable all the time.

Conclusion

As of now, numerous Open Education Resource initiatives are in progress, posing essential questions about who participates, how they engage, and why. The act of freely sharing educational resources, initially puzzling within traditional economic and educational contexts, is better comprehended as components of a burgeoning cultural shift and an unfolding economic landscape with unique attributes. In the realm of online education in India, there are abundant opportunities and challenges yet to be fully explored, with many trials just commencing. MOOCs, a relatively recent phenomenon in online learning, have garnered significant attention and interest from higher education institutions over the past eight years. While MOOCs extend existing online learning approaches like X-MOOC and C-MOOC by providing a wider perspective of learning and fostering new skills.

These figures illustrate a dynamic and evolving landscape of Open Online Education (OOE) with the potential to revolutionize global education. As technology access and awareness of OOE continue to grow, its influence and reach are expected to expand further, fostering a more inclusive and accessible learning environment worldwide.

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From Pages to Reality: Revolutionizing Practical Learning in Libraries with Augmented Reality and Virtual Reality

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Abstract

Unlocking the future of practical education within libraries necessitates the integration of Augmented Reality (AR) and Virtual Reality (VR) technologies. This research proposal introduces an innovative approach to revolutionize how learners engage with technical fields, particularly in engineering and medicine, and practical courses like chemistry and physics. Utilizing AR-VR instruments accessible through a simple QR code scan, library users can embark on immersive journeys into virtual practical worlds directly from their textbooks. Addressing the challenges highlighted in the literature and supported by survey data, the proposed AR-VR solution eliminates the need for costly physical kits, democratizing access to practical education. Users can explore virtual laboratories, interact with realistic experiments, and receive step-by-step guidance from virtual instructors with a mere scan. This transformative vision aims to empower learners from diverse backgrounds, promoting a deep passion for practical sciences and technical fields. The literature review highlights how AR and VR can revolutionize education by promoting active learning, engagement, and cost-effectiveness. Challenges in practical education, as identified in both literature and survey data, inform the proposed solution. The survey's findings regarding user preparedness, which indicate that 65.5% of respondents are likely to adopt AR and VR, are consistent with previous research showing favorable attitudes toward the use of technology in education. In conclusion, this research proposal serves as a catalyst for the future of practical education in libraries. By leveraging AR-VR technologies, libraries can evolve into dynamic centers for immersive learning experiences, ensuring accessibility, efficiency, and interest in practical instruction. The proposed solution not only aligns with existing literature but also addresses the concerns and expectations revealed through survey data, laying the foundation for a transformative and inclusive educational future.

Keywords: Immersive Learning Experiences, AR-VR Integration in Education, Library Transformation, Skill Enhancement in Education, Cost-Effective and Eco-Friendly Education

Introduction

Libraries, long revered as repositories of knowledge, have continually adapted to the evolving landscape of education. They stand as vital resources, fostering the spread of information and nurturing the growth of knowledgeable individuals. Ranganathan (1931) encapsulated their essence by stating, "Books are for use," emphasizing the role of libraries in facilitating education. Despite their evolution into digital realms, libraries encounter challenges in providing comprehensive educational resources, particularly in the realm of practical education. The digital age, as noted by Lesk (2005), has introduced new challenges and opportunities for libraries, including the management of collections and extending roles in providing information. These challenges encompass issues such as limited access to expensive practical kits, geographical constraints, and the need for professional supervision, especially in technical and skilled trade areas.

This research proposal delves into the democratization of practical education, recognizing various challenges faced by learners, educators, and institutions. In many fields, practical education is the

backbone of education; however, challenges like the high cost of practical kits, missed learning opportunities, the complexity of practical concepts, limited access to expert guidance, and the need for independent learning persist. The proposed solution lies in the integration of Augmented Reality (AR) and Virtual Reality (VR) technologies within library settings. By embedding QR codes alongside educational materials, textbooks, or practical guides, users gain access to dynamic virtual laboratories. This approach aligns with Milgram and Kishino's (1994) vision of AR as a technology augmenting reality for a broader audience. Our vision is to empower learners of diverse backgrounds by making practical education more accessible and cost-effective. By eliminating the constraints of physical resources, this research aligns with the demand for affordable and inclusive educational alternatives (Klopfer & Squire, 2008). Furthermore, it positions libraries as dynamic centers for immersive learning experiences, resonating with Lesk's (2005) recognition that libraries must adapt to new challenges and opportunities in the digital age.

In essence, this research proposal addresses the need for transformative solutions in practical education, aligning with wider social goals of educational equality, cost-efficiency, and environmental sustainability. By reducing dependence on physical resources, our proposal envisions a future where libraries play a pivotal role in fostering immersive, engaging, and inclusive practical education. The collaboration among educators, researchers, and library professionals will be essential to unlock the full potential of AR-VR technology in education, reshaping the future of learning.

Literature Review

Libraries, long regarded as centers of knowledge, are evolving to meet the challenges of the digital age. Despite this adaptation, they encounter hurdles in providing comprehensive educational resources. The digital era brought in new challenges and opportunities for libraries, particularly in delivering practical education.

AR-VR Integration in Education: A Review

The integration of Augmented Reality (AR) and Virtual Reality (VR) technologies in education has gained prominence, offering immersive and experiential learning experiences. This section provides a critical review of existing literature to contextualize the proposed AR-VR solution.

1. Impact of AR-VR in Education: Researchers highlight the transformative impact of AR-VR technologies on education. Dede (2009) emphasizes that virtual environments provide learners with situated learning experiences, fostering engagement and higher-order thinking. Klopfer and Squire (2008) suggest that well-designed virtual environments can promote active learning, making education more dynamic.
2. The challenges in practical education are multifaceted, resonating with the findings of our survey (Jain & Bohra, 2023). Limited access to practical resources, as highlighted in the survey (59.6%), has been a persistent issue. The high costs of educational materials, a concern expressed by 42.8% of survey participants, align with broader discussions on the financial barriers in STEM education (National Academies, 2011). Understanding complex concepts in practical settings is another significant challenge, noted by 57.6% of respondents. This highlights the necessity of specialized teaching methods to handle the complexities of real-world learning environments.

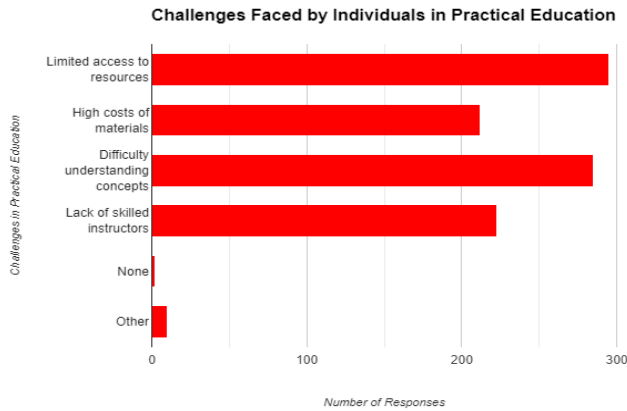


Fig. 1 Challenges Faced in Practical Education

Proposed AR-VR Solution

1. **Democratizing Practical Education:** The proposed AR-VR solution aligns with the literature on democratizing education. According to Milgram and Kishino (1994), augmented reality is the idea of using interfaces and displays to supplement or replace reality in order to make education more widely available.
2. **Addressing Challenges in Practical Education:** Our proposal strategically addresses challenges identified in both existing literature and survey data. The anticipated impact on cost aligns with Klopfer and Squire's (2008) emphasis on cost efficiency within virtual environments. Additionally, the proposal recognizes and actively addresses concerns raised in the survey, including privacy and data security (43.8%), in alignment with literature emphasizing the critical importance of addressing ethical considerations in AR-VR implementation (Dede, 2009). Importantly, our proposal also prioritizes equity and access for all students, addressing the concern expressed by 57.2% of survey participants. This ensures that the benefits of AR-VR technology are accessible to a diverse student population, promoting inclusivity in practical education.
3. **User Readiness for AR-VR:** Survey data indicating a high likelihood (65.5%) to embrace AR-VR aligns with the literature, emphasizing the positive attitude toward technology adoption in educational settings.

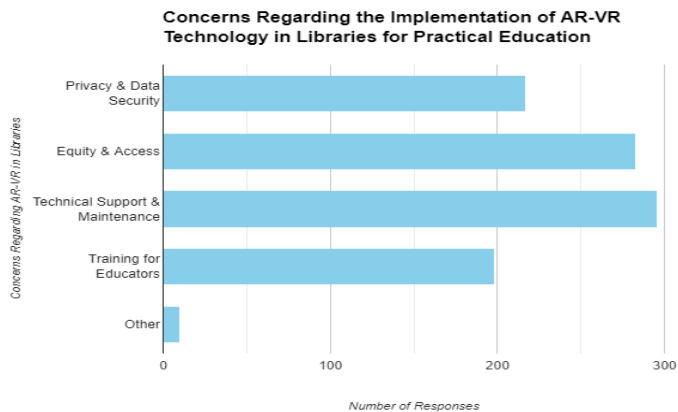


Fig.2 Concerns Regarding AR-VR Implementation in Libraries

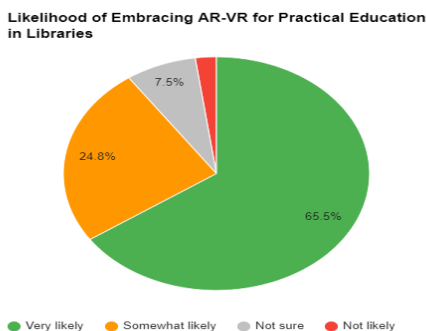


Fig. 3 Likelihood of AR-VR Adoption

In conclusion, the proposed AR-VR solution draws inspiration from existing literature on the impact of AR-VR in education and aligns with the challenges and opportunities identified in both literature and survey data (Jain & Bohra, 2023). The next sections will delve into the specific implementation considerations and expected outcomes, building upon the foundation laid by the literature review and survey insights.

Note: Survey data analysis, including detailed statistics and participant responses, can be found in Table A-I in the Appendix.

Problem Statement

A fundamental component of many academic disciplines, practical education faces numerous obstacles to equitable learning opportunities, understanding, and access. These challenges are not isolated incidents but widespread problems affecting learners, educators, and institutions on a broad scale. Several examples highlight the seriousness of the situation:

1. *Costly Practical Kits:* In numerous STEM disciplines, the expense associated with practical kits and laboratory equipment proves to be prohibitive. For example, specialized apparatus in advanced physics courses can cost thousands of Rupees. This financial barrier not only restricts access to crucial hands-on experiences but also exacerbates financial inequalities among learners.
2. *Missed Learning Opportunities:* Students often miss valuable learning experiences or classes due to factors beyond their control, such as illness, scheduling conflicts, or remote learning challenges. When they cannot attend laboratory classes or engage in practical experiments, their educational journey becomes disjointed and incomplete.
3. *Complexity of Practical Concepts:* Practical concepts, especially in fields like chemistry, biology, or engineering, are inherently complex and challenging to grasp within the confines of a classroom. Learners may struggle with understanding complex experiments or face difficulties executing them outside of the classroom setting.
4. *Limited Access to Expert Guidance:* Practical experiments frequently necessitate expert supervision to ensure safety and facilitate learning. However, access to qualified instructors may be limited, particularly in remote or underserved areas. Learners may lack the guidance needed to navigate complex experiments effectively.
5. *The Need for Independent Learning:* In today's dynamic world, fostering independent learning is paramount. Learners should have the autonomy to explore practical concepts at their convenience. Dependence totally on scheduled lab sessions restricts this independence.

TABLE A1: SURVEY DATA ANALYSIS [SOURCE: JAIN AND BOHRA (2023)]

Category	Number of Responses	Percentage
Total Participants	500	100%
AR-VR Usage		
- Participants who used AR-VR for education	172	34.70%
- Participants who did not use AR-VR for education	323	65.30%
Participant Roles		
- Students	469	94.70%
- Teachers	24	4.80%
- Librarians	2	0.40%
Fields Benefiting from AR-VR Integration		
- Engineering	454	91.70%
- Medical Science	223	45.10%
- Social Science	127	25.70%
Challenges in Educational Journey		
- Limited access to practical resources or labs	295	59.60%
- High costs of educational materials	212	42.80%
- Difficulty understanding complex concepts	285	57.60%
- Lack of skilled instructors or resources	223	45.10%
Preferred AR-VR Educational Experiences		
- Simulated laboratory experiments	250	50.50%
- Interactive history or cultural experiences	104	21%
- Virtual language immersion	135	27.30%
Expectations on Impact of AR-VR on Education Cost		
- Significant cost reduction	140	28.30%
- Moderate cost reduction	161	32.50%
- No significant cost change	73	14.80%
- Unsure	121	24.40%
Importance of Accessibility to AR-VR Technology		
- Very important	280	56.50%
- Somewhat important	186	37.60%
- Not very important	20	4%
- Not important at all	9	1.80%
Concerns about AR-VR Implementation in Libraries		
- Privacy and data security	217	43.80%
- Equity and access for all students	283	57.20%
- Technical support and maintenance	296	59.80%
- Training for educators	198	40%
Likelihood to Embrace AR-VR for Practical Education		
- Very likely	324	64.80%
- Somewhat likely	123	24.60%
- Not sure	37	7.50%
- Not likely	11	2.20%

These challenges collectively undermine the efficacy of practical education, hinder learners' understanding, and impede their ability to excel in STEM-related fields. It is imperative to comprehensively address these issues to ensure that all learners, regardless of their circumstances or location, can access and benefit from practical education opportunities. The significance of resolving these challenges extends beyond individual learners, aligning with Johnson et al.'s (2018) assertion that enhancing access to practical education not only empowers individuals to pursue STEM careers but also contributes to a well-rounded, scientifically literate society. Thus, developing innovative solutions to democratize practical education is crucial for advancing both individual educational outcomes and societal progress.

Proposed Idea

In response to the prevalent challenges outlined in the previous section, we propose the design and implementation of an innovative augmented reality (AR) and virtual reality (VR) solution tailored for practical learning in a library setting. The envisioned system introduces a dedicated space within the library, equipped with AR-VR setups, where users can access immersive learning experiences seamlessly. The primary features of this proposed system are as follows:

1. *Designated Learning Space:* A specific area within the library will be designated for practical learning using AR-VR technology. This space will be equipped with the necessary hardware and software to facilitate an immersive learning environment.
2. *QR Code Integration:* Practical textbooks and guides in the library will be embedded with QR codes. Users can utilize specialized equipment available in the designated area to scan these QR codes, triggering access to virtual environments related to the practical content in the books.
3. *Immersive Virtual Experiments:* Upon scanning the QR codes, users will be transported into virtual laboratories or practical settings. Here, they can engage with realistic experiments, manipulate virtual equipment, and receive step-by-step guidance similar to traditional hands-on experiences.
4. *Independent Learning:* The system aims to empower users to learn at their own pace. By providing access to virtual experiments, learners can revisit concepts as needed, reinforcing understanding and allowing for a personalized learning experience.
5. *Elimination of Physical Dependency:* The proposed AR-VR solution intends to eliminate the need for physical equipment and reduce dependency on a physical supervisor. Learners can independently explore practical concepts in a controlled virtual environment, fostering self-reliance.
6. *Cost-Effective Access:* By leveraging AR-VR technology, the proposed system eliminates the necessity for costly physical kits and laboratory equipment. This not only reduces financial barriers but also contributes to a more sustainable and eco-friendly approach to practical education.
7. *Seamless Integration:* The implementation of this AR-VR solution will seamlessly integrate with the library's existing infrastructure. The designated learning space will complement traditional resources, transforming the library into a dynamic hub for interactive and immersive practical learning experiences.

By proposing this AR-VR solution, we aim to revolutionize practical education within libraries, providing users with an accessible, cost-effective, and engaging method to interact with practical content. This innovative approach aligns with the evolving landscape of educational technology and addresses the ongoing challenges faced in offering hands-on learning experiences.



Fig. 4 QR Code Embedded in Educational Material (Source: freepik.com)



Fig.5 Immersive Learning with AR-VR Technology (Source: freepik.com)

Potential Impact

The envisioned AR-VR solution for practical learning in library settings holds the promise of transformative impacts, addressing key challenges and ushering in a new era of immersive and accessible education. The potential impact of this innovative solution spans various dimensions:

1. *Accessibility Revolution:* The proposed AR-VR solution has the potential to revolutionize access to practical education. By eliminating the need for expensive physical kits, it levels the playing field, ensuring that learners from diverse socioeconomic backgrounds can engage in hands-on experiences.
2. *Financial Liberation:* The cost-effective nature of the proposed system aligns with the research by Klopfer and Squire (2008), emphasizing the potential for virtual environments to reduce educational costs. It not only eases financial burdens on learners but also supports educational institutions facing budget constraints.
3. *Independent Learning Empowerment:* Users engaging with the AR-VR system will experience a newfound sense of empowerment in their learning journey. The system encourages independent exploration, allowing learners to revisit concepts, experiment at their own pace, and develop a deeper understanding of practical content.
4. *Inclusive Educational Landscape:* The impact of the proposed solution extends to marginalized communities and remote areas. Learners who previously faced geographical barriers or lacked access to specialized instructors can now benefit from high-quality practical education, aligning with the principles of educational inclusivity.
5. *Library Transformation:* Libraries, often seen as repositories of knowledge, will undergo a significant transformation. The designated AR-VR learning space will position libraries as

dynamic centers for interactive and immersive learning experiences, meeting the evolving needs of the digital age.

6. *Environmental Sustainability*: The reduction in the use of physical resources, in line with the study by Klopfer and Squire (2008), promotes sustainability objectives. By minimizing the production and disposal of traditional educational materials, the proposed solution contributes to a more environmentally friendly approach to education.
7. *Fostering Future-Ready Skills*: The immersive and independent learning experiences facilitated by the AR-VR system equip learners with skills crucial for success in a technology-driven world. It aligns with the dynamic requirements of the job market, preparing individuals with practical expertise and adaptability.
8. *Educational Equity*: By democratizing access and reducing financial barriers, the proposed system contributes to educational equity. It ensures that every learner, regardless of their circumstances, has an equal opportunity to engage with practical content and pursue STEM-related fields.

In conclusion, the potential impact of the AR-VR solution extends far beyond the boundaries of traditional education. It envisions a future where practical learning is not only accessible and cost-effective but also empowers learners to take charge of their educational journey, fostering a more inclusive, sustainable, and dynamic educational landscape.

Implementation Considerations

The successful implementation of the proposed AR-VR solution within library environments requires careful consideration of various factors to ensure a seamless and effective integration.

The following key considerations are essential for the successful deployment and operation of the AR-VR system:

1. *Hardware and Software Selection*
 - a. Choose AR and VR hardware that is user-friendly, cost-effective, and compatible with the proposed system. This includes headsets, scanners, and other peripherals.
 - b. Select software platforms that support immersive learning experiences and are adaptable to the evolving needs of practical education.
2. *Content Development Collaboration*
 - a. Collaborate with educators, subject matter specialists, and instructional designers to develop high-quality virtual laboratory content aligned with educational objectives.
 - b. Ensure that the virtual content is engaging, accurate, and capable of delivering an authentic practical learning experience.
3. *User Experience Design*
 - a. Design a user interface that facilitates a smooth transition from real-world materials to virtual ones. Prioritize simplicity and user-friendliness to encourage widespread adoption and inclusivity.
 - b. Seek feedback from potential users during the design phase to refine the user experience and address any usability concerns.
4. *Accessibility Integration*
 - a. Prioritize inclusive education by ensuring that the AR-VR solution is accessible to users with diverse needs and abilities. This includes considerations for users with disabilities to guarantee a universally accessible learning environment.
5. *Integration with Library Systems*
 - a. Plan and execute a seamless integration of AR-VR resources with existing library systems and resources. This integration should enhance the overall library experience and align with the digital transformation of library services.

6. *Training and Support Programs*

- a. Develop comprehensive training programs for both library staff and users to familiarize them with the AR-VR system's functionalities.
- b. Establish ongoing support mechanisms to address any technical issues, queries, or concerns that may arise during the implementation and usage phases.

7. *Privacy and Security Measures*

- a. Implement robust privacy and security measures to safeguard user data and virtual interactions. Adhere to industry standards and regulations to build trust among users and ensure compliance with data protection laws.

8. *Technical Difficulties Contingency*

- a. Anticipate potential technical difficulties and establish contingency plans to address any issues promptly. This includes having technical support staff available and creating resources for users to troubleshoot common problems.

9. *User Feedback Mechanism*

- a. Implement a feedback mechanism to gather insights from users regarding their experiences with the AR-VR system. Use this feedback to make continuous improvements and refinements to enhance the overall user satisfaction.

By carefully addressing these implementation considerations, libraries can maximize the potential of AR-VR technology to enhance practical education, creating a dynamic and sustainable learning environment for users.

Expected Outcomes

The implementation of our AR-VR solution in libraries holds the potential for transformative outcomes, as expressed by leading researchers in the field:

1. *Deeper Understanding:* According to Dede's observations on the potential for immersive interfaces to promote profound learning, learners who participate in immersive virtual practical experiments are likely to develop an in-depth knowledge of complex subjects.
2. *Heightened Engagement:* Similar to Klopfer and Squire's studies on the engagement-boosting benefits of virtual environments (Klopfer & Squire, 2008), the interactive element of AR-VR experiences is likely to increase learner engagement.
3. *Cost Efficiency:* The elimination of physical resources promises substantial cost savings for both educational institutions and learners.
4. *Empowered Independent Learning:* Users will be given the freedom to investigate practical experiments independently, encouraging empowerment and self-directed learning.
5. *Inclusive Access:* The concept was emphasized by Milgram and Kishino in their vision of augmented reality as an inclusive technology (Milgram & Kishino, 1994). The solution's universal accessibility removes obstacles, making practical education accessible to all.
6. *Library Transformation:* Libraries will undergo a revival, evolving into dynamic centers of interactive learning experiences, enhancing their value in the digital age.
7. *Environmental Stewardship:* Less reliance on physical resources is consistent with sustainability objectives and considerably reduces the environmental impact of traditional resources.

These expected outcomes not only address current challenges but also pave the way for a more dynamic and inclusive future for practical education within library settings.

Significance of the Research

The significance of our proposed AR-VR solution in libraries extends beyond its immediate impact and corresponds with the broader educational landscape. According to Lesk (2005), "Libraries must adapt to new challenges and opportunities in the digital age." These points illustrate the significance of the study:

1. *Educational Transformation:* By improving accessibility, efficiency, and engagement, our approach has the potential to revolutionize practical education. This is in line with the broader objective of improving educational methods and addressing the needs of a world that is changing quickly.
2. *Education Inclusion:* By solving accessibility issues, our solution encourages educational inclusion and overcomes achievement gap. This is associated with the larger social objective of educational equality.
3. *Library Reinvention:* Libraries, which are frequently viewed as repositories of knowledge, might revive their function in education. This study positions libraries to be dynamic centers for immersive learning experiences, enhancing their applicability and importance in the age of the digital revolution.
4. *Cost-Efficiency:* Our solution has significance for educational institutions facing financial restrictions because of its potential to reduce costs. The findings of this study are consistent with the demand for affordable educational alternatives (Klopfer & Squire, 2008).
5. *Environmental Sustainability:* Reducing the use of physical resources is in line with sustainability objectives and promotes a more environmentally friendly approach to education (Klopfer & Squire, 2008).
6. *Future-Ready Skills:* The immersive and independent learning experiences facilitated by our solution provide learners with skills necessary for success in a technology-driven world.

In conclusion, this research isn't merely about a technological solution; it's about reshaping educational frameworks, promoting inclusivity, improving libraries, and contributing to a more sustainable and future-ready education system.

Conclusion

In conclusion, our research proposal presents an innovative and transformative vision for the integration of Augmented Reality (AR) and Virtual Reality (VR) technologies in libraries to enhance practical education. Drawing inspiration from survey data and leading scholars in the field of immersive interfaces and digital education, our proposal envisions a future where learners of all backgrounds can access and engage with practical experiments seamlessly.

Our proposed AR-VR solution addresses the ongoing challenges faced by libraries, educators, and learners in offering practical education. It promotes accessibility, cost-efficiency, independent learning, and inclusivity. Additionally, it redefines libraries as dynamic hubs for interactive learning experiences, in line with their evolving role in the digital age. Furthermore, our research is significant not only for its potential to transform education but also for its alignment with wider social goals of equity, cost-efficiency, and environmental responsibility. By reducing dependence on physical resources, our proposal supports sustainability objectives.

In summary, our research points towards an exciting future where libraries become catalysts for immersive, engaging, and inclusive practical education. As we move forward, collaboration

among educators, researchers, and library professionals will be essential to achieve this vision and unlock the full potential of AR-VR technology in education. Our approach is a significant step towards redefining how we learn and ensuring that practical education is accessible to all, ultimately contributing to a more equitable and knowledge-driven society.

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Changing Role of College Librarians in the Digital Environment of 21st Century

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Abstract

This paper studied the changing roles of college librarians in the new digital environment of the 21st century. The information and communication technologies are changing at a tremendous speed. The e-learning and e-platform have influenced every aspect of digital services in libraries. They provide new opportunities and challenges to this profession. The information revolution created a new challenge to professional ethics. The challenges in obtaining and providing access to digital resources have made the librarian to equip himself to apply the necessary skills to provide online digital information resources. These diverse constraints and challenges require continuous support from authorities on many aspects such as financial, technical, managerial, and entrepreneurial in nature. The invention of World Wide Web has drastically changed the information environment in an unpredictable way, as a result the role of librarian has shifted to that of information provider or knowledge navigator who use new techniques to search information in the light of information technology and the requirement of users. This paper tries to find out the different challenges faced by the LIS professional and their changing role in the new digital environment of 21st century.

Keywords: College Library, Challenges, Digital Library, Librarian, Library professional, ICT

Introduction

The Information era with its various electronic facilities have imposed many challenges in each and every sphere of developmental activities in libraries and information centres. Librarianship is a service profession which is an ancient and honourable one. It is a combination of professional expertise in three areas -Information, New Technology and Users. Librarianship addresses all these three areas whereas all other field including computer science and communication technology address some part of these. It is because of effective information retrieval services require the unique professional mix of knowledge such as information, users and information technology. The invention of World Wide Web has drastically changed the information environment in an unpredictable way; as a result the role of librarian has shifted to that of information provider or knowledge navigator who uses new techniques to search information in the light of information technology and the requirement of users. Lack of resources, constant changes, and the need for flexibility, effective communication define the work-role of librarian today.

Review of Literature

Obogu, JO (2021) Studied the role of librarian in 21st century. Study found that library is in a state of dilemma because of drastic change that ICT has brought. Library are facing difficulties due to the insufficient fund, but the inability of librarian to acquire IT skills relevant to the advance 21st century library services could see as a more difficult challenge. Aslam (2021) reveals the most important competencies in a reshaping environment of libraries and the best way of dealing with change. Library professionals are struggling to reform their traditional ways of working and trying

to boost their knowledge and skills as current demand for higher education. Organizations can play an important role in developing a willingness to accept changes and reduce stress among employees. Singh, B.P (2019) Examined how the digital library has changed the role of the librarian in 21st century. Libraries nowadays using various mobile technology-based app to provide faster services. Yee (2012) describes that the challenges for libraries are to have a pool of skilled staff ready to take on emerging new roles and responsibilities in the digital environment. So that, for the successful 21st librarianship expertise with digital technologies is essential, followed by new cutting age technologies to managing the digital resources and services in the libraries. Zickuhr, K., Rainie, L., & Purcell, K. (2013). Their report explores the changing world of library services by exploring the activities at libraries that are already in transition and the kinds of services citizens would like to see if they could redesign libraries themselves. It is part of a larger research effort by the Pew Research Center's Internet & American Life Project that is exploring the role libraries play in people's lives and in their communities. The research is underwritten by the Bill & Melinda Gates Foundation. This report contains findings from a survey of 2,252 Americans ages 16 and above between October 15 and November 10, 2012. The surveys were administered on half on landline phones and half on cell phones and were conducted in English and Spanish. The margin of error for the full survey is plus or minus 2.3 percentage points. There were several long lists of activities and services in the phone survey. In many cases, the authors asked half the respondents about one set of activities and the other half of the respondents were asked about a different set of activities. These findings are representative of the population ages 16 and above. Hao-Chang Sun and others (2013) showed how implementing new information technology has expanded the role of libraries as educators and how this role has matched the evolution of new technology. Collaboration with faculty was found to be an essential feature of the most successful stories. Teaching students and faculty to use how technology may have become one of the major roles of libraries.

Methodology

For the present study, some of the recent and relevant studies have been reviewed. The author conducted telephonic interviews with the few prominent college librarians for their views on the changing role of librarians in the digital era and how they are managing these challenges.

Need to Change the Role of Librarians

A review distributed by the Special Library Association in 1998 found that although our job is changing, Librarians anticipate their job developing to that of a corporate system. Following are few motivations to change the job librarians.

1. Fast changing and multidimensional client request.
2. Information explosion.
3. Computer and media transmission innovation development
4. Internet and versatile innovation progression.
5. Increased mindfulness among client of the library.
6. The technology was accessible to the fingertips.

Advantage of the Digital Library

A computerized library is not bound to a specific area, it is disseminated everywhere throughout the world. The users can get his/her data by utilizing the internet. In reality it is system of slight and sound frame work, which gives fingertips get to

1. No physical Limit
2. Non-stop accessibility
3. Different gets to: Similar assets can be utilized simultaneously by various clients.
4. Organized Methodology: Digital Libraries gives access to a lot more extravagant substance in a progressively organized way.
5. Data recovery: In digital environment suppose user lost any data it can be recovered again
6. Space: Digital library needs no physical infrastructure like huge library building.
7. Preservation of Information.
8. Cost: The expense of maintain digital library is lesser than physical library. A traditional library maintains its staffs, physical books, buildings etc. digital library get rid of these charges.

Disadvantage of Digital Library

Besides several advantages, it has few disadvantages few of them are below:

1. Copyright issues: In digital library chances of copyright violation is high.
2. Speed of access: As many PC are associated with the internet speed of access is become slow.
3. Starting expense is high: The foundation cost of the computerized library is generally very high because of software cost, Systems maintenance, equipment etc.
4. Bandwidth: Digital library needs high a band for a move of slight and sound asset however the bandwidth is decrease step by step because of its over usages.
5. Effectiveness: Finding the correct material within the huge volumes of information resources is challenging tusk.
6. Condition: Digital library can't duplicate the earth of a conventional library. Numerous individuals additionally see perusing printed materials as simpler than materials on a PC screen.
7. Protection: Due to mechanical improvements, a computerized library can quickly get obsolete and its information may become inaccessible.
8. Challenges facing by the librarian in the twenty-first century

New Challenges for LIS Professionals

Because of speedy changing in ICT throughout the world library professional are facing so many challenges. The significant challenges are,

1. ICT upheaval
2. Explosive development and use of web asset
3. Dwindling Library spending plan
4. Accelerating price of printed resources
5. Intensive utilization of advance assets.
6. Interactive virtual learning condition
7. Online bookshops and information administration
8. Desires of library users
9. A new example of scholarly distributing and correspondences.

Challenges Facing By the Librarian in the 21st Century

To adopt the new changes in 21st century librarian is facing so many difficulties. The significant difficulties are

1. User desires.
2. Preservation of materials on advance scale
3. Growth and uses of web assets.
4. Translation from print to the advance substance
5. Information explosion and ICT
6. Technological injury and foundation
7. Staff protection from change.
8. Multi position information creation.
9. Online book shop and data administration

Changing Role of Library Professional in Digital Age

The prepared accessibility of data on the internet, and its broad use, truly gives librarians a chance, not a risk. Innovation savvy clients acknowledge they need assistance, which librarian can give. Librarian presently face trouble and complicity challenges because of new pattern in data get to. In the present innovative or internet period the expert needs to change themselves as the data is being changed. Present data expert needs to be updated with latest ICT.

- a. *Information Manager* - To address the data issue of the client they should realize how to oversee and convey fitting data administration.
- b. *Information Councillor/educator* - Ensure that user or client realizes how to get to applicable wellsprings of data.
- c. *System and Networking* - For easy transfer of data to the users without delay, librarian have to be aware about the system and networking properly.

Changing Role of College Librarian

The role of college librarians has been changed with advent of new ICT. Librarian ought to have knowledge and experience in library automation, software, networking and di0gital library. The best utilization of any library is relying on the administrative ability of the librarian.

a. Position of Authority and Managerial Skills:

One essential Job of librarian is to give administration and aptitude in the structure, improvement and moral administration of information-based data frame work in the executive's ability for sorting out, overseeing, dispersing e-education to utilize.

b. ICT Skill As Digital Information Provider:

As the librarian is the manager of the library, he ought to have skills of ICT to manage e-resources of his library. Library possess huge e-resources for its users/clients, to proper utilize these resources librarian should have special knowledge to manage e-resources.

c. An Evaluator of Digital Resources:

Assessing the correct data at the right time is the most significant factor in the advanced library. Librarian has the quality to choose the correct e-resources for its users. There are thousands of e-resources, choosing the right one is very difficult tusks. So, librarian need to evaluate the resources before purchasing for library.

d. Staff Development Programme:

Staff development programme is the integral part of any organization. Library being an information service provider organization, staffs associated with it should be well efficient and trained in latest ICT. Librarian should organize training programme for the subordinate staffs. Staffs should be sent to the different workshop or training programme for upgradation of their knowledge and experience.

e. E-Resource Manager:

Librarian of the academic institutions plays significant role in managing the information. Today's research library is full of e-resources. Libraries collect thousands of electronic resources for its users. Librarian has to be played a role of e-resource manager rather than simple an administrator. To get the right resources at the right time librarian cum information manager play vital role.

f. Data Literacy Programme:

Librarian need to change their job in e-learning condition by talking an interest in e-learning test and getting associated with the college's e-learning focuses. An all around learned must train data proficiency to teach future information labourer, in customary ways or using internet-based guidance modules.

Conclusion

Govt. has taken so many positive initiatives to make scholarly publication and institutional repository free for all in India. All the above efforts coupled with the skilling programs would surely enhance the confidence and employability of the library professional. Although the higher education institution is basically intended to educate students by imparting the requisite knowledge and skills to get respectable position in the society, there is also need to utilize the favourable environment and the effect of modified curriculum change, with more focus on practical orientation and more or less the institutions must be well equipped with the latest ICT infrastructure. It is proven that industry must expand and take as a challenge to keep the staff trained through frequent workshop and other training programmes. If suggested step followed, surely the library professional will be fit with the multidisciplinary talent such as skilled in ICT, KM with subject knowledge, good communication and leadership skill.

No matter what happened, librarian and library professional will last as long as scholarly publication exists, information dissemination is required. When the communication system revolutionizes to pure electronic form, library will transform to e-information servers and library professional as information technologist and will serve the user efficiently that begin a new era in which the whole world is e-world, e-information, e-governance, e-education so that no tangible pen or paper will be found in that e-world.

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KTHM College Library: Best Practices and Services

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Abstract

This paper is mainly focused on various best practices and services to be followed by KTHM College Library, Nashik. It is discuss importance of introducing best practices and services in KTHM College Library, Nashik to improving and optimising the resource utilization and delivering efficient services to the users. This paper includes traditional best practices, Modern (Technology Based) best practices and for special users best practices implemented in KTHM College Library, Nashik. This article will be most useful for other libraries to get idea about various techniques and methods can be adopt to in their libraries to providing effective services irrespective to their users. With the help of this article other users of KTHM college library get idea about library services and best practices which improved and utilised library resources effectively.

Keywords: KTHM College Library, Information Technology, Best Practices, Screen Reading Software, Special Users

Introduction

In the 21st century, libraries maintain their importance as dynamic and adaptable institutions that serve variety of roles in our digital driven society as digital access, information literacy, community hubs, preservation and archivals, lifelong learning, digital skills, innovation and creativity, cultural diversity, academic support, reference and expertise, literacy program, mental health support, e-government services and community needs. As well as library promote environmental sustainability by offering material on environmental topics and adapting green practices hells. In the 21st century library is multi facilitated institution continually evolving to meet demand of the digital age while preserving its traditional roles as a centre for library, community and knowledge information access.

KTHM College Library

KTHM College Library: The College established in 1969. That time library having one room stack, now library having separate building which occupies an area of 882.57 Sq. Mts. consisting of a spacious reading hall, stacking section, text book section, periodical section, reference section, administrative wing, librarian's cabin, Asst. librarian cabin, issuing counters etc. library budget is near about 8,00,000/- every year and UGC also provides funds for library development. The library is enriched with a huge collection of reference books, text books, CD's, Audio books, Braille books, periodicals and research journals. KTHM College have research centre (M.Phil & Ph.D.) for ten subjects. College already have Youtube Channel & Institutional Repository on DSpace platform. College Admissions are near about 17000 students every year to various courses and total collection of library is 1,80,000. KTHM College library have providing following best practices for students and staff.

Best Practices

ODLIS (Online Dictionary of Library and Information Science) describes best practices as, “In the application of theory to real-life situation procedures that one properly applied, consistently field superior results and are therefore used as reference points in evaluating the effectiveness of alternative methods of completing accomplishing the same task. Best practices are identified by examining empirical evidence of success.”

Oxford English Dictionary describes, “Best practices quality of most excellent or desirable type of most appropriate advantages type highly improved outstanding per excellence services are the custom customer expected procedures or way of doing something that is usual or expected way in a particular organisation or situation guidelines for good practices. In this process of developing best practices we take action rather than good ideas and we improve our skills.”

KTHM College Library, Nashik provides library services and best practices and facilities in three types as traditional, technology based and special users. These are as follows:

Traditional Best Practices and Services as:

1. *Library Brochure* - This brochure contents the information about library such as library collection, library rules & regulations, library timings, library services and facilities etc. Library brochures are provided to the each and every student at the time of admission.
2. *Orientation Program* - Every Academic Year, Library organised orientation program on 1st week of July for all new admitted students to creating awareness about library sections, library resources, services, facilities and activities for maximum utilisation of library resources.
3. *Book Exhibition* - Arrange book exhibition on different occasions {i.e. National Library Week, Birth Anniversary of Dr APJ Abdul Kalam (Vachan Aani Prerna Din), Maratha Vidya Prasarak Samaj (MVP Samaj Din), Independence Day, Marathi Bhasha Din etc.} display new arrival books as well as particular publishers us for exhibit it. A new published book to know the college users and they demand to purchase such books for college library which increase the number of library regular users or readers
4. *New Arrivals* - As new books are purchased by library. Title page of that book's photocopy is displayed on notice board for awareness amongst students about the new reading material so users could demand for it. As well as the list of new arrival books are provided subjectwise to the departments.
5. *Newspaper Clipping* - Library department cut newspaper clippings on reading habits, MPSC / UPSC series, motivational articles, recruitment advertisements etc. are useful for students which are studying for competitive examinations.
6. *Student Internship* - Students M.Lib. & I.Sc. students applied for internship program. They make one application for doing two or three months training regarding library sections services facilities library software, B.Lib. & I.Sc. Students have in their Library Science course compulsory one month internship. For students selected or sort listed and selected by library committee members on interview of that students. After completion of internship student get certificate from college which is helpful their job profile.
7. *Reprographic Service* - Photocopy service of reference books some pages of required by student or demanded by student. Such type information resources are xeroxed in the library before new pattern that is CBCS University question papers Xeroxed are provided to students by charging amount.
8. *Earn & Learn Scheme* - As per University rules, Board of Student Welfare Department select the needy students in this scheme. Board of Student Welfare Department (BOSWD) allotted

these students in various departments including library department. These students' worked in the library for two hours on daily basis. They learned library activities and trained by library staff in making identity cards, distribution of Identify cards and Marksheets, books accessioning, library software modules and providing library services and facilities to the students.

9. *Assist in Project Work* - Providing reading material or information regarding projects, mini projects, assignment etc. is basic work of library. But students from open distance learning such as YCMOU, IGNOU, TIMES etc. came for their project work. Specially B.Lib.& I.Sc. and M.Lib.& I.Sc. Students take project on or about KTHM College Library. Such students get regarding whole information against on student application or letter from their centres regarding taken project topics.
10. *Best Reader Award* - Every year best reader award is given to concerned student who access library many times and read more books other than textbooks. On KTHM College Annual Honour Day Ceremony, Student get award which contains one certificate, one trophy and Rs.501/- amount from the Chief Guest of the programme.

Modern (Technology Based) Services and Best Practices

1. Library Automation

KTHM College Library automation was done in the year 2008. The Library is automated using e-Campus Education Hub Library Software. It is available on Windows Operating System in offline mode and the Browser Based Interface is available in online mode. This library software consists of Four Core modules: Master Information Module, Reports Module, Search Module and Administrator Module. The Master Information module has several Sub-Modules: Book Master, Circulation, Member, Subscription, Periodicals, Stock Verification, Book Shelf, Book recommendations and Reading Hall module. The Various types of Reports, Barcode printing, Book card printing, Accession Register etc. are available in the Reports Module. The OPAC is available in the Software through Search Module on the Windows base version whereas the Web OPAC is available in the Search Module on the Browser base platform. The Administrator Module has Identity Card (I Card) configuration and Circulation configuration as its sub-modules.

2. Library Webpage

KTHM College library webpage have online services option; where open access newspapers i.e. online e-papers links are given. Online journals links are attached. Open access e-books, Indian Digital libraries & some important links like www.maharashtra.gov.in, www.jdhepune.info & www.nashikcorporation.in are linked.

3. KTHM College Institutional Repository

KTHM College library created Institutional Repository on server using DSpace software. By using book scanner documents such as Term end question papers, university examination question papers, syllabus in pdf, college magazine "Akshar", newspaper clippings, raw material research articles provided by teaching staff, faculties PPT's, rare books, reference books indexing, old photos of events or programmes etc. are uploaded. Library webpage have link to KTHM College Institutional Repository. It has campus limitation (only on LAN).

4. Email Services

Library department send alerts on emails of the students. As students demanded for some books which not available today but when it is available that time email is sent. Similarly if user asked for particular softcopy or Portable Document Format (pdf) or information through email then it is replied as early as possible through same medium.

5. Online Public Access Catalogue (OPAC)

The Online Public Access Catalogue (OPAC) is available in the Software through Search Module on the Windows base version whereas the Web OPAC is available in the Search

Module on the Browser base platform. By using this Web OPAC, users get idea about available collection, borrowed books and not availability of the collection. How many books on particular subject, various authors wrote books on one specific topics etc. can search by the students.

6. *On Demand Service*

For motivating and increasing reading habits amongst users library department take initiatives. New books (new Arrivals), famous books in pdf, audio books etc. are announcing in break of lectures on Google classroom. Students demand through whatsapp number or through their e-mails. As requirements are fulfil on that same day. Library having 2000+ audio books and 1800+ free e-books downloaded from various Marathi websites like e-sahitya, netbhet etc. Our students are mostly demand for Marathi e-books.

7. *Events and Programs*

One community of event & programs is available there for celebrating Birth Anniversary or Death Anniversary of Institution Founder members, Indian social workers, famous persons worked in any filed etc. In pandemic situation these activity is celebrated online like 15th Oct. 2023 Dr. APJ Abdul Kalam Birth Anniversary (Reading Inspiration Day). Some information about person is uploaded in Marathi language and book on him or written by him are linked their further reading to all users.

Book Exhibition activity through online services on library webpage. Book catalogues, book list are attached in pdf. Some images of new arrival books are visualised for students. Library department make banners and displayed on college campus. Various Guest lectures are arranged online such as “Importance of reading” & “Use of Google tools in research” for the UG and PG students. Webinar, quiz for Reading awareness etc. are conducted by college. Participants providing e-certificate through library department to their registered e-mail address.

Best Modern Library Practices for Special Users

Amongst 17000 students approximately 83 students are special users amongst that 66 are visually disabled and remaining Deaf and Dumb or physically handicap. To provide them library services is crucial work from library staff. Majority of students are Visually Impaired students hence to them following services are provided as:

1. *Computers:* Dedicated 05 computers with headphones and specialized software JAWS (Job Access with Speech) Professional-V.17 software, NVDA software for visually challenged students.
2. *JAWS:* - Five License copies JAWS Professional Version 17. JAWS are a screen reader that works with Windows operating system to provide access to today’s popular software applications and the Internet. JAWS use an integrated voice synthesizer and computer’s sound card to output the content of computer screen to speakers.
3. *Braille Books:* - Library having more than 135 Braille books on syllabus as well as other motivational and reading.
4. *CD’s:* - College library having 340 Motivational & Educational CD’s.
5. *Audio Books:* - More than 2000+ audio books are available through Yashowani, Pune.
6. Yashowani, Pune helping in recording books for visually impaired students on demand.
7. *Book Bank:* - Book Bank facility is given to the physically challenged students whole set is allotted to them for recording for that academic year.
8. *DOT Mini Device:-* Library Department Provides 12 DOT Mini Device to Visually impaired students. DOT Mini device is like recorder having 8GB memory card with Braille words key.
9. *KIBO XS Devices:* - Library Department having three KIBO XS devices. KIBO XS is a device like books scanner which scan book page and recorded in audio format on Cloud

server. Students retrieve data through their Android Mobile phone using KIBO app from Google Play Store.

Conclusion

In the current digital age, having access to knowledge and information is more important than ever. Individuals who do not have access to necessary information are not allowed to actively engage in social, political, or economic activities. Due to a lack of easily accessible resources, people who are visually impaired - particularly those who reside in developing countries like India have been excluded from society for far too long. As a result, Indian libraries must fulfil their ethical responsibility to provide an inclusive and equitable library as well as information services for the visually impaired in and other stakeholders. Best practices of KTHM College library are very useful in providing support to students, staff and alumina. There is only one library (HPT College) oldest library in Nashik as compare to KTHM College Library. Hence Libraries should establish, promote, maintain, and evaluate a range of quality services that support the colleges, mission and goals.

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Encouraging Lifelong Learning: Libraries' Essential Function in Today's Society

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Abstract

This paper explores the indispensable role of libraries in fostering and empowering lifelong learning within contemporary society. As dynamic hubs of knowledge, libraries have transcended their traditional image, evolving into vibrant centres that actively contribute to the intellectual growth and development of individuals across the lifespan. Emphasizing their pivotal position in today's information landscape, the discussion unfolds to illustrate how libraries serve as catalysts for continual learning, offering diverse resources, innovative programs, and embracing technology to meet the evolving needs of a knowledge-driven society. Beyond their conventional function as repositories of books, libraries emerge as dynamic spaces that cultivate a love for learning, facilitate skill development, and bridge educational gaps. The examination of libraries as agents of empowerment sheds light on their ability to democratize access to information, support diverse learning styles, and foster a sense of community engagement. Through an exploration of various facets, from early childhood literacy initiatives to adult education programs, this paper underscores the multifaceted contribution of libraries in shaping individuals into lifelong learners. By championing inclusivity, technology integration, and a commitment to intellectual curiosity, libraries stand as fundamental pillars in the quest for lifelong learning in the 21st century.

Keywords: Lifelong learning, Libraries, Information literacy, Technology integration, Community engagement, Educational programs

Introduction

In an era marked by rapid technological advancements and a constant influx of information, the pursuit of lifelong learning has become more critical than ever. In this context, libraries, once viewed as bastions of books, have metamorphosed into dynamic hubs that play a vital role in empowering individuals on their educational journey throughout life. This paper delves into the multifaceted and indispensable role of libraries in shaping and sustaining lifelong learning in contemporary society. As repositories of knowledge and gateways to information, libraries have adapted to the evolving needs of a knowledge-driven society. They serve as not just static archives but as dynamic spaces that actively contribute to the intellectual growth and development of individuals across diverse age groups. The pivotal role of libraries in lifelong learning is underscored by their ability to democratize access to information, foster community engagement, and adapt to the digital landscape. This transformation positions libraries as fundamental agents in the cultivation of a culture of continuous learning. Drawing on a wealth of resources and innovative programs, libraries have become catalysts for learning that extend far beyond the confines of traditional reading. From early childhood literacy initiatives that set the foundation for a love of learning to adult education programs that cater to diverse learning styles, libraries are instrumental in nurturing a society of lifelong learners. This exploration will unfold by examining the various dimensions of libraries' contribution to lifelong learning, encompassing their role in early childhood literacy, support for formal education, integration of technology, and promotion of community engagement. By delving into these aspects, we aim to illuminate the ways in which libraries stand as fundamental pillars in the empowerment of individuals on their journey of continual learning.¹

Objectives

1. *Assess the Impact on Lifelong Learning:*

Evaluate the overall impact of libraries on fostering a culture of lifelong learning within society, considering factors such as accessibility, inclusivity, and the ability to adapt to emerging educational trends.

2. *Examine Community Engagement Initiatives:*

Examine how libraries complement formal education systems, providing resources, guidance, and spaces that enhance the learning experience for students of all ages.

3. *Explore Early Childhood Literacy Initiatives:*

Explore how libraries have embraced technology to meet the evolving needs of learners, incorporating digital resources, e-books, and educational apps to enhance the overall learning environment.

Explore the transformation of libraries from traditional repositories of books to dynamic centres that actively contribute to lifelong learning in the contemporary digital age.

4. *Identify Challenges and Opportunities:*

Identify challenges faced by libraries in their mission to promote lifelong learning and explore potential opportunities for further enhancement and adaptation to contemporary educational needs.

Illuminate the diverse functions of libraries beyond book storage, focusing on their contributions to early childhood literacy, formal education support, technology integration, and community engagement.

Investigate the community-oriented initiatives undertaken by libraries to promote inclusivity, diversity, and a sense of belonging, emphasizing their role as hubs that foster continuous learning within diverse populations.

5. *Investigate the Integration of Technology:*

Investigate the specific programs and initiatives implemented by libraries to promote early childhood literacy, emphasizing their role in cultivating a love for learning from a young age.

6. *Offer Recommendations for Improvement:*

Provide recommendations based on the findings to enhance the effectiveness of libraries in empowering individuals on their journey of lifelong learning in today's society.

Through a comprehensive exploration of these objectives, this paper seeks to shed light on the pivotal role of libraries in the empowerment of individuals and the cultivation of a society that values and actively pursues lifelong learning.

The Lifelong Learning Paradigm

The concept of lifelong learning has evolved into a paradigm that transcends traditional educational boundaries, emphasizing the continuous acquisition of knowledge and skills throughout one's life. This paradigm recognizes that learning is not confined to formal institutions but is a dynamic and ongoing process woven into the fabric of everyday life. Lifelong learning is driven by the imperative to adapt to the ever-changing demands of the modern world, where technological advancements, global interconnectedness and evolving industries necessitate a flexible and persistent approach to education. This paradigm underscores the shift from a linear model of education, where learning is concentrated in the early stages of life, to a more fluid and encompassing model that spans across the entire lifespan. Lifelong learning recognizes the need for individuals to update, expand, and refine their knowledge and skills continually, fostering adaptability and resilience in the face of societal and economic transformations.

Libraries play a central role in facilitating the lifelong learning paradigm. As dynamic and inclusive spaces, libraries provide resources, programs, and support that cater to individuals of all

ages and backgrounds. They serve as hubs for information dissemination, skill development, and community engagement, embodying the ethos of continual learning.²

Access to Lifelong Learning: Bridging the Educational Divide

Access to lifelong learning is a fundamental aspect of fostering personal and societal development. It goes beyond traditional educational structures, emphasizing continuous skill acquisition, knowledge enrichment, and personal growth throughout an individual's life. This access is not only a right but also a cornerstone for creating an inclusive and dynamic society that thrives on innovation and adaptability.

1. Accessibility Beyond Formal Education:

Lifelong learning extends the reach of education beyond formal institutions, recognizing that learning opportunities should be available to individuals throughout their lives, irrespective of age, background, or prior educational experiences.

2. Libraries as Gateways to Lifelong Learning:

Libraries play a pivotal role in democratizing access to lifelong learning. As dynamic community hubs, they offer diverse resources, educational programs, and support systems that cater to the needs of learners at various stages of life. Libraries act as inclusive spaces where individuals can embark on learning journeys regardless of socio-economic factors.

3. Digital Inclusion:

The digital age has further expanded the landscape of lifelong learning by providing online platforms, courses, and resources. Ensuring digital inclusion becomes crucial to guarantee that individuals, regardless of their socio-economic status, have equitable access to these digital educational opportunities.

4. Community Education Initiatives:

Beyond formal educational structures, community-based initiatives and programs contribute significantly to lifelong learning. Collaborations between educational institutions, community organizations, and libraries enhance access to educational resources and opportunities within local communities.

5. Workplace Learning:

Lifelong learning extends into the professional realm, emphasizing the importance of continuous skill development and training throughout one's career. Access to workplace learning opportunities becomes a key factor in ensuring that individuals can adapt to evolving job requirements and industry trends.

6. Government Policies and Support:

Policies that promote lifelong learning and allocate resources to support educational initiatives contribute to increased access. Governments play a crucial role in creating an environment where learning is not confined to specific life stages but is a continual and accessible process for all citizens.

7. References:

Ensure that educational policies and practices are rooted in evidence-based research and references, drawing from established educational theories, frameworks, and successful case studies in providing accessible lifelong learning opportunities.

Access to lifelong learning is not merely a personal benefit but a societal imperative. It contributes to social cohesion, economic development, and the cultivation of a population equipped to face the challenges of an ever-changing world. By fostering accessibility to learning opportunities, societies can unlock the full potential of individuals and build a foundation for sustainable progress.³

Cultivating a Culture of Lifelong Learning: Nurturing Continuous Growth

Cultivating a culture of lifelong learning is essential for individuals and societies to thrive in the dynamic and rapidly evolving landscape of the 21st century. This cultural shift embraces the idea that learning is a lifelong journey, extending beyond formal education and permeating all aspects of life. It fosters adaptability, innovation, and a commitment to personal and collective development.

1. Promoting Curiosity and Inquiry:

Encouraging curiosity and a thirst for knowledge from an early age sets the foundation for a lifelong learning culture. Creating environments, both at home and in educational institutions, that nurture questioning, exploration, and critical thinking is essential.

2. Educational Institutions as Lifelong Learning Hubs:

Formal educational institutions play a crucial role in instilling the value of continuous learning. By incorporating lifelong learning principles into curricula, offering diverse learning experiences, and promoting a growth mindset, these institutions contribute to shaping individuals who embrace learning as a lifelong endeavour.

3. Library as a Lifelong Learning Hub:

Libraries act as vibrant centres for fostering a culture of lifelong learning. They provide a diverse array of resources, educational programs, and community engagement initiatives that cater to individuals of all ages. The adaptability and inclusivity of libraries contribute significantly to creating an accessible and enriching learning environment.

4. Integration of Technology:

Embracing technological advancements is integral to cultivating a culture of lifelong learning. The integration of digital resources, online courses, and interactive platforms facilitates continuous learning beyond physical boundaries, making education accessible to a broader audience.

5. Community Engagement and Collaborations:

Building a culture of lifelong learning requires collaboration between educational institutions, libraries, community organizations, and businesses. Community engagement initiatives and partnerships create a holistic learning ecosystem that extends learning opportunities beyond traditional settings.

6. Workplace Learning and Professional Development:

Organizations play a pivotal role in fostering a culture of lifelong learning by investing in employee training and professional development. Encouraging a learning-oriented workplace culture contributes to the continuous growth of individuals and the overall adaptability of the workforce.

7. Government Policies and Advocacy:

Governments can influence the cultural shift towards lifelong learning through policies that support accessible education, promote adult learning programs, and incentivize businesses to invest in employee development. Advocacy for the value of lifelong learning at the policy level contributes to a broader societal embrace of continuous education.

Cultivating a culture of lifelong learning is not merely about acquiring knowledge but about fostering a mindset that embraces curiosity, adaptability, and a commitment to continual growth. By intertwining learning into the fabric of daily life, societies can ensure that individuals are equipped to navigate the complexities of the modern world.⁴

Education for All Ages: Nurturing Continuous Learning across Lifespan

Education, traditionally confined to specific life stages, is evolving into a concept that transcends age boundaries. Recognizing the importance of lifelong learning, the paradigm of "Education for

All Ages" emphasizes that learning opportunities should be accessible and relevant to individuals at every stage of life. This inclusive approach ensures that education becomes a continuous and enriching journey, contributing to personal development, societal advancement, and the cultivation of a culture that values knowledge at all ages.

1. Holistic Learning across Life Stages:

The concept of Education for All Ages envisions a holistic approach to learning that spans early childhood, formal education, adulthood, and beyond. It acknowledges that individuals have diverse learning needs and preferences at different life stages.

2. Early Childhood Education:

The foundation of Education for All Ages begins with early childhood education. Quality early learning experiences set the stage for a lifelong love of learning. Emphasizing play-based and experiential learning during these formative years contributes to a solid educational foundation

3. Formal Education Systems:

Education for All Ages recognizes the importance of formal education systems in providing structured learning experiences. It advocates for flexible educational models that cater to the varied learning styles and paces of individuals, fostering a culture of adaptability.

4. Continual Learning in Adulthood:

Lifelong learning extends into adulthood, where individuals engage in continuous education to acquire new skills, pursue personal interests, and adapt to evolving career demands. Adult education programs, professional development opportunities, and community-based courses become integral components.

5. Technology Integration:

The integration of technology plays a crucial role in Education for All Ages. Digital platforms, online courses, and e-learning resources provide accessible and flexible avenues for individuals of all ages to engage in learning, breaking down geographical and economic barriers.

6. Community Learning Centres:

Establishing community learning centres further supports Education for All Ages. These centres, often housed in libraries or community spaces, serve as hubs for diverse learning initiatives, workshops, and collaborative projects, fostering a sense of shared knowledge within local communities.

7. Government Policies and Inclusivity:

Education for All Ages aligns with inclusive government policies that prioritize equal access to education. It encourages the development of programs that cater to the educational Ages envisions a society where learning is not confined to specific milestones but is a lifelong pursuit embedded in the fabric.⁵

Benefits of Lifelong Learning for Society: Fostering Progress and Inclusivity

Lifelong learning contributes significantly to the overall well-being and progress of society, bringing about a range of social, economic, and cultural benefits. This transformative impact extends beyond individual development, influencing communities and societies on a broader scale.

The following outlines the multifaceted benefits of lifelong learning for society, supported by scholarly references:

1. Economic Advancement:

Lifelong learning equips individuals with up-to-date skills and knowledge, fostering a skilled and adaptable workforce. A well-educated and continually learning population enhances economic productivity and innovation (Bishop, 2017).⁶

2. Social Inclusion and Equity:

Accessible and inclusive lifelong learning opportunities contribute to reducing societal disparities. Lifelong learning initiatives promote social inclusion by ensuring that education is accessible to individuals from diverse socio-economic backgrounds (Field, Kuczera, & Pont, 2007).⁹

3. Cultural Enrichment and Diversity:

Lifelong learning fosters cultural awareness, tolerance, and diversity. Through educational programs and community initiatives, individuals engage with different perspectives, enriching the cultural fabric of society (Eurydice, 2013).⁸

4. Community Engagement and Cohesion:

Learning initiatives, especially within local communities, enhance social cohesion and community engagement. Libraries and community learning centres serve as hubs for shared knowledge, fostering a sense of belonging and collective growth (Davies & Colbourn, 2019).

5. Health and Well-being:

Lifelong learning is linked to improved health outcomes and well-being. Continuous cognitive stimulation and engagement through learning activities contribute to healthy aging and overall wellness (Morrow-Howell et al., 2014).¹⁰

6. Innovation and Problem-Solving:

Lifelong learners are often more innovative and adept at problem-solving. A society that values continual learning nurtures an environment where new ideas flourish, contributing to technological advancements and societal progress (Field, 2008).

7. Adaptability to Change:

Continuous learning prepares individuals and societies to adapt to societal, economic, and technological changes. It fosters resilience and agility in the face of challenges, contributing to the overall stability of communities (OECD, 2019).¹¹

8. References:

The mentioned benefits are substantiated by reputable sources such as Bishop (2017), Field, Kuczera, & Pont (2007), Eurydice (2013), Davies & Colbourn (2019), Morrow-Howell et al. (2014), and OECD (2019), providing a comprehensive foundation for the societal advantages of lifelong learning.⁷

In conclusion, lifelong learning is not merely an individual pursuit; its societal benefits are profound and far-reaching. By investing in and promoting lifelong learning opportunities, societies can cultivate a more vibrant, inclusive, and resilient collective future.

The Impact of Libraries on Lifelong Learning: Nurturing Curiosity and Knowledge across Generations

Libraries serve as dynamic catalysts for lifelong learning, playing a pivotal role in fostering a culture of continuous education within communities. The impact of libraries on lifelong learning is multifaceted, encompassing early literacy, community engagement, and the provision of diverse resources. This discussion is substantiated by scholarly references that underscore the crucial role libraries play in promoting lifelong learning.

1. Early Literacy Development:

Libraries are instrumental in early literacy initiatives, providing a rich array of age-appropriate books, interactive storytelling sessions, and educational programs. These efforts cultivate a love for reading from a young age, setting the stage for lifelong learning (American Library Association, 2018).¹²

2. Community Learning Hubs:

Libraries function as inclusive community learning hubs, offering educational programs for individuals of all ages. These include workshops, lectures, and skill-building activities that cater to diverse interests and support continual learning throughout life (Davies & Colbourn, 2019).

3. Access to Diverse Resources:

Libraries provide unparalleled access to a wide range of resources, including books, digital materials, and educational tools. This accessibility ensures that individuals can pursue their learning interests regardless of socio-economic status or geographical location (Abels & Yuen, 2016).

4. Technological Integration:

The integration of technology within libraries expands learning opportunities. Digital resources, e-books, and online databases augment traditional learning methods, catering to the preferences and needs of a technologically savvy audience (American Library Association, 2019).¹³

5. Lifelong Learning Programs:

Libraries actively organize and promote lifelong learning programs that encompass various topics, from academic subjects to practical life skills. These programs contribute to the intellectual growth of community members and support a culture of continuous learning (Davies & Colbourn, 2019).¹⁵

6. Community Engagement and Support:

Librarians, often skilled in educational support, guide individuals in finding relevant materials, fostering a sense of curiosity and inquiry. The personalized assistance provided by librarians enhances the learning experience and encourages a proactive approach to seeking knowledge (Abels & Yuen, 2016).¹⁴

7. References:

The impact of libraries on lifelong learning is substantiated by reputable sources, including the American Library Association (2018, 2019), Davies & Colbourn (2019), and Abels & Yuen (2016), providing a robust foundation for understanding the transformative role of libraries in continuous education.¹⁴

In conclusion, libraries emerge as vital contributors to the cultivation of a lifelong learning ethos within society. By providing accessible resources, community-focused programs, and guidance, libraries become indispensable partners in the journey of individuals seeking knowledge across the span of their lives.

The Crucial Role of Libraries in Fostering Early Childhood Literacy and Lifelong Learning

Libraries play a pivotal and transformative role in nurturing early childhood literacy, laying the foundation for a lifetime of learning.

This discussion explores how libraries contribute to the development of literacy skills in young children and, in turn, cultivate a culture of lifelong learning. The insights presented here are supported by scholarly references, emphasizing the importance of libraries as dynamic educational hubs.

1. Early Literacy Programs and Resources:

Libraries offer tailored early literacy programs that include interactive storytelling sessions, rhymes, and age-appropriate books. These initiatives are designed to engage young minds, enhance language development, and install a love for reading from an early age (American Library Association, 2018).¹⁶

2. Diverse and Accessible Book Collections:

Libraries curate extensive collections of age-appropriate books, fostering a rich and stimulating environment for young readers. The availability of diverse literature contributes to language acquisition, vocabulary development, and the cultivation of a lifelong affinity for reading (American Library Association, 2018).

3. *Parent-Child Bonding and Education:*

Libraries actively encourage parental involvement through family reading programs. By providing resources and guidance to parents, libraries become essential partners in fostering parent-child bonding and supporting early childhood development (American Library Association, 2018).

4. *Educational Play Spaces:*

Modern libraries feature educational play spaces that integrate games, puzzles, and hands-on activities. These spaces promote sensory development, problem-solving skills, and a positive association with learning, laying the groundwork for a lifelong love of exploration and education (American Library Association, 2018).

5. *Digital Resources for Early Learning:*

Libraries have adapted to the digital age by providing access to a range of digital resources, including e-books and educational apps suitable for young children. This integration of technology enhances traditional reading, making the learning experience more engaging and interactive (American Library Association, 2019).¹⁷

6. *Encouragement of Curiosity and Inquiry:*

Librarians often equipped with expertise in child development, guide children in exploring age-appropriate books and resources. This guidance fosters curiosity, encourages questioning, and instills an early understanding of the value of seeking knowledge (American Library Association, 2018).

In summary, libraries emerge as dynamic hubs that not only contribute significantly to early childhood literacy but also lay the groundwork for a lifelong journey of learning. By fostering a love for reading, encouraging exploration, and embracing modern educational approaches, libraries become invaluable partners in shaping intellectually engaged individuals.

Transformation of Lifelong Learning: The Impact of Digital Resources and Technology in Libraries

In the evolving landscape of lifelong learning, libraries are experiencing a transformative shift driven by the integration of digital resources and technology.

This discussion explores how libraries are harnessing digital tools to enhance the learning experience, making education more accessible, engaging, and adaptable.

Scholarly references underpin these insights, emphasizing the significant impact of technology on the evolution of lifelong learning within library settings.

1. *Digital Resources Enriching Learning Materials:*

Libraries have expanded their traditional collections to include a wealth of digital resources, such as e-books, online databases, and multimedia materials. These resources augment traditional learning materials, providing users with diverse and interactive content (American Library Association, 2019).¹⁸

2. *E-learning Platforms and Online Courses:*

Libraries are increasingly offering access to e-learning platforms and online courses, allowing patrons to engage in self-paced learning on a variety of subjects. This digital dimension extends educational opportunities beyond physical library spaces (Association of College & Research Libraries, 2017).¹⁹

3. *Educational Apps and Interactive Tools:*

The integration of educational apps and interactive tools within library services caters to diverse learning styles. These tools enhance user engagement, making the learning experience more dynamic and adaptable to individual preferences (American Library Association, 2019).

4. *Virtual Libraries and Remote Access:*

Technology enables the creation of virtual libraries and facilitates remote access to resources. Users can explore digital collections, participate in virtual events, and access educational materials from the comfort of their homes, expanding the reach of lifelong learning initiatives (Bali & Caines, 2018).²⁰

5. *Digital Literacy Programs:*

Libraries play a crucial role in promoting digital literacy through structured programs. These initiatives empower users with the skills needed to navigate the digital landscape, critically evaluate online information, and leverage technology for continuous learning (Bertot, Real, & Lee, 2014).²¹

6. *Adaptive Learning Platforms:*

Adaptive learning platforms, which personalize learning experiences based on individual progress and preferences, are being integrated into library services. This customization enhances the effectiveness of educational interventions and supports diverse learning needs (McGill, Littig, & Chong, 2015).²²

In conclusion, the integration of digital resources and technology within libraries is revolutionizing the landscape of lifelong learning. By embracing these advancements, libraries are ensuring that education remains dynamic, accessible, and aligned with the evolving needs of a technologically driven society.

Conclusion

In conclusion, libraries stand as indispensable pillars in fostering a culture of lifelong learning, playing a vital role in shaping the intellectual landscape of contemporary society. The multifaceted functions of libraries contribute significantly to encouraging individuals of all ages to embark on a continuous journey of discovery, exploration, and education. In essence, libraries are fundamental partners in the endeavour to encourage lifelong learning. They go beyond being repositories of books; they are dynamic educational spaces that adapt to societal changes, technological advancements, and the diverse learning needs of their communities. Through a combination of traditional and innovative approaches, libraries continue to inspire individuals to embrace a culture of continuous learning. As we navigate the complexities of the 21st century, libraries remain beacons of enlightenment, fostering a society that values knowledge, curiosity, and the pursuit of lifelong learning. The essential function of libraries in today's society is not just to provide information but to ignite the flames of curiosity, guide the quest for knowledge, and ensure that learning becomes a lifelong adventure for every individual.

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Collection Evaluation of a Case Study of the New College Library from 2013-2023

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Abstract

Evaluation is a key part of making sure that a library's collections are useful and good. This research piece gives a full case study of the process of evaluating the library's collection that took place at the New College Library from 2013 to 2023. The goal of the study is to figure out how well collection development methods work, find ways to make them better, and learn more about how the needs and trends of academic libraries are changing. This piece talks about the methods used, how the data was analyzed, what the main results were, and how the collection development practices could be improved.

Keywords: Collection evaluation, library collections, academic libraries, collection growth, data analysis, and trends are some of the words that come to mind

Introduction

As an important part of the college, the New College Library knows how important it is to regularly evaluate its collection. This article aims to explain the process of evaluating the New College Library's collections from 2013 to 2023. It will show how well collection growth strategies work and where they can be improved. This research piece is a detailed case study of how the New College Library evaluated its collection from 2013 to 2023. The study looks at many different parts of collection development, such as the size and growth of the collection, how it is used and how it moves around, how diverse it is, how current and relevant it is, how it is presented, what users think and what their needs are. By looking at these key dimensions, the study hopes to find out how well the collection development methods used during the given time period worked. Collection evaluation is one of the most important ways to figure out how well collection development methods are working, where there are gaps, and how to best use resources. It gives a systematic way to look at the strengths and weaknesses of the existing collection, figure out how current and important it is, and make sure it fits with the institution's goals for education and study.

Library Collection

Library collections are made up of many different kinds of tools that are put together and made available to people who use the library. These collections usually have books, journals, magazines, newspapers, audiovisual materials, electronic tools, and other kinds of information. Libraries, whether they are academic, public, or specialised, try to build collections that meet the needs and interests of the people who use them.

1. *Print Collection:*

Print collections include books, magazines, encyclopaedias, and other printed tools that you can hold in your hands. These collections are often the most important part of a library's collection. They are organised and categorised so that they are easy to find and use.

2. *Digital Collection:*

Digital collections include things like e-books, e-journals, online libraries, and multimedia files. With the rise of digital technologies, libraries have added a lot of digital material to their collections, so people can access information from anywhere.

3. *Special Collections:*

Special collections include things that are rare, unique, or expensive and need special care and storage to keep them in good shape. Some of the things in these collections are manuscripts, archives, historical documents, maps, works of art, and other culture items. Special collections often offer unique ways to do study and give new insights into certain topics or times in history.

4. *Reference Collection:*

Reference collections are made up of resources that are easy to find and get knowledge from right away. These can include encyclopaedias, dictionaries, atlases, bibliographies, directories, and other reference tools. Reference collections are usually kept in certain places in libraries so that people can use them right there.

5. *Periodicals Collection:*

Journals, magazines, and newspapers, both in print and online, are part of a group of periodicals. They offer current information on a wide range of topics and fields, giving users access to the latest study, news, and analysis. Libraries often subscribe to a wide range of magazines and newspapers to meet the needs of people with different hobbies and academic goals.

6. *Audiovisual Collection:*

There are DVDs, CDs, audiobooks, and other kinds of multimedia tools in audiovisual collections. These collections give users access to material in different formats that can be used to learn, teach, or have fun.

7. *Specialized Collections:*

Specialised collections focus on certain topics, fields of study, or types of users. These collections are made for people who use specialised libraries, like medical libraries, law libraries, or libraries that serve certain businesses or professions.

8. *Digital Archives:*

Digital archives comprise digitized historical documents, photographs, audio recordings, and other materials of cultural and historical significance. These collections provide access to primary sources and valuable research materials for scholars and researchers.

Libraries use policies and strategies for collection growth to make sure that they buy, organise, and take care of their collections. Choosing, evaluating, and getting rid of books are all important parts of collection growth. They make sure that the books in a library are still useful, up-to-date, and meet the needs of their users. Overall, library collections are useful tools that help people learn, do study, and make new discoveries. They meet the educational and informational needs of library users in many different areas.

Need For Academic Collection Development

Academic collection growth is very important for academic libraries because it directly helps academic institutions with their teaching, learning, and research. Here are a few of the most important reasons why academic collection growth is important. Helping people get smarter and keep learning throughout their lives. Academic libraries are places where people can learn and grow intellectually throughout their lives. Academic libraries try to meet the wide range of interests of their users by offering a wide range of materials. Through collection development, libraries can offer materials that spark intellectual curiosity, encourage learning across disciplines, and encourage students, teachers, and researchers to love learning for the rest of their lives.

Helping with distance education and learning from afar. Since online and distance learning are becoming more popular, college libraries must build collections that meet the needs of students who are not in the same place as them. This includes getting electronic tools like e-books and

online databases that students and teachers can use from anywhere. By putting money into digital tools, academic libraries improve access and help for students no matter where they are. Trying to meet the needs of a wide range of users. People use academic schools for different reasons and have different information needs. By adding to their collections, libraries can meet the needs of students and teachers from different fields and accommodate different research methods and areas of study. Academic libraries can make sure that their collections are complete, inclusive, and representative of the varied academic community they serve if they talk to users and try to figure out what they need.

Review of Literature

Methods and approaches for evaluating a collection: Different methods and techniques to evaluating collections have been looked at in past studies. These include both quantitative and qualitative methods, such as user surveys, focus groups, and expert evaluations. Quantitative methods include collection size, circulation figures, and analysis of usage data. Scholars have talked about the pros and cons of different evaluation methods, as well as how they can be used in university libraries.

User Needs and the Changing Information Landscape: Researchers have looked into how the changing information needs of library users affect the review of collections. The review will look at studies that look at user preferences, how people look for information, and how changes in technology affect collection growth. It will also look at how college libraries have changed how they evaluate their collections to meet the needs of their users as they change.

Best Practises and Case Studies: The literature review will look at case studies and the best ways that university libraries around the world have evaluated their collections. These studies give us important information about what works, what doesn't, and what we've learned about reviewing and improving library collections. By looking at these case studies, you can learn more about how to evaluate collections in a good way.

Budget: The choice of books is affected by how much money you have. Librarians have to figure out how to grow their collections without spending more money than they have. Strategies could include putting the most important resources at the top of the list, taking advantage of group buying deals, looking into open access options, and asking for donations or grants to add to the budget.

Assessing and getting rid of books on an ongoing basis: Choosing books is an ongoing process that includes evaluating the strengths and weaknesses of the collection on a regular basis. By evaluating their collections and looking at how people use them, libraries can find places to improve, materials that are out of date, and subjects that aren't well covered. Weeding, or getting rid of old or unused items, helps the collection to be constantly improved and made better.

Objectives of the Study

To measure the growth and size of the library's collection: The goal of the study is to look at how the collection grew and how big it got over the time period. This includes looking at how the library gets new materials, adds to its current collections, and changes the size of its collections so it can meet the changing needs of its users.

To figure out how often the collection is used and how many times it is checked out, the study looks at usage and circulation data. This includes looking at how often people borrow things, how

popular different tools are, and where there is a lot of demand. The goal of the study is to figure out how relevant and famous different pieces of the collection are by looking at how they are used. To figure out how diverse and complete the collection is. The goal of the study is to figure out how diverse and complete the library's collection is across different subject areas, fields, and forms. It tries to find out if the collection includes a lot of different points of view, if it helps the academic programmes that the school offers, and if it has enough resources to meet the information needs of the user community.

To figure out how current and useful the collection is, the study's goal is to figure out how current and useful the library's collection is. This means looking at when the materials were published, deciding if they include recent papers and new research, and figuring out if the collection reflects current trends and developments in different fields.

To figure out how well collection development strategies work. The goal of the study is to figure out how well the New College Library's collection development strategies work. This includes looking at how well collection development policies match up with how the collection is actually put together, figuring out how budget limits affect collection development, and figuring out where collection development practises could be improved or changed.

To get feedback from users and figure out what they need: The goal of the study is to get feedback from users and figure out what they need and like. This could mean doing polls, interviews, or focus groups to find out what users think, how satisfied they are, and how they think the collection could be improved. The goal of the study is to make sure that the collection meets the information needs of its main stakeholders by taking into account user views.

To make suggestions for improving the collection. Based on the results of the study, the goal of the research is to make suggestions for improving the collection at the New College Library. These ideas might include ways to expand the collection, add more resources to certain subject areas, update old materials, get the most out of the budget, and add new formats and sources of information.

Motivation for the Study

Enhancing Collection Development Practices: The study aims to contribute to the improvement of collection development practices at the New College Library. By conducting a comprehensive evaluation of the collection, identifying its strengths and weaknesses, and providing recommendations for enhancement, the study seeks to support informed decision-making and strategic planning for future collection development efforts.

Meeting User Needs and Expectations: Understanding and meeting the information needs of library users is a primary goal for academic libraries. By evaluating the collection and gathering user feedback, the study aims to align the library's collection with the evolving needs and expectations of its user community. It strives to ensure that the library's resources are relevant, current, and comprehensive, thereby enhancing the user experience and supporting academic success.

Optimizing Resource Allocation: Collection evaluation provides insights into the effectiveness and efficiency of resource allocation within the library. By assessing the usage patterns, relevance, and currency of the collection, the study aims to help optimize budget allocation, ensure cost-effective acquisitions, and streamline collection development strategies. It provides valuable information for decision-makers to make informed choices about resource allocation and investment.

Assessing Collection Development Policies: The study seeks to evaluate the effectiveness of the collection development policies in place at the New College Library. By examining the alignment between the policies and the actual composition of the collection, the study aims to identify areas for improvement, ensure policy relevance, and address any gaps or challenges in meeting the library's mission and goals.

Contributing to the Field of Collection Evaluation: The study aims to contribute to the existing body of knowledge and research on collection evaluation in academic libraries. By conducting a focused case study, the research aims to generate insights, best practices, and lessons learned that can benefit other academic libraries facing similar challenges. It strives to contribute to the professional discourse and assist in advancing the field of collection evaluation.

Continuous Improvement and Accountability: The study's motivation lies in fostering a culture of continuous improvement and accountability within the New College Library. By conducting a systematic and evidence-based evaluation of the collection, the study encourages the library to reflect on its practices, identify areas for growth, and engage in ongoing assessment to better serve its user community. It aims to ensure that the library remains responsive, adaptable, and committed to providing high-quality resources and services.

Analysis of the Library Collection

The college library has been actively acquiring various types of subject books, language books, and other literature books over the past five decades. The annual financial expenditure for book acquisitions from 2013 to 2023 is presented in Table I.

TABLE I ANNUAL LIBRARY BUDGET FOR PURCHASE OF BOOKS BY THE MANAGEMENT

S. No.	Year	Amount	Number of Books
1	2013-14	22,000	330
2	2015-16	24,000	370
3	2017-18	30,000	430
4	2019-20	35,500	470
5	2021-2022	42,000	510
Total		1,53,500	2,110

Conclusion

The New College Library from 2013 to 2023 gives important information about how the library's collection will grow, change, and work. By addressing the study's goals, we've learned a lot about how the library builds its collection and how well it can meet the information needs of its user group. Through a study of the library's collection size and growth, subject distribution, format diversity, usage patterns, newness, diversity and inclusion, and collection development strategies, we have found its strengths and areas where it could improve. The study's results show how important it is to match the collection to users' needs, make the best use of resources, and keep up with new research and trends in different fields.

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Evaluation of User Satisfaction with Best Practices in Academic Library

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Abstract

The studies on user satisfaction and best practices in college libraries are continuous process with the impact of ICT and use of electronic on line resources and online repositories. The main aim of this paper is to know the importance of best practices to the user community in academic libraries. Knowledge society which is basically an ICT driven society aims at providing access to knowledge, its preservation and dissemination to the user community, it is equally important to recognize the value and importance of libraries, library services and best practices to supplement a dynamic and effective educational system at par with global standards. Library and information system and services in a knowledge society not only provide easy access to knowledge resource's but create an appropriate learning environment (24x7) with huge variety of learning resources either available at an affordable cost or no cost. Library is the important support of all academic activities of any education institutions. This paper highlights the how the best practices support the user community in academic libraries for enhancing the quality of teaching learning procedure and also suggests the new initiative and practices should be followed.

Findings: This study explains the terms of information about the user satisfaction, information needs of the user and Innovative Best Practices and Digital best Practices.

Introduction

In the user centered library quality service and user satisfaction are the primary goals. User Satisfaction and perception is a psychological concept that involves the feelings of well-being and pleasure that results from obtaining what one hopes for and expects from an appealing and or service (WTO) 1985. Users satisfaction can also be defined as satisfaction based on an outcome or a process. This study found that there is a positive. This study found that there is a positive relationship the user satisfaction and the duration of the relationship. This study also suggested that organizations should focus on users in the early stages of relationship, because customers considered prior collective satisfaction heavily and the duration of the relationship depended on the satisfactory level.

Best practices is a method or technique that has been generally accepted as superior to any alternatives because it produces results that are superior to those achieved by other means or because it has become a standard way of doing things. Information plays important role in personal development of users. Libraries plays pivotal role in providing users access to this information through printed material and internet services. Today we are living in ICT environment; we should adopt the external and internal environment of ICT. Hence the very life of a library is the personal service given to the people. User satisfaction is an ultimate objective of whole librarianship.

The best practice adopted in academic institute's bridge the gap between library collection & user community for maximum utilization of the resources. Library adopted various best practice in its

administration, Management collected works & services, extent of the use of services and use of technology.



Fig. 1 User Satisfaction

User Satisfaction

Customer Satisfaction is principally the judgment a consumer makes in relation to his/her sense of completion related to his/her choice about the procure and use of specific products and services.

Customer Satisfaction information is defined as a measurement that determines how happy customers are with library, services, and capabilities customer. Customer satisfaction information, including surveys and ratings, can help a library to decide how to best improve or changes and services.

Importance of User Satisfaction

The users Satisfaction are main aim of library services and it is key success of any library. The services of librarian are also making good customer services and information preferences to sure that the information needs of users are suitably complete within time. Users Satisfaction with library information resources and services is a way in which user's judge the capability of the library information resources and services render to them and also their opportunity are provided to them.

Customer Satisfaction is important because it illustrates whether your customer base likes what you're doing. Research shows that high satisfaction lead to greater customer retention, higher life span value, and a stronger brand reputation.

Library User's

The term include various terms such as patrons, clients, information users, information seekers, consumers; readers etc, these terms can be used interchangeably because they all apply to those seeking the services of a library.

S.R. Ranganathan Perspective: User Satisfaction

The law of library science put forth by Dr. S.R. Ranganathan, Father of Indian library science, lay emphasis on the importance of books and readers significance. Due to the information explosion in the modern world, people are craving knowledge, and libraries worldwide face tough challenge to meet their needs. The library, as an organization, is undergo a multi-dimensional change. Only by satisfying the needs of its users, a library can justify its existence. All the services provided by the library are for the benefit of the users. The past trend of book approach has changed in to user oriented one. User is one of the essential components of an information system intended to satisfy the information needs. Overall, several studies conducted by researchers show the exact need of the readers. Library professional spend considerable time studying the users. Moreover, user satisfaction is the main objective of libraries and library professionals. In the academic library, there are various types of users with different expectations. New technologies, databases, and more innovative systems for access information have made the library more complicated and challenging for library professionals and users similar. The abundance of resources available and

the complexity of evaluate these resources also create problems for users. The inability to quickly identify the specific use of libraries services because of the new technology and the difficulty to access information sources can all contribute to user dissatisfaction among academic library users. This study will help library authorities know users satisfaction with the presented library services and physical facilities.

Types of Users Satisfaction

1. Users Satisfaction with library services
2. Users Satisfaction with Library resources
3. Users Satisfaction with staff conduct
4. Contribution of the library to the academics of users

Levels of User Satisfaction

1. Not fulfilled
2. faintly Satisfied
3. fulfilled
4. Very fulfilled
5. tremendously Satisfied

Prioritizing user needs through research and testing ensures we meet their expectations. Applying responsive design and feedback loops helps us illiterate and improves continuously. By adhering to UX principles, we foster trust, satisfaction, and engagement, ultimately leading to a successful product or service

How to Increase Customer Satisfaction

1. Experience the Customer expedition
2. Listen to your clientele
3. Offer practical multi –channel support
4. Act on customer response
5. Personalize the user knowledge

User Satisfaction as an Indicator of Library Value

According to Hernon and Altman (2010), “satisfaction is an emotional reaction, the degree of contentment or discontentment with a specific transaction or service encounter”. If the service performance falls below the users expectations, they become dissatisfied. However, if service performance matches expectations, users become satisfied (Bua and Yawe, 2014).Therefore, satisfaction can be personal and it is the degree at which users are pleased with the library services, with staff attitudes, and the library environment in fulfilling their needs and expectations. Giese and Cote (2000) explained that users respond while a service is being delivered or after service delivery is indicative of user satisfaction. It can therefore be inferred that satisfaction is an individual response to a service and it can be subjective depending on the time and needs of a user. It may or may not directly relate to the performance of the library. In service organizations, satisfaction plays a major role, and according to Alasandi and Bankapur (2014), it is the positive feeling created after receiving a service that makes users desire to use the service again. In view of this, all libraries rtive to satisfy the information needs and expectations of users (Warraich and Ameen, 2010. According to Bua and Yawe (2014), the extent to which an academic library services satisfy its users defines how effective or efficient the library is. For the purpose of this study, user’s satisfaction shall mean the fulfillment of user’s expectations and needs as they use the library services and resources for learning, teaching, research and other purposes.

Drives of Customer Satisfaction

Three major factors that affect modern customer satisfaction are customer understanding, service, and technology. By tapping into these factors, you can provide positive, consistent customer experiences and create real customer loyalty.

Best Practices Meaning and Definition

According to Oxford Advanced Learners Dictionary Best Practices is defined as a quality of high standard, Excellence, highly improved outstanding par excellence service. It means way of doing something that is usual or expected way in particular organization or situation, guidelines for good practices. In this process of emergent best practices we can take action rather than good ideas to improve our skills

ODOLIS (REITZ, 2004) defined 'best practices as follows. "In the application of theory to real-life situation, procedure that, when properly, applied consistently yield superior results and are therefore used as reference points in evaluation of the effectiveness of alternative methods of accomplishing the same task. Best practices are identified by examining empirical evidence of success".

Need of Best Practices

Libraries and other non- profit organizations have recently become aware of the need to market their products and services. Library and information products and services are now being accepted as merchandise that can be sold, exchanged, lent and transmit. As we know the best practices carry out a special role in user satisfaction to provide the needs of the specific group of users.

Importance of Inclusive and Innovative Best Practices to Users

The best practices help for improving quality of library services. The best practices adopted in academic institute should bridge the gap between library collection & user community for maximum exploitation of the resources. A customer is the most important in library information centre. They will not dependant on us. We are needy on him. He is not an disruption in our work. He is the reason of it. He is not a stranger on our commerce. He is a part of it. We are not doing him or favor by serving him. He is doing a favor by giving us an chance to do so.

The importance of the customer of all the business activities rightly focused by the Father of the Nation Mahatma Gandhi, lays due emphasis on the pivotal position on the consumer occupies in the business world. Ideally the customer is the king unrounded monarch observe come to the libraries with varied expectations. Since it is personal to an individual experiences with a specific encounter or series of experience. pleasure may or may not be relaxed to the presentation of the library. One user may be satisfied while another is not with the same library service.

Libraries are stage to lifelong learning for the user community. The educational library comes with conclusion of ICT and embracing cutting edge technology in a range of areas, India has recognized itself as a global leader. The nation as a whole is now digitally empowered and transitioning to a knowledge economy. The gate keeping of these services and meeting of user request require qualified and experienced professionals to keep up with the constant speed of technical changes.

The usage and integration of technology has advanced pedagogical practices and technology has been established as an autonomous entity inside the NEP to provide a platform for two way communication on the use and deployment of technology to improve the current teaching and t=learning techniques.

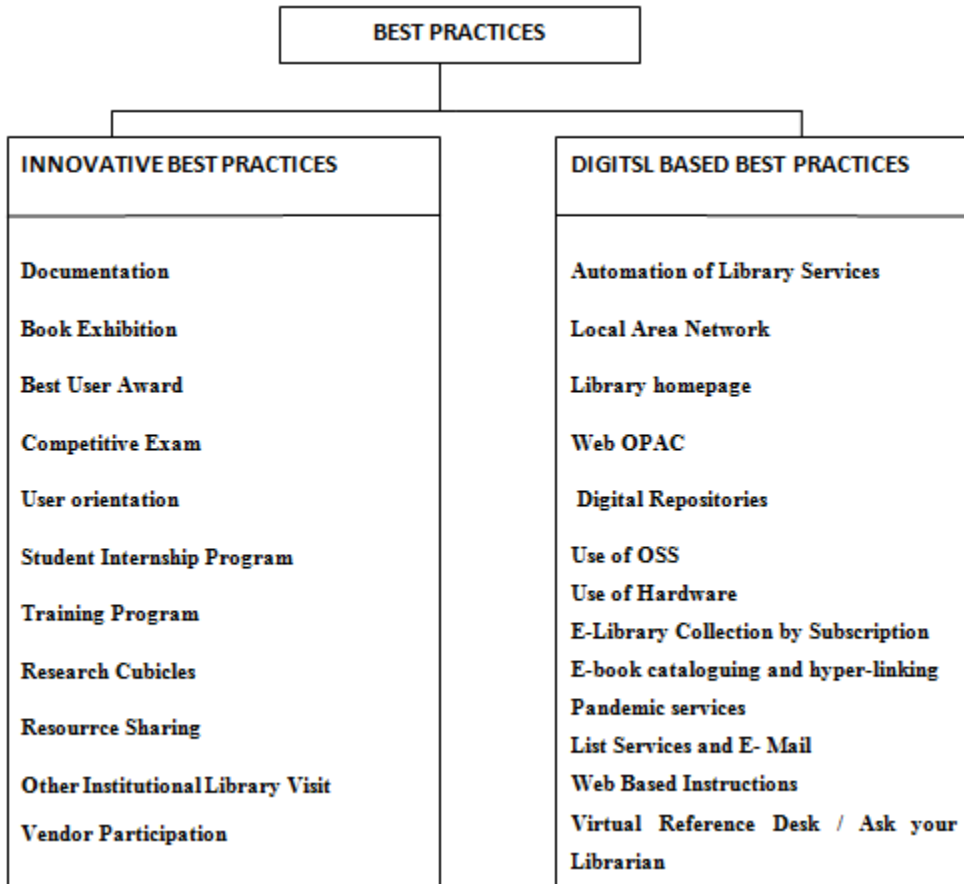


Fig. 2 Library Resources and Services

This figure shows the way of providing best practices in the concept of user community by giving recognition to the relationships among the concepts of information needs of the users. Best Practices in easy phrase known as the practices which enhances the existing function and activities of any system. Use of technology in the marketing of information products and services is always made good results. All higher education institutions are now in the process of digitization an all their services especially libraries. Disseminating information through library website in a networked atmosphere is enabling possible due to skill and this have to be adopted in our academic libraries. So the best practices playing major role in the development of library management system.

Role of Librarian in Best Practices

1. Familiarize him with the services of the best practices.
2. Make the library change management and quality management.
3. The librarian handles both the internal as well as external change
4. Ability to deal with people in the groups, one that are part of the change and those that are bringing about the change
5. Facilitate and promoting reading clubs.
6. Developing programs for library user of all ages and background.
7. Managing access to electronic information resources.

8. Answering received reference questions via telephone, postal, mail, email, fax, and chat.
9. The librarian has developed numerous programs to fulfill user requirements.
10. The increasing prospect of users has challenged libraries to improve their quality of services.
11. By adopting excellence management, the library image and service quality can improve, and librarians can increase productivity while focusing on the customers' needs.
12. The librarians are aware of more pressure to fully develop available resources.

NAAC Parameters for Best Practices

Best Practices in library and NAAC for Best Practices in Academic Libraries” (NAAC, 2007) says Best Practices may be innovative and be a philosophy, policy, strategy, program, process or practice that solves a problem or create new opportunities and create positive impact on organizations. For college libraries NAAC has developed the following set of best practices for college libraries.

1. automation of library with standard software,
2. Inclusion of adequate information about the library in the college /university prospectus,
3. Compiling student/ teacher attendance information and locating the same on the notice board and clippings files periodically
4. Career employment information services
5. Information literacy programmes
6. Suggestion Box
7. Displaying New arrivals
8. Conduct Book Fair
9. Organizing book talks
10. Instituting Annual Best User award for students
11. Organizing Competitions annually
12. Conducting user survey periodically S.D (VYAS 2009) and some library best practices in this article these are making of a path finder to the library
13. Compiling a list of Current Serials/ Catalogue of journals
14. Updating and maintaining library website.
15. Maintaining useful statistics regarding the use of the library and displaying them on the library walls
16. Compiling checklists on different subjects/topics as a part of documentation service
17. Distribution of useful contributions

Out Comes of Best Practices

A best practice is a standard or set guideline that is known to produce good outcomes if followed. Best practices are related to how to carry out a task or configure something. Strict best practice guidelines may be set by a governing body or may be internal to an organization. To cope with the timely challenges, every library has to identify and develop its own best practices to enhance the collection development process, services dissemination and use of the library as a whole. Developing best practices, analyzing and revising them at a regular period will lead to continuous improvement in overall performance of the library and the whole institution. Apart from the regular services, it is necessary to provide new and improved services as and when needed. Today libraries are not just issue or return the books but have plenty of information sources both in print and online sources to support learning, teaching, research and extension activities of the user community.

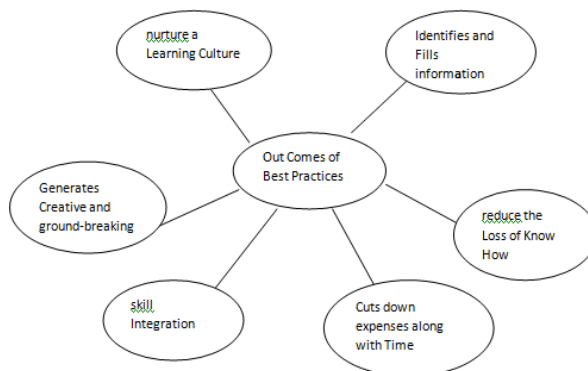


Fig. 3 Out Comes of Best Practices

The best practices assist in developing the ability of students and staff. ICT enabled best practices helps in preserve the coursewares and less manual work load of the faculty and make them available to the student community under system environment. Best practices lead and make the user lifelong learning and research to avoid individuals with disabilities losing the knowledge, skills, and experience necessary to lead pleasant life in society.

The future of the library depends on its services. The implementation of innovative best practices provide good learning environment to flourish the library. Education is basic right of every person of the country and whole world the library provides quality service to the user community and also transforming vibrant knowledge to the society.

User is the most important component of library activities or information business. There are various alternative characteristics of users determine the user satisfaction of the library services such as their social background, viz., their racial, ethnic, religious, cultural, social, economic, demographic, physical, mental statuses among others affect their satisfied level.

Ultimate task or function of any library product or service is to satisfy the ever- changing and ever-growing information needs of the users. If LIS professionals know the attributes of the users, they can plan product and services in better way.

A few examples of Experience of Best Practices in Academic Research Libraries

Dr. S.R. Ranganathan writes that he brought to the notice of Sir. C.V. Raman Effect which was published I a foreign journal. This incident happened in Madras University Library in early thirties. Sir C.V.Raman received the Nobel Prize for his work on the scattering of light which s called Raman scattering of lighting or Raman Effect.

Mr.T.N. Chaturvedi, former Governor of Karnataka narrated the experience about when he approached Prof. D,N. Marshall, Librarian Bombay University for book from his Library. Prof. Marsha; sent him the book immediately without waiting whether his library rules permitted him or not Mr. T.N Chaturvedi wrote to many university libraries. He received negative reply from them saying that they have the book in the library but their rules do not permit them to send the book.

Conclusion

User Satisfaction and Best Practices plays significant role in library. The library has to support students and staff with innovative best practices if awarding Best User award, motivational means of promoting reading habits, conducting exhibitions on various occasion like librarians day

teachers day cultural day for students. Best Practices in simple term known as the practice which enhances the existing function and actives of any system. All higher education institutions are now in the process of digitization in all their services. Disseminate information through library website in a networked environment is made possible due to technology and this has to e adopted in our academic libraries. So the innovative best practices and digital based practices of the library have created a complex and truthful images in the mind of students and staff and Research scholar of the Academic Institution.

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An Analysis of Institutional Performance and Research Productivity of the Indian Institutes of Management (IIM's) With Special Reference to IRINS and NIRF

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Abstract

This study presented a detailed analysis of the Indian Institutes of Management (IIMs) using data from the National Institutional Ranking Framework (NIRF) and the Indian Research Information Network System (IRINS). The research evaluates NIRF rankings, key performance parameters, faculty information, and research productivity across various IIMs. The findings showcase the top-performing institutions, their strengths, and departmental contributions. Citation analyses on Scopus and Crossref platforms provide insights into the research impact of each IIM. The study serves as a valuable resource for stakeholders interested in understanding and comparing the academic and research excellence of IIMs, aiding prospective students, researchers, and policymakers in informed decision-making.

Keywords: National Institutional Ranking Framework (NIRF), Indian Research Information Network System (IRINS), Indian Institutes of Management (IIMs), and INFLIBNET

Introduction

The Indian Management Institute (IIM) is a group of well-known management institutes in India that offered the highest levels of business and management education. The Institute has been established to promote excellence in management education and is recognized worldwide for its rigorous academic curriculum, experienced faculty, and strong industry links. The first IIM, Calcutta, was established in 1961 and since then several other IIMs have been established throughout the country. Twenty institutes are available, including Ahmadabad, Bangalore, Lucknow and Kozhikode. Each IIM operates autonomously, but cooperates at different levels to maintain high standards and share resources.

The process of framing the National Institutional Ranking Framework (NIRF) began in 2014 to suggest a reliable, transparent, and authentic National Framework for performance measurement and ranking of institutions of higher education, which was launched by MHRD on September 29, 2015, after intense deliberations at various levels. These parameters are set under five main areas: "Teaching, Learning, and Resources," "Research and Professional Practices," "Graduation Outcomes," "Outreach and Inclusivity," and "Perception". It also helps parents and students to know about the institution's standards when selecting an institution to seek admission. Furthermore, NIRF promotes the top performing institutions to have a brand image in the public and is marketing to gain more admission.

IRINS is a web-based information management service (RIM) developed by INFLIBNET Center, in collaboration with Punjab Central University. The portal facilitates the collection, administration and presentation of academic communication activities of academic, research and development organizations and faculty members, scientists and provides an opportunity to create a scientific network. IRINS is free software that contributes to the Indian academic and research and

development community by providing valuable tools for managing and presenting academic activities.

Review of Literature

Shivaram BS, Uma M, and Satya Ranjan Sahu (2022) evaluate the research performance of the top-six NIRF-ranked engineering institutions in Karnataka. The average citations of all the institutions increased, and MS Ramaiah Institute of Technology (MSRIT) recorded the highest 1.7 citations per paper, followed by Visvesvaraya Technological University (VTU) with 1.69 citations per paper. The decreasing trend of relative growth and increased doubling time reveal that the institutes are reaching their saturation point in their publication productivity. Jeyapragash and Muthuraj (2021) analysed the NIRF-ranked IITs, faculty members and their publications, and departments and their publications with citations and impact.

It is found that "Indian Institute of Technology Madras" has the highest 85.31 score received from NIRF. "Prof. Prafulla Kumar Behera", Professor (Indian Institute of Technology Madras), has published 1255 (16.58%) articles with a 104 h-index, and he has received 40931 (18.96%) citations from Crossref and 56029 (20.04%) citations from Scopus. Chaman Sab, Dharani Kumar and Biradar (2019) have discussed the IRINS, the web-based Research Information Management (RIM) service offered by the Centre of Information and Library Networks (INFLIBNET).

Developed in cooperation with the University Grants Committee in Gandhinagar, Gujarat, IRINS has launched "VIDWAN", a prominent database of research profiles of scientists, researchers, and faculty from leading academic institutions and research institutions throughout India. VIDWAN is a leading platform that enables academic organizations and research and development organizations (R&D), as well as individual professors and scientists to collect, organize and present academic communications activities. It facilitates the creation of a scientific network, allowing researchers to highlight their research contributions and academic efforts. IRINS is a free software that contributes to the Indian academic and research and development community by providing valuable tools for managing and presenting academic activities.

Objectives of the Study

1. To identify the NIRF ranked Indian Institute of Management (IIM's) institutions
2. To analyze the Indian Institute of Management's NIRF rank position with RP scores, TLR scores, Graduation Outcome Score, Outreach and Inclusivity Scores, Perception Score
3. To find out the Number faculty members profiles and Publications of IIM's.
4. To find out the Resource Impact from various databases.
5. To identify the contributions of top department of individual institution and its h-index.

Methodology

The data were collected from National Institutional Ranking Framework (NIRF) home page (<https://www.nirfindia.org/Home>) and Indian Research Information Network System (IRINS) website (<https://irins.org/irins/>) as on 20th January 2024. It is found that 20 Indian Institute of Management institutes have got score in NIRF 2023. The study is also aimed to analyze NIRF ranked IIM institutes faculty members publications, Resource Impacts from various databases. The Data were analyzed using simple calculations.

Data Analysis and Interpretation

NIRF Ranked Indian Institute of Management (IIM's) Institutions

The table I contained information on various Indian Management Institutes (IIMs), including their name, location, national institutional classification framework (NIRF) and NIRF ranking. The

highest ranking institution is the Indian Management Institute Ahmedabad in Gujarat, which received a score of 83.20 NIRF. The Indian Institute of Management Bangalore in Karnataka, with a score of 80.89, secured second place. This list extends to other IIMs in different states, showing their respective NIRF points and rankings and providing a comprehensive overview of the comparative performance of these well-known management institutions in India.

TABLE I NIRF SCORES AND RANKS OF INDIAN INSTITUTES OF MANAGEMENT (IIMS)

S. No.	Name of the Institute	State	NIRF Score	NIRF Rank
1	Indian Institute of Management Ahmedabad	Gujarat	83.20	1
2	Indian Institute of Management Bangalore	Karnataka	80.89	2
3	Indian Institute of Management Kozhikode	Kerala	76.48	3
4	Indian Institute of Management Calcutta	West Bengal	75.53	4
5	Indian Institute of Management Lucknow	Uttar Pradesh	74.11	6
6	Indian Institute of Management Indore	Madhya Pradesh	71.95	8
7	Indian Institute of Management Raipur	Chhattisgarh	66.18	11
8	Indian Institute of Management Rohtak	Haryana	65.88	12
9	Indian Institute of Management Udaipur	Rajasthan	62.78	16
10	Indian Institute of Management Kashipur	Uttarakhand	61.07	19
11	Indian Institute of Management Tiruchirappalli	Tamil Nadu	60.83	22
12	Indian Institute of Management Ranchi	Jharkhand	59.99	24
13	Indian Institute of Management Shilong	Meghalaya	59.12	26
14	Indian Institute of Management Visakhapatnam	Andhra Pradesh	57.57	29
15	Indian Institute of Management Jammu	Jammu & Kashmir	54.17	41
16	Indian Institute of Management Nagpur	Maharashtra	53.41	43
17	Indian Institute of Management Amritsar	Punjab	51.30	51
18	Indian Institute of Management Bodh Gaya	Bihar	51.28	53
19	Indian Institute of Management Sambalpur	Odisha	50.90	58
20	Indian Institute of Management Sirmaur	Himachal Pradesh	43.26	98

Performance Assessment of Indian Institutes of Management (IIMs) Based on NIRF Key Parameters

The table II showed the detailed analysis of the various Indian Institutes Management (IIMs) on different parameters, including teaching, learning and resources (TLR), research and professional practice (RP), graduation results (GO), outreach and inclusion (OI) and perception (PR), each measuring 100. The Ahmedabad Indian Institute of Management ranks first in all parameters, especially in education, learning and resources, outreach and inclusion.

The Indian Institute of Management in Bangalore followed closely, achieving perfection in professional practice and high scores in other categories. The table II provides a complete overview of IIM's strengths and focus areas and provides useful insight into its academic and research performance.

TABLE II PERFORMANCE ASSESSMENT OF INDIAN INSTITUTES OF MANAGEMENT (IIMS) BASED ON NIRF KEY PARAMETERS

S.No.	Name of the Institution	TLR (100)	RP (100)	GO (100)	OI (100)	PR (100)
1	Indian Institute of Management Ahmedabad	92.55	63.45	99.14	69.66	96.14
2	Indian Institute of Management Bangalore	90.38	55.61	99.11	72.83	100.00
3	Indian Institute of Management Kozhikode	84.83	56.10	94.92	77.03	75.16
4	Indian Institute of Management Calcutta	82.29	51.23	99.03	70.78	85.81
5	Indian Institute of Management Lucknow	83.76	49.71	96.86	69.81	77.24
6	Indian Institute of Management Indore	83.00	53.53	92.84	67.79	56.36
7	Indian Institute of Management Raipur	82.65	44.62	90.78	78.25	20.14
8	Indian Institute of Management Rohtak	82.41	40.44	89.28	78.00	33.66
9	Indian Institute of Management Udaipur	81.98	35.83	87.99	72.84	25.57
10	Indian Institute of Management Kashipur	72.15	36.80	88.09	73.75	33.92
11	Indian Institute of Management Tiruchirappalli	70.04	29.06	87.97	68.49	66.57
12	Indian Institute of Management Ranchi	68.06	37.05	90.10	72.92	31.50
13	Indian Institute of Management Shilong	76.33	23.37	93.60	76.32	28.64
14	Indian Institute of Management Visakhapatnam	76.42	21.75	85.84	69.46	39.97
15	Indian Institute of Management Jammu	73.97	10.76	85.40	74.75	41.96
16	Indian Institute of Management Nagpur	69.25	15.92	86.31	65.69	40.20
17	Indian Institute of Management Amritsar	64.44	19.58	82.47	70.51	25.57
18	Indian Institute of Management Bodh Gaya	68.45	11.99	85.46	71.70	28.94
19	Indian Institute of Management Sambalpur	70.41	14.09	78.38	74.76	23.95
20	Indian Institute of Management Sirmaur	45.45	15.22	83.47	68.21	15.53

Research Productivity and Faculty Information of Indian Institutes of Management (IIMs)

The table III provided information on various Indian Institutes of Management (IIMs), including their respective IRINS URLs, the number of faculty members, and the count of scholarly resources. IIM Calcutta leads with 1827 scholarly resources, followed by IIM Bangalore with 1751. The total number of faculty members across all institutes is 1042, contributing to a cumulative scholarly resource count of 11450. This data showcases the academic productivity and research output of each IIM, providing valuable insights into the scholarly contributions of these institutions.

Citation Analysis of Indian Institutes of Management (IIMs) on Scopus and Cross ref

The table IV provided a comprehensive overview of citation metrics for various Indian Institutes of Management (IIMs) based on Scopus and Cross ref citations. The data includes the number of citations, the percentage contribution of each institute to the total, and their respective percentages in Scopus and Cross ref databases. Indian Institute of Management Bangalore leads with the highest number of Scopus citations (31,633) and Cross ref citations (14,810), contributing significantly to the total citation count.

Indian Institute of Management Calcutta follows closely, particularly excelling in Cross ref citations (24,945). The total citations across all IIMs amount to 132,379, with Scopus and Cross ref each constituting 100% of the total citations. This data provides valuable insights into the research impact and visibility of each institute in the academic community.

TABLE III RESEARCH PRODUCTIVITY AND FACULTY INFORMATION OF INDIAN INSTITUTES OF MANAGEMENT (IIMS)

S. No.	Name of the Institute	IRINS URL	No. of Faculty	No. of Scholarly Resource
1	IIM Calcutta	https://iimcal.irins.org/	79	1827
2	IIM Bangalore	https://iimb.irins.org/	102	1751
3	IIM Ahmedabad	https://temp.irins.org/	107	1501
4	IIM Lucknow	https://iiml.irins.org/	82	1229
5	IIM Kozhikode	https://iimk.irins.org/	89	731
6	IIM Indore	https://iimidr.irins.org/	103	661
7	IIM Ranchi	https://iimranchi.irins.org/	59	617
8	IIM Raipur	https://iimraipur.irins.org/	30	457
9	IIM Gaya	https://iimbg.irins.org/	48	347
10	IIM Nagpur	https://iimnagpur.irins.org/	36	313
11	IIM Rohtak	https://iimrohtak.irins.org/	24	312
12	IIM Kashipur	https://iimkashipur.irins.org/	32	274
13	IIM Tiruchirappalli	https://iimtrichy.irins.org/	28	269
14	IIM Sirmaur	https://iimsirmaur.irins.org/	36	260
15	IIM Shilong	https://iimshillong.irins.org/	33	241
16	IIM Udaipur	https://iimu.irins.org/	51	216
17	IIM Jammu	https://iimj.irins.org/	45	197
18	IIM Visakhapatnam	https://iimv.irins.org/	29	126
19	IIM Sambalpur	https://iimsambalpur.irins.org/	11	73
20	IIM Amritsar	https://iimamritsar.irins.org/	18	48
Total			1042	11450

Research Performance of Departments in Indian Institutes of Management (IIMs)

The table V provided a comparative analysis of research metrics for various departments across Indian Institutes of Management (IIMs). The "Department of Marketing" at IIM Bangalore leads in publications and Scopus citations, while the "Department of Management Information Systems" at IIM Calcutta excels in Crossref citations.

Collectively, the departments contribute to 3,267 publications, an H-Index of 413, 53,976 Scopus citations, and 28,046 Crossref citations, showcasing their research productivity and impact.

TABLE IV CITATION ANALYSIS OF INDIAN INSTITUTES OF MANAGEMENT (IIMS) ON SCOPUS AND CROSS REF

S. No	Name of the Institute	Scopus Citations	%	Crossref Citations	%
1	Indian Institute of Management Ahmedabad	17072	12.90	10523	11.49
2	Indian Institute of Management Bangalore	31633	23.90	14810	16.18
3	Indian Institute of Management Kozhikode	7297	5.51	3247	3.55
4	Indian Institute of Management Calcutta	16291	12.31	24945	27.25

5	Indian Institute of Management Lucknow	14732	11.13	10176	11.11
6	Indian Institute of Management Indore	3915	2.96	1789	1.95
7	Indian Institute of Management Raipur	5487	4.14	3525	3.85
8	Indian Institute of Management Rohtak	3267	2.47	1812	1.98
9	Indian Institute of Management Udaipur	2517	1.90	835	0.91
10	Indian Institute of Management Kashipur	2622	1.98	1172	1.28
11	Indian Institute of Management Tiruchirappalli	3583	2.71	3327	3.63
12	Indian Institute of Management Ranchi	10921	8.25	3368	3.68
13	Indian Institute of Management Shilong	1697	1.28	964	1.05
14	Indian Institute of Management Visakhapatnam	1728	1.31	1030	1.12
15	Indian Institute of Management Jammu	2105	1.59	2368	2.59
16	Indian Institute of Management Nagpur	1871	1.41	2236	2.44
17	Indian Institute of Management Amritsar	1170	0.88	797	0.87
18	Indian Institute of Management Bodh Gaya	1932	1.46	2349	2.57
19	Indian Institute of Management Sambalpur	925	0.70	537	0.59
20	Indian Institute of Management Sirmaur	1614	1.22	1746	1.91
Total		132379	100	91556	100

TABLE V RESEARCH PERFORMANCE OF DEPARTMENTS IN INDIAN INSTITUTES OF MANAGEMENT (IIMS)

S. No.	Departments	Pub	H-Index	Scopus Citations	Crossref Citations
1	Department of Marketing, (IIM Bangalore)	633	61	14447	4965
2	Department of Management Information Systems (IIM Calcutta)	480	36	5955	4919
3	Department of Operation Management (IIM Ranchi)	307	53	9323	2553
4	Department of Operation Management (IIM Lucknow)	269	32	6559	4491
5	Department of Production and Quantitative Methods, (IIM Ahmedabad)	266	31	3688	2372
6	Department of Quantitative Methods, & Operation Management (IIM Kozhikode)	181	28	3784	1722
7	Department of Information Technology and Systems (IIM Raipur)	154	21	1736	1185
8	Department of Operation Management and Quantitative Techniques (IIM Indore)	148	15	1076	624
9	Department of Economic Environment and General Management (IIM Bodh Gaya)	148	13	767	1140
10	Department of Operation Management, Quantitative Methods Information System (IIM Udaipur)	110	18	1848	642
11	Department of Finance and Accounting (IIM Nagpur)	110	10	434	616
12	Department of Management Information System (IIM Rohtak)	92	15	948	548
13	Department of Economics and Business Environment (IIM Jammu)	73	10	318	426
14	Department of Operation Management and Decision	63	14	717	323

	Sciences (IIM Kashipur)				
15	Department of Operation Management and Quantitative Techniques (IIM Tiruchirappalli)	57	11	565	416
16	Department of Finance and Accounting (IIM Shilong)	53	7	231	83
17	Department of Marketing (IIM Visakhapatnam)	42	16	752	195
18	Department of Marketing Management (IIM Sirmaur)	38	12	533	556
19	Department of Finance (IIM Sambalpur)	22	3	40	1
20	Department of Marketing Management (IIM Amritsar)	21	7	255	269
Total		3267	413	53976	28046

Conclusion

This study provided a comprehensive assessment of the Indian Management Institute (IIM) based on NIRF rankings, research productivity, and faculty information. The analysis highlights the best performing institutions, their strengths in key parameters, and the diversity of departmental research contributions. The citation analysis emphasized the impact of each IIM's research. These findings provide valuable resources for stakeholders who seek to understand IIM's academic and research excellence.

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Lifestyle Change Management during Covid-19 Pandemic among Public Librarians in Trichy District

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Abstract

During a crisis, maintaining a healthy lifestyle becomes important as routines and mental health are disrupted by uncertainties and worries. Stress, caused by factors such as financial concerns and job security, can lead to disrupted sleep and eating patterns, emotional outbursts, and changes in substance use. It is crucial to seek help and support during such times, while also focusing on getting back into a routine and maintaining a healthy lifestyle. This article explores the relationship between sustainable development and the idea of lifestyle as it pertains to public librarians in the Trichy District. It draws attention to the many decisions and actions that comprise a person's lifestyle, including their food preferences, vacation spots, wardrobe, and pastimes. According to the paper, having different definitions of lifestyle helps with communication and avoids misconceptions, which is important for promoting sustainable development. Additionally, it notes that lifestyle choices are frequently entangled with environmental difficulties. Among the many modifications were adjustments to diet, exercise, stress management, smoking, drug usage (both recreational and medicinal), caffeine and alcohol intake, environmental and occupational exposures, and preventative care.

Keywords: sustainable development, change management, lifestyle behaviors

Introduction

When anything needs to change for us to achieve sustainable development, the word "lifestyle" is usually used to describe it. However, what does the word "lifestyle" actually mean? What does it mean to be defined? A definition is necessary for educators and legislators, among others, to apply the concept and understand its importance. Development that takes time. A plural definition is proposed in this work based on a level analysis. This is where the idea that we should approach lifestyle in a variety of ways first emerged. Like in other fields, sociology uses the phrase to refer to a variety of lifestyles. Individuals with diverse lifestyles can express themselves through a range of behaviors. How to eat and what to eat (and drink); where to travel and how to get there; what to wear, when to wear it, and how to furnish one's home; where to live (urban, rural, or suburban); what to watch and read; what to work with; the choice of education; how to engage in politics or spirituality; who to associate with; where and with whom to spend free time; and whether to use drugs, cigarettes, or alcohol. It is not clear when the term lifestyle was first mentioned in the literature, but the first definitions of the term go back to the 1920s. When the sociologist Max Weber and - shortly after him - the psychologist Alfred Adler introduced the term, they also gave birth to its ambiguity. Later on, the concept was introduced to marketing by William Lazer and hereafter modified several times.

Change Management

One of the key components of success in the bureaucratic paradigm of the modern world is change management. All other project-related factors as well as the project development process are unstable. They need to be updated frequently due to the shifting demands of the market. Therefore, in order to ensure that they can successfully manage any changes that arise during their development process, project managers must incorporate a change management method into their approach.

Lifestyle Behaviors during the COVID-19

There is a correlation between social isolation and loneliness and adverse mental and physical health outcomes, including an elevated susceptibility to prevalent mental disorders (e.g., anxiety and depression), substance misuse, and cognitive deterioration. People everywhere are being encouraged to isolate themselves and refrain from social engagement due of the COVID-19 pandemic. There is a critical need, from a public health and preventative care perspective, to provide individuals, communities, and health agencies with the knowledge and behaviors necessary to maintain the healthiest lifestyle possible while residing in isolation. Longevity and well-being have been associated with healthy lifestyle behaviors (HL), as well as a decreased all-cause mortality rate. Poor eating habits, inactivity, alcohol and cigarette use, and other unhealthy behaviors are major contributors to the global sickness burden and have been associated with worse outcomes for a variety of mental disorders. Furthermore, it's becoming more and more obvious that the rise of common mental illnesses may be fueled in part by unhealthy lifestyles. Research indicates that the current pandemic-associated mandatory self-isolation may contribute to depression and PTSD, and that possessing COVID-19 or working in the healthcare industry are risk factors for mental health issues related to stress.

Anu Molarius (2022) The COVID-19 pandemic, which began in Sweden in March 2020, has had a significant impact on mental health in the country. A longitudinal study found that mental health remained stable or improved during the initial periods of the pandemic, but poorer mental health, anxiety, and insomnia were observed in 1212 participants. An early study in the UK found that anxiety and depression increased immediately after the first lockdown, particularly among young adults. In Sweden, the pandemic is likely to cause a risk of dying in the future due to mass unemployment, increased mortality rates from alcohol-related illnesses, suicide, and cardiovascular disease, particularly among low-income men. Social metrics such as lockdown, fear of COVID-19, and lifestyle changes may negatively impact mental health. Some population groups, such as children, the elderly, and persons with learning and mental disabilities, may be more impacted than others.

Muna Abed Alah (2022) Countries have implemented restrictions to reduce infection, such as physical separation and home confinement. The COVID-19 pandemic has significantly impacted various aspects of life, including work and personal health. Organizations have encouraged work from home (WFH) to stay safe. However, these measures have led to negative health effects, including increased dietary changes, decreased physical activity, increased daily sitting and screen time, mass gain, and sleep disruptions. A study found that WFH has led to increased food consumption, decreased exercise, excess weight, and sleeplessness among those who have switched to WFH.

Statement of the Problem

The problem stated in the study is “Lifestyle Change Management during Covid-19 among Public Librarians in Trichy District”.

Objectives

1. To know the various factors influencing lifestyle change among public library professionals during covid-19.
2. To find the socio-demographic variables of the public library professionals.
3. To find the various individual lifestyle change among public library professionals during covid-19.
4. To know the various organizational lifestyle change among public library professionals during covid-19.

Methodology

Questionnaires were used to collect the data from the data respondents. It was split into two parts. The first part consists of Socio-Demographic details and the second part is related to Lifestyle changes among Public Library professionals. This questionnaire totally consists of 25 questions. The total number of respondents in the study region is 80 branch libraries that work in the Trichy district's public libraries.



Fig.1 District Central Library, Trichy

Data Collected From the Listed Branches

Ramji_nagar	Kirapatti
Puthur	S_kannanur
Koppu	Thalukai
Pichandarkovil	Patchaperumalpatti
Ponmalaiappatti	Koratheru
Thathaiyangarpettai	Sirugamani
Mettuppalayam	Alakarai
Dalmiyapuram	Peruvalapur
Ayyappanagar	Puthanatham
B_Mettur	Thirupanjili
Erakudi	Edamalaipattiputhur
Sobhanapuram	Pullambadi
Thandalaiputhur	Mugavanoor
Ariyamangalam	Vaiyampatti
Somarasampettai	Karungulam
Athavathur	Woraiyur
Varaganeri	Valachiramani
Thiruverumbur	Thuvarankurichi
K_K_nagar	Thuvakudi
Thiruvaikovil	Inamkulathur

Analysis

TABLE I FREQUENCY DISTRIBUTION OF GENDER

S.No.	Gender	Frequency
1	Male	55
2	Female	38
3	Transgender	0
	Total	93

The table I shows the frequency distribution of gender. In this table 59.1% of respondents are male and 40.9% of respondents are female. Out of 93 respondents, 55 respondents are male and 38 respondents are female.

TABLE II FREQUENCY DISTRIBUTION OF RESIDENCE

S.No.	Residence	Frequency
1	Rural	17
2	Urban	50
3	Semi-urban	26
	Total	93

The table II shows the frequency distribution of residences. 53.8% of respondents belong to the urban area, 28% of respondents belong to the semi-urban area and 18.3% of respondents belong to the rural area.

TABLE III FREQUENCY DISTRIBUTION OF DESIGNATION

S.No.	Designation	Frequency
1	Librarian	49
2	Assistant Librarian	44
3	Library Assistant	0
	Total	93

The table III shows the frequency distribution of designation. 52.7% of respondents are working as librarians, and 47.3% of respondents are working as assistant librarians.

TABLE IV FREQUENCY DISTRIBUTION OF SELF-ISOLATION DURING COVID-19

S.No.	Self-isolation	Frequency
1	Yes	48
2	No	45
	Total	93

The table IV shows the frequency distribution of self-isolation. 51.6% of respondents are self-isolated themselves and 48.4% of respondents are not self-isolated themselves during the covid-19 pandemic.

TABLE V FREQUENCY DISTRIBUTION OF DIAGNOSED WITH COVID-19

S.No.	Diagnosed with covid-19	Frequency
1	Yes	43
2	No	50
	Total	93

The table V shows the frequency distribution of diagnosed with covid-19. 53.8% of respondents are diagnosed with covid-19 and 46.2% of respondents are not diagnosed with covid-19.

TABLE VI FREQUENCY DISTRIBUTION OF CHANGES

Changes	Fully	Moderately	Mildly	Never
Alcohol	9	22	24	2
Diet nutrition	14	32	38	9
Physical activity	14	44	33	2
Deal with stress	11	53	28	1
Sleep pattern	12	56	24	1
Social support	46	14	31	2
Environmental exposures	51	13	26	3

TABLE VII FREQUENCY DISTRIBUTION OF CHANGES IN DAILY HABIT DURING COVID-19

Habits	Fully		Moderately		Mildly		Never	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Eating Habits	24	25.8	35	37.6	22	23.7	12	12.9
Daily Habits	17	18.3	40	43.0	25	26.9	11	11.8
work/study habits	12	12.9	31	33.3	34	36.6	16	17.2
Shopping	11	11.8	27	29.0	33	35.5	22	23.7
Adaptability on new lifestyle?	11	11.8	27	29.0	36	38.7	18	19.4
Betterment of new way of life	14	15.1	27	29.0	31	33.3	21	22.6
New way of work/study efficiency	12	12.9	28	30.1	34	36.6	19	20.4
Rejection on outgoing rather on home delivery.	12	12.9	24	25.8	31	33.3	26	28.0
Influence on Advertisements	14	15.1	36	38.7	24	25.8	19	20.4
Back to normalcy after COVID-19	18	19.4	22	23.7	33	35.5	20	21.5

The table VI shows the frequency distribution of changes during covid-19 among public librarians. 54.8% of respondents have said that environmental exposures are totally changed during covid-19. 60.2% of respondents have said that sleeping pattern moderately changed during covid-19. 40.9% of respondents have said that diet nutrition mildly changed during covid-19.

The table VII shows the frequency distribution of habits changed. 25.8% of respondents have said that their eating habits totally changed during covid-19. 43.0% of respondents have said that their

habits moderately changed during covid-19. 38.7% of respondents have said that they mildly adapted to their new lifestyle.

TABLE VIII FREQUENCY DISTRIBUTION OF PHYSICAL HEALTH

Physical health	Totally		Moderate		Mild		No	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
A decline in walking capacity	45	48.4	24	25.8	23	24.7	1	1.1
Mental health	40	43.0	25	26.9	27	29.0	1	1.1
More anxious	42	45.2	20	21.5	29	31.2	2	2.2
Unhappier	42	45.2	27	29.0	22	23.7	2	2.2
More stressed	20	21.5	44	47.3	29	31.2	0	0.0
More depressed	18	19.4	46	49.5	29	31.2	0	0.0
Sedentary habits	50	53.8	8	8.6	15	16.1	20	21.5
Spend more time watching TV	13	14.0	43	46.2	34	39.8	0	0.0
Spend more time sitting	12	12.9	43	46.2	38	40.9	0	0.0

The table VIII shows the frequency distribution of physical health. 53.8% of respondents have said that their sedentary habits totally changed. 49.5% of respondents have said that they moderately more depressed. 40.9% of respondents have said that they mildly spending more time sitting.

TABLE IX FREQUENCY DISTRIBUTION OF STRESS SYMPTOMS

Symptoms	Yes		No	
	Frequency	Percent	Frequency	Percent
Frequent headaches	88	94.6	5	5.4
Depression	28	30.1	65	69.9
Anxiety attacks	0	0.0	93	100.0
Insomnia	2	2.2	91	97.8
Loss of appetite	0	0.0	93	100.0
Prolonged fatigue	0	0.0	93	100.0
Irritability	29	31.2	64	68.8
Oversensitivity	0	0.0	93	100.0
Others (please specify)	0	0.0	93	100.0

The table IX shows the frequency distribution of stress symptoms. 94.6% of respondents have said that they had frequent headaches.31.2% of respondents have said that they had irritability. 30.1% of respondents have said that they had depression. 2.2% of respondents have said that they had insomnia.

Recommendations

- 1.Restrict the consumption of unhealthy foods and priorities the consumption of nutritious meals.
2. Stay adequately hydrated by drinking water and minimizes the intake of sugary beverages.
3. Ensure sufficient and quality sleep.

4. Exercise moderation in alcohol consumption and maintain sobriety.
5. Decrease the amount of time spent sitting and using screens.

Conclusion

As a result of the COVID-19 pandemic that occurred in Trichy District, a sizeable fraction of the Library Professionals reported experiencing significant alterations in their lifestyle behavioral patterns. During the COVID-19 pandemic, the lifestyle was altered by a variety of factors, including but not limited to: nutrition, weight management, exercise, psychological stress, cigarette smoking, recreational and prescription drug use, consumption of alcohol and caffeine, environmental and occupational exposures, preventative care, and other behavioral changes.

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Building a Knowledge-Centric Culture in Small Libraries: Strategies for Success

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Abstract

Small libraries, despite their size, can play a pivotal role in fostering a knowledge-centric culture within their communities. This article explores strategies tailored to the unique challenges faced by small libraries in building a knowledge-centric culture. Drawing on practical insights, technological advancements, and community engagement principles, this article provides a roadmap for small libraries to become dynamic hubs of information and lifelong learning. By embracing these strategies, small libraries can transcend their physical constraints and make significant contributions to the intellectual growth of their communities.

Keywords: Knowledge management, knowledge-centric, small libraries

Introduction

In the era of information explosion, even small libraries can become vibrant knowledge centres, fostering a culture of learning and innovation. While larger libraries may have more resources at their disposal, small libraries can leverage their intimate community connections to create a distinct knowledge-centric culture. By leveraging technology thoughtfully, implementing knowledge management strategies, tailoring collections to community needs, prioritizing community-centric programming, promoting digital literacy, and engaging in collaborative networking, small libraries can overcome their physical constraints and become vibrant hubs of knowledge.

Implementation of Knowledge Management strategies in Small Libraries

1. *Conduct a Knowledge Audit:* Begin by assessing the existing knowledge resources within the library. Identify tacit and explicit knowledge held by staff, including specialized skills, expertise, and institutional knowledge.
2. *Define Knowledge Management Objectives:* Clearly articulate the goals of knowledge management for your small library. This may include improving the efficiency of library operations, enhancing community services, or preserving institutional knowledge.
3. *Establish a Knowledge Management Team:* Form a dedicated team responsible for driving knowledge management initiatives. This team can consist of librarians, IT specialists, and staff members who understand the library's goals and operations.
4. *Promote Collaboration and Knowledge Sharing:* Foster a culture of collaboration and knowledge sharing among library staff. Encourage regular team meetings, brainstorming sessions, and opportunities for informal knowledge exchange. Utilize tools such as collaboration platforms, instant messaging, and video conferencing.
5. *Capture Tacit Knowledge:* Recognize the importance of tacit knowledge – the informal, experience-based knowledge that individuals possess. Encourage staff to document their experiences, best practices, and insights. This can be done through regular debriefing sessions or the use of knowledge-sharing platforms.

6. *Provide Training and Professional Development:* Invest in training programs and professional development opportunities for library staff. This ensures that they stay updated on new technologies, information management practices, and emerging trends in the library field.
7. *Utilize Technology:* Leverage technology tools to streamline knowledge management processes. Implement library management systems, content management systems, and collaboration platforms that facilitate information sharing, retrieval, and collaboration.
8. *Create Knowledge Networks:* Establish connections with other libraries, both locally and globally, to exchange knowledge and best practices. Participate in library networks, attend conferences, and engage in collaborative projects that enhance the library's knowledge base.
9. *Implement Knowledge Retention Strategies:* Small libraries often have a close-knit team, making knowledge retention critical. Develop strategies to capture and preserve institutional knowledge, especially when staff members retire or move on. This can include documentation, mentorship programs, and succession planning.

Strategies to Build a Knowledge-Centric Culture in Small Libraries

1. *Leveraging Technology Thoughtfully:* Small libraries may have limited budgets and staff, making the integration of technology a delicate balance. However, strategic adoption of technology is crucial for building a knowledge-centric culture. Utilizing open-source library management systems, embracing cloud-based solutions for seamless accessibility, and exploring low-cost automation tools can enhance the efficiency of small libraries. For instance, implementing user-friendly cataloguing software can streamline resource management, enabling librarians to focus more on community engagement and personalized services.
2. *Tailoring Collections to Community Needs:* In small libraries, the importance of curating collections that align with community interests cannot be overstated. Conducting regular surveys, organizing focus groups, and engaging in conversations with community members can provide valuable insights into their informational needs. Small libraries can leverage these insights to curate collections that are relevant, diverse, and reflective of the community's unique characteristics. This personalized approach not only fosters a knowledge-centric culture but also strengthens the library's bond with its patrons.
3. *Community-Centric Programming:* Community engagement is a cornerstone of success for small libraries. Hosting events, workshops, and educational programs that directly address the needs and interests of the local community fosters a sense of belonging and active participation. Collaborating with local schools, community centres, and businesses can amplify the impact of library programs. For example, organizing book clubs, author talks, or technology workshops tailored to local demographics can create a vibrant and inclusive knowledge-sharing environment.
4. *Digital Literacy Initiatives:* In the digital age, fostering digital literacy is essential for building a knowledge-centric culture. Small libraries can play a pivotal role by offering workshops on basic computer skills, internet literacy, and navigating online resources. Partnering with local schools and community organizations to provide digital literacy programs for different age groups enhances the library's role as a community educational resource. Empowering patrons with digital literacy skills not only broadens their access to information but also nurtures a culture of continuous learning.
5. *Collaborative Networking:* Small libraries can overcome resource limitations by fostering collaborative networks with other libraries, both locally and globally. Participating in inter-library loan programs, sharing digital resources, and collaborating on joint events can expand the reach and impact of small libraries. Additionally, networking with community organizations, local businesses, and educational institutions creates a symbiotic relationship that benefits all parties involved. Collaborative efforts amplify the library's role as a

knowledge hub and strengthen its position as a central player in the community's intellectual life.

Overcoming Challenges

Building a knowledge-centric culture in small libraries can be a transformative but challenging endeavour. Here are some common challenges and strategies to overcome them:

1. *Limited Budget and Resources*: Prioritize and allocate resources wisely. Focus on cost-effective technologies and leverage free or open-source tools. Seek grants and partnerships with local organizations to supplement the budget.
2. *Resistance to Change*: Communicate the benefits of a knowledge-centric culture clearly. Involve staff in the decision-making process, address concerns, and provide training and support during the transition. Highlight success stories from other libraries that have successfully embraced change.
3. *Lack of Technological Infrastructure*: Start with basic, scalable technologies that align with the library's needs. Gradually invest in more sophisticated tools as the culture evolves. Explore cloud-based solutions that require minimal infrastructure.
4. *Staff Skill Gaps*: Implement a comprehensive training program to bridge skill gaps. Offer ongoing professional development opportunities to keep staff updated on the latest technologies and trends. Encourage a culture of learning within the organization.
5. *Lack of Data Management Policies*: Develop clear data management policies to ensure the responsible use and protection of information. Train staff on data privacy and security. Regularly review and update policies to align with evolving best practices.
6. *Insufficient Collaboration*: Foster a culture of collaboration within the library and with external partners. Encourage interdisciplinary collaboration among staff members. Seek partnerships with local schools, community organizations, and businesses to enhance knowledge-sharing opportunities.
7. *Sustainability Concerns*: Embed the knowledge-centric culture in the library's mission and values. Develop long-term plans that consider scalability and adaptability. Foster a sense of ownership among staff to ensure the culture becomes ingrained in the organizational DNA.

Conclusion

Building a knowledge-centric culture in small libraries requires a strategic and community-focused approach. By leveraging technology thoughtfully, tailoring collections to community needs, prioritizing community-centric programming, promoting digital literacy, and engaging in collaborative networking, small libraries can overcome their physical constraints and become vibrant hubs of knowledge. Through these strategies, small libraries can not only survive but thrive as essential contributors to the intellectual growth and community development of their localities.

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Role of Librarian and Libraries in Institutional Rankings

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Abstract

Dr. Radhakrishnan said that “the Library is the heart of an Institutions” this reflects the importance of libraries in the development of the institutions. Then the second concept of library trinity in this concept Dr. Raganathan in his trinity concept said the library is interdependent on the three components are Readers, Books and the Staff with the unity of all these three libraries will become the social institution. This research paper will focus on the important roles of librarian and libraries in the Institutional Ranking.

Keywords: Institutional Ranking Framework, NIRF, Library practices, Librarian Skill

Introduction

The UGC is playing the quality control role in education system of India. The Institutional Ranking Framework (NIRF) work under MHRD and it was launched in 2015. University Grant Commission (UGC) setup the expert committee for ranking the higher education institute. The top most institutes will gate ranking every year by the NIRF. This ranking system is activated by the Ministry of Education and it help to decide the rank of institute. For the ranking of institute NIRF evaluate research output and impact with the help of Scopus and Web of science data. Near about 100 institutions till date raked by the NIRF.

Methods

To collect the information NIRF website data and various journal paper on google scholar searches for this paper. Qualitative research methods adopted for this research paper. To confirm the Library, stack and Librarian Names Researcher visited the authorized websites of the institute then confirm the information.

Trinity Concept of S.R. Ranganathan

S.R. Ranganathan fetch the concept theory of trinity, by this concept the books, readers and staff are the three interdependent parts which are play vital role to making the library as a social institution.

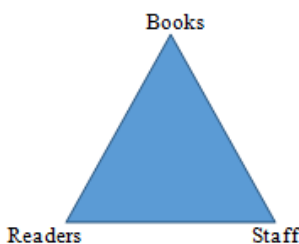


Fig.1 Trinity Concept of S.R. Ranganathan

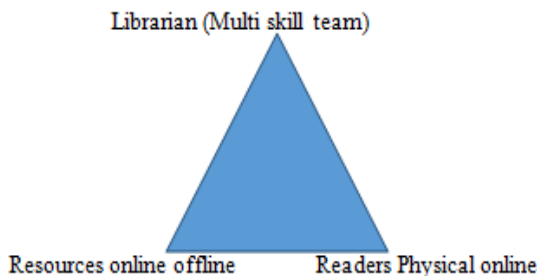


Fig.2 Modern Trinity Concept

TABLE I NIRF RANKING 2023: TOP INSTITUTES OF INDIA (OVERALL)

NIRF Ranking 2023	Institute Name	Establishment year	Librarian	Library Stack	City	State	Score
1	Indian Institute of Technology, Madras	1959	Dr.Mhendra N.Jadhav	11,3,514+	Chennai	Tamil Nadu	86.69
2	Indian Institute of Science, Bengaluru	1911	Dr. Suresh Balutagi (Deputy Librarian)	1,98,213+	Bengaluru	Karnataka	83.09
3	Indian Institute of Technology, Delhi	1961	Nabi Hasan	1,91,289+	New Delhi	Delhi	82.16
4	Indian Institute of Technology, Bombay	1958	Dr.Manju Naika	2,51,826+	Mumbai	Maharashtra	81.28
5	Indian Institute of Technology, Kanpur	1960	Prof.Nandini Nilakantan Professor In-Charge Library	2,23,972+	Kanpur	Uttar Pradesh	77.23
6	All India Institute of Medical Sciences , Delhi	1957	Dr.S.Siva Chidambaram	71,844 +	New Delhi	Delhi	72.14
7	Indian Institute of Technology, Kharagpur	1951	Dr. B. Sutradhar	1,50000+	Kharagpur	West Bengal	71.82
8	Indian Institute of Technology, Roorkee	1847	Dr. C. Jayakumar	1,20,000+	Roorkee	Uttarakhand	71.48
9	Indian Institute of Technology, Guwahati	1995	Dr.Tamal Kumar Guha	1,00000+	Guwahati	Assam	68.78
10	Jawaharlal Nehru University	1969	Dr. Manorama Tripathi	3,00000+	New Delhi	Delhi	67.25

Source: <https://www.nirfindia.org/2023/OverallRanking.html>

Role of Librarian in Institutional Rankings

Institutional ranking is measured by different national and international accreditation systems like: Times Higher Education University Ranking (THE Ranking), Quacquarelli Simonds (QS) National Institutional Ranking framework (NIRF), National Board of Accreditation (NBA) and National Assessment and Accreditation Council (NAAC) these are very famous authorities for the institutional ranking. To get the maximum points, from these Authorities special skills and expertise Library professionals require. A Librarian plays a very vital role in accreditation and ranking. Through Librarian expertise an institute can get higher ranking.

A Librarian is the head of the Library. He is the main distributor of the whole resource property of the library. Librarian decides the strategies about how to distribute, serve the knowledge property of the library. With the following points, Librarian can provide excellent services and acquire good ranking for his institute.

1. Every year arrange the Induction programme for the new library user
2. Arrange some webinar or seminar for awareness about copyright and fair use knowledge.
3. Daily guidance provides about what resources library have and how to use those resources.
4. 24*7 Availability for your student and faculty physical as well as online.
5. Focus on feature change technology and update knowledge of it.

Role of Libraries in Institutional Rankings

On the Parameters of NIRF, Research and professional Practice counted 100 marks. To achieve maximum marks of these parameters every library needs to do some extra efforts like:

1. Qualified and skilled Library Staff.
2. Quality collection Development
3. Availability of Resource sharing and Consortium
4. Provide services with Value addition
5. Provide supporting atmosphere for study and research.

Results and Discussions

To maintain the standard of education is very important to have some Authorities who check and verify and provide some type of ranking to the institute. While checking the data of top 10 overall ranking institutes we found the institutes are establishing in before 80, 90 years and they maintain their quality education system. So they are ranking on the top position.

Conclusion

Dr. Radhakrishnan said that “the Library is the heart of an Institutions” as per the thought, In an overall study we found that the Libraries and Librarian play a very vital role in institute ranking. All the top ten Library is very big and very quality resources they having as well as all libraries having very high range of library professionals with them. Only because of their high range of library professionals and mega library resources they are succeeded to achieve the best ranking.

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Student-Teachers' Attitude towards MOOC in Teacher Education

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Abstract

MOOC is an online platform which improves learner's perception, knowledge and achievement with in the context of teacher education. Hence, the investigator tries to attempt in this present research study. For this study, the Normative-survey method was followed. Attitude scale for MOOC has used to gather the data. The researcher applied Random Sampling Technique to select the sample. In Tiruvarur District, 799 student-teachers were taken as sample. The appropriate statistical techniques were employed to analyze the data. The main findings are: (i) The attitude about MOOC of student-teachers is positive. (ii) The mean score of attitude about MOOC of student-teachers does not significantly differ based on locale of student-teacher, parent's annual income and type of college. (iii) The mean score of attitude about MOOC of student-teachers differs significantly based on gender and subject discipline. The recommendations are further discussed by the investigator.

Keywords: Attitude, MOOC, Student-Teacher and online

Introduction

The short form MOOC consist of four words namely Massive, Open, Online and Course in which 'Massive' expresses large scale participation of participants, 'Open' represents that these courses are open for all without any restrictions, 'Online' depicts that such courses are available on only online mode on Internet or no face to face attendance, and last word 'course' denotes about structures of courses offered online to the participants or the concept of a pedagogically produced to online learning.

Need for the Study

Massive Open Online Course (MOOC) contains diversity of online reading materials and resources. MOOC is very distinct online learning model from traditional or online classes wherein few numbers of students, face-to-face interactions with age adhere in particular geographical location in a university/college/institute are essential components. MOOCs offer online courses to unlimited users who endure in various locations or different geographical areas with requirements of no addresses, no age bar and almost no cost too. But, it is mandatory for every user who wishes to join MOOC must have a mobile or personal computer and internet connection with his/her. In the curriculum of B.Ed., Degree Course, it is compulsory that the student-teacher should complete the MOOC course and produce a certificate on it. Therefore, it is an urgent need to find out the student-teacher's attitude about MOOC.

Objectives

1. To assess student-teachers' attitude about MOOC in Teacher Education level.
2. To examine if there exists any significant difference in the mean score of student-teachers' attitude about MOOC in Teacher Education level on the basis of gender, locale of student-teacher, subject discipline, parent's annual income and type of college.

Hypotheses

1. The attitude about MOOC of student-teachers is not positive.
2. The mean score of attitude about MOOC of student-teachers does not significantly differ based on gender.

3. The mean score of attitude about MOOC of student-teachers does not significantly differ based on locale of student-teacher.
4. The mean score of attitude about MOOC of student-teachers does not significantly differ based on subject discipline.
5. The mean score of attitude about MOOC of student-teachers does not significantly differ based on parent's annual income.
6. The mean score of attitude about MOOC of student-teachers does not significantly differ based on type of college.

Method

The Normative-survey method has employed in the investigation.

Variables

Attitude about MOOC is adopted as a main variable and gender, locale of student-teacher, subject discipline, parent's annual income and type of college are adopted as the sub-variables of the study.

Sample

799 student-teachers were selected as sample by using Random Sampling technique in Tiruvarur District, Tamil Nadu.

Tools

Attitude Scale for MOOC has developed and standardized by the investigator. There are 52 items in the scale. In the 52 items, 28 are positive and 24 are negative items. The score varies from 52 to 260. The reliability of the scale is established by Split-half method. The content validity of the scale has established.

Statistical techniques

The obtained data have been analyzed by applying suitable statistical measures such as mean, 't'-test, standard deviation and 'F'-test,

Results and Interpretation

TABLE I ATTITUDE TOWARDS MOOC

Attitude towards MOOC	N	Mean	Standard Deviation
	799	215.5490	22.3121

According to the above table, the mean score of student-teachers is found to be 215.5490 which is more than 50% and therefore it is concluded that the attitude about MOOC of student-teachers is positive and therefore the hypothesis is to be rejected.

The value (t) which is calculated in the above-mentioned table (2.7565) is not less than the value 1.96 (table value) at 5% significant level. It is hence, significant. Thus, the hypothesis is to be rejected and it can be stated that the mean score of attitude about MOOC of student-teachers differs significantly based on gender, and female student-teachers have more positive attitude than male students-teachers.

The value (t) which is calculated in the above-mentioned table (0.9497) is not greater than the value 1.96 (table value) at 5% significant level. It is hence, not significant. Thus, the hypothesis is not to be rejected and it can be stated that the mean score of attitude about MOOC of student-teachers does not significantly differ based on locale of student-teacher.

TABLE II STUDENT-TEACHERS BASED ON LOCALE

Sub-variables	Gender		locale of student-teacher		Subject Discipline	
	Male	Female	Rural	Urban	Arts	Science
No. of samples	384	415	420	379	432	367
Mean value	213.5446	217.9011	214.5647	216.0612	213.6434	217.2446
S.D value	21.1362	23.5324	20.8132	23.6498	20.8635	21.2639
df	797		797		797	
't' value	2.7565*		0.9497		2.4063*	
Significant level	* - Significant (5 %level)		Not Significant		* -Significant (5 % level)	

The value (t) which is calculated in the above-mentioned table (2.4063) is not less than the value 1.96 (table value) at 5% significant level. It is hence, significant. Thus, the hypothesis is to be rejected and it can be stated that the mean score of attitude about MOOC of student-teachers differs significantly based on subject discipline, and the student-teachers those who are belongs to science discipline have more positive attitude than the student-teachers those who are belongs to arts discipline.

TABLE III STUDENT-TEACHERS BASED ON SUBJECT

Variables	Parent's annual income		Type of college	
	Between groups	Within groups	Within groups	Between groups
Source of Variation	769.354	368330.675	597.768	363738.451
Sum of Squares (MS)				
df	2	796	2	796
Mean Variance of Squares (MVS)	384.677	462.7270	298.884	456.9578
F	0.8313		0.6541	
Significant level	Not Significant		Not Significant	

The value (F) which is calculated in the above-mentioned table (0.8313) is not greater than the value 3.00 (table value) at 5% significant level. It is hence, not significant. Thus, the hypothesis is not to be rejected and it can be stated that the mean score of attitude about MOOC of student-teachers does not significantly differ based on parent's annual income.

The value (F) which is calculated in the above-mentioned table (0.6541) is not greater than the value 3.00 (table value) at 5% significant level. It is hence, not significant. Thus, the hypothesis is not to be rejected and it can be stated that the mean score of attitude about MOOC of student-teachers does not significantly differ based on type of college

Conclusion

The study found that the attitude about MOOC of student-teachers is positive. Therefore, MOOC developers should create activities, chats, quiz and assignments, forums to motivate the participants to promotethevirtual community and communicate with other participants. These communities authorize to confirm knowledge through exchange of wisdom, ideas, information etc in the MOOC environment. There is a necessity to give rewards and recognition for the learners who participate sincerely in these virtual communities.

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Appraisal of Collection Development Policy in Public Libraries as a Panacea for Enhancement of Knowledge Management in Zaria Local Government Area, Kaduna State, Nigeria

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Abstract

This paper was written to appraise the Collection Development Policy in Public libraries as a Panacea for enhancement of knowledge management in Zaria Local Government Area, Kaduna State, Nigeria. The study was circled around three research questions and objectives. The study adopted a survey research design. The community included 4 public libraries with 6 (six) librarians working in CDP departments in the study areas. Due to the small size of the study and the population, a census sampling technique was used to gather data from the study participants. A questionnaire was used as a data collection instrument. Data were analyzed by descriptive statistics and measures of central tendency using frequencies, percentages, and means. The benchmark was set at 0.3 using the average of the standards on a 3-point Likert scale. The results of the study showed that a small number of respondents indicated that acquisition of information sources was strongly guided by a written collection policy ($x = 0.613$), and the weeding of information resources ($x = 0.545$). It was also shown that only one of the public libraries surveyed had a workable written Collection Development policy. It also confirmed that a good number of public libraries admitted that they do not have a written CDP in their library. It concluded that it is important to note that the aim and objectives of any CDP is to meet up with the reasonable information needs of its users within the accessible resources. Information resources must be led by the CDP to provide resources that meet the urgent needs of users and society. This study showed that most public libraries do not have a practical and applicable written CDP. It also revealed that Zaria public libraries face many challenges that hinder and slow down their performance. It recommended that state and local governments require all public libraries in their immediate area to always use a guided CDP when acquiring information resources. Public library management must ensure that all libraries in their immediate area are required to produce and use a written CDP and that any challenges identified are addressed promptly so as not to impede the development of public libraries, which would have a negative impact on users.

Keywords: Appraisal, Collection Development Policy, Kaduna Knowledge Management, Public Libraries, Zaria Local Government.

Introduction

The implementation of the guidelines means an important change in contracting processes with public libraries. Gone are the days when libraries obtained information resources without a policy to guide them in selecting information sources of interest to library users, including the reference. The library collection preparation process involves a series of procedures, organization, and documentation. A lengthy process begins with selecting titles for research until they reach the shelf (Sagender, 2016).

Though, the development of collections cannot follow the whims and whims of the librarian, but with due regard to the library's mission as it emerges from policy-driven acquisitions. The library is the key center of the academic activities of universities and a bank of knowledge with diverse and valuable information enclosed in different types of documents, each with its own way of dealing with it. The university library is a major player in the search for academic excellence in higher education institutions. Public libraries are libraries located in the community to provide book-loving students/children the opportunity to read, learn and research in the community and university. This shows that libraries are very vital in society for the reason that they help users realize their goals and objectives by providing information that meets users' information needs (Jimoh & Suleiman 2017).

Collections Development plays a key role in Public library, and no library remains without this department, as it involves is the logical planning of the collections of the library that includes activities such as selection, acquisition, evaluation, ordering, and arrangement of collections in the library (Imasilo, 2021).

A policy can be an unwritten agreement or a printed document (Krampah & Frempong-Kore, 2022). A Collection Development Policy is a written statement of the principles that shows the operation of a library and, when properly expressed, can provide a daily working tool that give the necessary guidance for carrying out collection development activities (Emasealu, 2021). According to IFLA (2001) cited in (Emasealu, 2021), the significance of a written Collection Development policy cannot be overemphasized and can be summarized below:

Selection: The Collection Development Policy assists the library in selecting information sources for the library based on the information needs of existing and potential users of the library.

Planning: A Collection Development Policy ensures a harmonized library order and helps the library prioritize which information resources to get our hands on when finances are limited.

Public Relation: Policy statements on collection development are very helpful in making library management decisions as they relate to library funding.

The broader context: A policy for developing written collections can strengthen the library

Information Resource Development

Developing information resources is another name for developing collections that can be used interchangeably. Lemu (2011) mentioned in (Jimoh & Suleiman, 2017), the development of information resources is a process carried out intentionally and deliberately to identify, select, acquire and continuously manage information resources, taking into account users information needs.

Process of Collection Development

Evans (1995), quoted in Khobragade, (2016), sees Collection Development as the way of meeting the information needs of people in a well-timed and cost-effective manner, using local information resources and from other organizations. He stated that CDP has a number of 6 components Public Libraries must strictly adhere to:

1. Collectibles: Acquisition of collectible items.
2. Policy: Set up a group development policy
3. Selection: Determine the materials to be purchased for the library
4. Weeding: Periodic or continuous assessment of resources
5. Needs Analysis: Collecting data to determine information needs
6. Evaluation.

Statement of the Problem

Collection development policy in public libraries assists in the appropriate acquisition, Choice of materials, organization, maintenance of information resources, in deselection up to date and retrospective materials, in setting up sound strategies for sustained acquisitions, and in appraising collection to determine how to meet the information needs of users. Mansur, (2012) quoted in (Emasealu, 2021). It also support libraries offering pertinent sources of information that would put in value to libraries to make sure that users' information needs are met. Several studies by Obiano (2021), Emasealu (2021), and Jimoh & Suleiman (2017) all determined that any Collection Development Policy should be governed by the basis, mission, and vision, among other things. The policy for Collection development has a favorable effect on the variety and kind of library resources brought or bought into the library. Despite these factors, it appears that the majority of public libraries in the Zaria area lack a workable written collection development policy. This forces us to ask whether the acquisition of information resources is governed by a written collection development policy, whether a workable collection development policy is available in the public libraries, and whether the collection development policy encounters any difficulties. Hence, the need for the study on Appraisal of Collection Development Policy as a panacea for Knowledge Management in Public Libraries in Zaria Local Government Area, Kaduna State.

Objectives of the Study

1. To find out if acquisition of information resources is guided by a written Collection Development Policy in Public libraries in Zaria environment, Kaduna State, Nigeria.
2. To determine if a workable Collection Development Policy is available in the Public Libraries in Zaria Environment, Kaduna State, Nigeria.
3. To ascertain the challenges confronting the application of Collection Development Policy in Zaria environment, Kaduna State, Nigeria.

Research Questions

1. To what extent is the acquisition of information resources guided by a written Collection Development policy in Public libraries in Zaria environment, Kaduna State, Nigeria?
2. What are the workable Collection Development Policies available in the Public Libraries in Zaria environment, Kaduna State, Nigeria?
3. What are the challenges confronting the application of Collection Development Policy in Zaria environment, Kaduna State, Nigeria?

Literature Review

Yakubu, Khalid, and Samsudin (2022) cited in Bitherman, Benedicta and Afua (2022), noted that the majority of libraries surveyed for their study of collection management practices in Nigerian university libraries did not have written documentation. Cassell (2007) cited in Jimoh and Suleiman (2017) indicates that there are certain elements that must be addressed in a written policy and these elements are: introduction, mission and vision, purpose of the library, customers and patrons of the library, library resources, and evaluation of replacement, library donations, retention, selection, cooperative agreements for resource development, and therefore also the future goals of the library as the library can be seen in 5 or 10 years. A study by Jimoh, Suleiman and Ibrahim (2016) on Collection Development Policy: A Survey of Academic Libraries in Federal and State Universities, Kaduna State, Nigeria, using a survey research design to collect samples from the Head of Development Unit for the collections of the libraries under study using purposive sampling techniques. The results of the study showed that only one of the libraries studied had an applicable written policy that guides the acquisition, selection and classification of materials in the library. The study also found that some library policies in the libraries under study

were developed by a committee set up by the university, which includes the Librarian in the acquisition section and heads of libraries as committee members. It concluded that the objectives of the CDP are to provide uniformity amid those accountable for collection development and to provide a tool for assessing and improving collections for all disciplines involved. It recommended that Kaduna State University Libraries try to compare their policies with those of UCD Library Dublin based on the guidelines. This would aid them to strengthen enforcement of their policy and make changes if needed.

Emasealu (2021) conducted a study on collection development policy and use of information resources in university libraries in Rivers State, Nigeria. Descriptive research design was used to assess policies for collection development and use by Rivers State Libraries. The studied population consisted of 42 professionals covering the entirety of the area studied. For a few libraries, census sampling techniques were used and a structured questionnaire was used to gather data from the study participants.

The results of the study showed that collection development policies have a positive impact on the use of information resources in academic libraries. It also showed that quite a few factors influence collection development policies in supporting the use of information resources in academic libraries. The study concluded that libraries that do not have collection development policies or poorly formulated collection policies will suffer from wasted funds, poor library services, and poor retention of beneficiaries or use of information resources by beneficiaries. It recommended continuing education for library staff involved in collection development activity, academic libraries should independently discover various ways to generate funds, such as providing imaging services to patrons, and library scholars should learn to use local but high-quality information resources.

Opiano (2021) stated that insufficient funding of academic libraries, high costs of information resources due to high exchange rates, among others, insufficient coverage of all disciplines in unwritten collection development policies and inability of collection development librarians to understand policy and compliance for some of the factors that influenced collection development policies in academic libraries. Ameyaw (2020), cited in Bitherman, Benedicta and Frempong-Kore, Afua, (2022) mention the absence of CDP, lack of regular training for librarians, lack of staff, lack of administrative support, and inability of libraries to involve library users in policy making in some of the challenges they face when using CDP in Ghana.

Methods and Materials

A survey research design was used for the study. It was adopted for the purpose of appraising and obtaining detailed information on CDP in public libraries in Zaria Local, Kaduna State, and was in fact based on the information that this study involves the collection of data from the respondents using questionnaire. The study population included 4 (four) public libraries around Zaria, Kaduna State, namely: Abdullah Muhammad Samaru Public Library, Sabongari Public Library, Kings Road, Zaria City Library, Kofan Doka Public Library, after LGA Secretariat, Zaria City and Librarians directly engaged in CDP in libraries. Due to the small size of the study and population, a census sampling technique was used to collect data from the respondents. Questionnaires were used as data collection tools. A total of 6 (six) questionnaires were distributed to the respondents and 6 (six) were filled correctly and returned by the respondents. The reason for the low number of participants was that two (2) out of four (4) public libraries in Zaria district were not operating at the time of this research. Data were analyzed by descriptive statistics using percentages and frequencies. However, the benchmark for determining the criterion mean of high strongly guided

written Collection Development Policy among Public libraries in Zaria environment was pegged at 0.3 benchmarks using the criterion mean on a 3-point Likert scale.

Data Analysis

Research Question One: To what extent is the acquisition of information resources guided by a written Collection Development policy in Public libraries in Zaria environment, Kaduna State?

TABLE I EXTENT OF ACQUISITION OF INFORMATION RESOURCES GUIDED BY A WRITTEN COLLECTION DEVELOPMENT POLICY IN PUBLIC LIBRARIES

Variable	Strongly Guided	Guided	Not Guided	Mean	Decision
Acquisition of Information Resources	4 (67%)	2 (33.3%)	0 (0%)	0.613	Accepted
Weeding of Information Resources	3 (50%)	2 (33.3%)	1 (16.7%)	0.545	Accepted
Gift and Exchange	2 (33.3%)	3 (50%)	1 (16.7%)	0.373	Accepted
Preservation & conservation	1 (16.7%)	2 (33.3%)	3 (50%)	0.247	Rejected
Selection of Information resources	2 (33.3%)	3 (50%)	1 (16.7%)	0.335	Accepted

Source: Field Work, 2023, Key: SG= Strongly Guided, G= Guided, NG= Not Guided

The information resources that have been acquired to date by public libraries in the Zaria area of Kaduna State, Nigeria are depicted in Table I above. The results, however, revealed that only a small percentage of respondents agreed that the acquisition of information resources was strongly guided by a written Collection Policy ($x = 0.613$), weeding of information resources ($x = 0.545$), while gift and exchange ($x = 0.373$), selection of information resources ($x = 0.373$), preservation & conservation ($x = 0.247$), ranked lowest among the information gleaned from the respondents about the extent of the acquisition of information resources guided by a written Collection Policy because it had a mean score which is lower than 0.5 benchmark on the 3 point Likert scale. However, the benchmark for the determining the criterion mean of a high strongly guided written Collection Development Policy among Public libraries in Zaria environment was pegged at 0.3 benchmark. Form the results above, it can be deduced that the functional Libraries in Zaria environs usually uses a guided Collection Development Policy in acquisition and weeding of information resources.

Research Question 2: What are the workable Collection Development Policy available in the Public Libraries in Zaria environment, Kaduna State, Nigeria?

TABLE II WORKABLE CDP AVAILABLE IN THE PUBLIC LIBRARIES IN ZARIA ENVIRONMENT IN ZARIA ENVIRONMENT, KADUNA STATE, NIGERIA

Public Libraries	Available	Not Available	Origination Period	Amendment Period
Abdullahi Muhammad Public Library, Samaru	Available	–	Unknown	Unknown
Public Library after LGA Secretariat, Zaria City.	–	Not Available	Nil	Nil
Public Library Sabongari LGA, Kings Road,	–	Not Available	Nil	Nil
Public Library Zaria City Kofan Doka	–	Not Available	Nil	Nil

Source: Field Survey, 2023

According to Table II above, just one (1) public library—the Abdullahi Muhammad Public Library—in the city of Zaria has or has ever employed an effective documented collection development policy. The acquisition, selection, weeding, and preservation/conservation processes at the other three (3) public libraries, namely the Public Library following the LGA Secretariat in Zaria City, the Public Library Sabongari LGA Kings Road, and the Public Library in Zaria City Kofan Doka, are not governed by any workable written CDP.

Research Question 3: What are the challenges confronting the application of Collection Development Policy in Zaria environment, Kaduna State, Nigeria?

TABLE III CHALLENGES CONFRONTING THE APPLICATION OF CDP IN ZARIA ENVIRONMENT, KADUNA STATE, NIGERIA

Variables	Frequency %
Libraries failure to include users in policy formation	5(83%)
Lack of written weeding policy	5(83%)
Lack of support from the administration/management	3(50%)
Lack of training of Collection Development staff directly involved	4(67%)
Inadequate staffing	3(50%)

Source: Field Survey, 2023

The challenges facing Collection Development Policies in Public Libraries were identified by all respondents in Table III as follows: 5 (83%) Libraries failure to include users in policy formation; 5 (83%) Lack of written weeding policy; 3(50%) Lack of support from the administration/management; 4 (67%) Lack of training of Collection Development staff directly involved; and 3 (50%) Inadequate staffing.

Results and Discussion

This study was led by three research questions aimed at appraising the written Collection Development Policies in Public libraries in Zaria environment, Kaduna State Nigeria. By examining the nature of the first research question, this study demonstrated and showed that majority of the respondents showed that acquisition of information resources was strongly guided by a written Collection Policy, Weeding of Information Resources, although, Gift and Exchange, Preservation & conservation, Selection of Information resources, ranked lowest among the information retrieved from the respondents about the extent of acquisition of information resources guided by a written Collection Development Policy in Public libraries in Zaria environment, Kaduna State, Nigeria. This result is in disagreement with that of Yakubu, Khalid, and Samsuddin (2022) cited in Bitherman, Benedicta and Afua (2022) who claimed that the majority of the libraries examined for this study on Collection Management practices in Nigerian University libraries lacked a written weeding strategy. However, it is implied that without a documented, guided CDP, the majority of public libraries would not be administered well.

The second research question revealed that only one (1) Public library in Zaria environment which is Abdullahi Muhammad Public Library has/or used a workable written Collection Development Policy in the Library. However, the other three (3) Public Libraries namely; Public Library after LGA Secretariat, Zaria City, Public Library Sabongari LGA Kings Road and Public Library Zaria City Kofan Doka do not have a workable CDP available in the Library so, the acquisition, selection, weeding and preservation/conservation was not guided by any workable written CDP.

This shows that by implication most public libraries in the Zaria environment may not be able to adequately provide users' information needs due to the lack of a sustainable written CDP that directs acquisition, selection, and weeding, among other things. This implication supports the study of Emasealu's (2021) which found that libraries without a CDP or one that was poorly drafted would squander money, provide bad library services, and have little user traffic or poor utilisation of the information resources. Furthermore, the findings of this study corroborated with the study conducted by Jimoh, Suleiman and Ibrahim (2016) on Collection Development Policy: A Survey of Academic Libraries in Federal and State Universities, Kaduna State, Nigeria which showed that only one of the library under study has a viable written CDP guiding the acquisition.

The third research question revealed that all of the respondents indicated that they had encountered difficulties in their libraries, including the failure of the libraries to involve users in policy formation, the lack of a written weeding policy, the lack of support from the administration/management, the lack of training of directly involved Collection Development staff, and insufficient staffing. This implies that if the public libraries continue to face difficulties of this size, the goals for which they were established would not be met, and they would have a negative impact on the surroundings in which they are located because, with time, the libraries would naturally decline. Additionally, this study concurs with that of Obiano (2021), who found that collection development policies were negatively impacted by a number of factors, including inadequate funding for academic libraries, high costs for information resources due to exchange rate fluctuations and other factors, inadequate coverage of all disciplines in the policy, an unwritten collection development policy, and collection development librarians' inability to understand and follow the policy. Ameyaw (2020) in Bitherman, Benedicta, and Afua, (2022), who revealed that the absence of CDPs, the lack of regular training for librarians, the shortage of staff, the dearth of administrative support, and libraries' failure to include users in policy formation were some of the challenges facing CDP utilization in Ghana.

Conclusion

It is crucial to remember that every CDP's objective is to satisfy the right information needs of its users while working within the constraints of the resources at its disposal. Any information resource acquisition, selection, weeding, etc., must be directed by a CDP in order to deliver resources that would meet the urgent needs of users and the community. This study demonstrated that the majority of public libraries lack a viable, practical, and written CDP. It also demonstrated the difficulties Zaria's Public libraries confront in operating effectively, which slows down the services offered to customers seeking information.

Recommendations

Based on the findings of study, it was recommended that:

1. The State and Local Government Area should compel all Public Libraries within their immediate community to always use a guided CDP in the acquisition of information resources.
2. The management of the Public libraries should ensure that all the Libraries within their immediate environs should be compelled to produce a written CDP and use it.
3. All the challenges identified should be addressed immediately so as not hamper the growth of Public libraries in our environs.

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Measuring Information Services and User Satisfaction: A Case Study

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Abstract

The study defined user satisfaction as an evaluation of a service in terms of whether that service met their needs and expectations. The aim of the study was to evaluate the services and information resources provided by Library of the Postgraduate of Archaeology, University of Kelaniya and to see if users are satisfied with them. The survey sought information on student's views of library collection, resources, facilities, services and their management. Delimitations of the research are that it is limited to the users who registered for the Postgraduate courses during the year 2021/22. The multiple questionnaire method was used and Google form questionnaire were distributed among students through PG Diploma and Masters Student's whatsapp groups. Out of seventy-five (75) PG students in the two groups, sixty-three (63) were responded, resulting in a response rate of 84%. Microsoft Excel was used to analyze the collected data. It was drawn that the students have shown preference in using e resources and databases and also Online Public Access Catalogue is an important tool that could be utilized in order to find out the available resources and also there are some areas that need attention like the increase of books, conference proceedings and improvement of the services from research facilities. It has been discovered that users much satisfied about the library, its services and resources, but at the same time they expect that more could be done. This is evident in the fact that the majority of library users indicated their satisfaction in the survey. But it is very important to continually evaluate and improve the services and resources.

Keywords: Information services, Library services, User satisfaction Case study, PGIAR Library

Introduction

“Library is the heart of the academic institution” made the presence of a library inevitable in all institutions and when it comes to an academic institution library plays a vital role. It is plays an important role in providing information services and resources to assist users in their studies and research activities (Mashroofa and Jayasundara, 2010).Users are very important for libraries. Therefore they should be satisfied with the service they receive. Satisfaction may lead to users using the services of the library over and over again and even recommending it to others (Motiang, 2014). Identifying the problems, weakness and importance in these services will help the library management to set a future development and provide better services for the University community.

There are different ways of figuring out the quality of information services. As a result, libraries have are often challenged of continuously providing valid and valuable reasoning for their work's that are carried out to meet the challenges and align themselves with the parent organizations' goals. There has been contemplation about the need to better understand and define the needs and expectations of library users to provide the appropriate kind and levels of service to provide gratification and service quality

PGIAR Library functioning as a Reference Library and members of the library are provided only with the reference facility. However the library caters for the students who enroll in five major

postgraduate courses currently being conducting by the institute. Academic membership of the library is open for the permanent academic staff of the PGIAR. Student Membership the students who have been registered the PGIAR can be obtained the membership free of charge. But they are not permitted to borrow books. The main functions of the library are that of searching and researching. Therefore no lending is done in general. But the lending service is offered for the members of academic and non-academic staff of the PGIAR.

Currently, the library owns approximately a collection of 20,000 books which belong to the discipline of Archeology and it ranges from Journals, Documents, Maps, Audio –Visual, Ola-leaves, Reports, Estam pages to Theses and Special Collections. The library prepares and releases a catalogue of new acquisitions periodically as a special service. The purpose is to inform the library-user about the updated collection. This service is also can be obtained through the email.

Index of titles of articles written on topics of Archeology and allied disciplines, appeared on academic journals, has been prepared and computerized in order to facilitate the reader. Journals, *Ancient Ceylon*, *Spolia Zeylanica*, and *University of Ceylon Review* are among them. An index of titles of articles appeared in journals published by native language also been computerized for the benefit of readers. A collection of clippings of selected newspaper articles and news-items dealt with the topics of Archeology and the allied disciplines is maintained. The collection is consisting with the material appeared on newspapers since 1996.

The library provides the restricted service of photocopy. It is notify that the library will not photocopy under any circumstances some literature viz., rare books, theses, large books, maps, unpublished reports, newspaper clippings, etc. The library owns a collection of 800 eBooks. Scanning service is available for copying selected book chapter and articles in journals. The service is free of charge for the students who have been registered at the Institute.

The main aims and objectives of the Library are to promote the knowledge of Archeology and its related disciplines; appropriate, improve, upgrade and disseminate the knowledge of Archeology and its related disciplines and produce the knowledge required to study the text, to conduct field research and to engage in relevant practices of Archeology. The intention of this study is to utilize the results in order to improve the service quality of the PGIAR Library.

Objectives of the Study

The objectives of the study are:

1. To measure the level of user satisfaction of Library resources, services and facilities provide by the library.
2. Measuring the effectiveness of the library service provided.
3. To rate the overall library service quality.
4. Determine the relationship between the overall library service quality and user satisfaction.
5. To identify the areas of improvements

Literature Review

Adeniran 2020 conducted a study on user satisfaction with academic libraries services at the Redeemer's University and adopted the survey research method for the study and developed a questionnaire to elicit data from academic staff and students. The study concluded that users were satisfied with the library services; however, there is need for improvement in the services provided by the library. And also indicate that academic libraries are presently faced with challenges as a

result of the introduction of information technology which has led to an increase in competition among information providers.

Amarasekara and Marasinghe (2020) says that it is one of the most important measures used for evaluating the service quality of a library is a user satisfaction survey. And also indicate that Identification of user needs and expectations on a regular basis and focusing on meeting those information needs will be a good solution to overcome the above challenge and it will be beneficial in continuous upgrading of the traditional libraries.

Tiemo and Ateboh (2016) examined how users of the College of Health Sciences library at the Niger Delta University in Nigeria are satisfied with the library information resources and services rendered to them. This study adopted the survey research design and a self-designed questionnaire was used to collect data on random sampling technique. The results of the study revealed that users were satisfied with the book borrowing services of the library and renewal process. And also better and long hours of online activities in the library. It also found that users were dissatisfied with the limited reference contents discussed in various topics. They recommended that the library should improve the computer literacy skill for users, electronic information services and photocopying services which the library can use in generating internal funds to develop its resources and services to users and the need to train library staff to improve on the library services rendered to library users.

User satisfaction with academic library performance was conducted by Ijiekhuamhen, Aghojare and Ferdinand (2015) the study revealed that the users were satisfied with the photocopying and scanning services, current books on shelves, and access to electronic information resources. They were not satisfied with the card catalogue to locate the resources, longer hours to be wait access resources via the internet and the library opening hours.

A study conducted by the University of Limpopo, Medunsa Campus on an evaluation of user satisfaction with Library Services by Motiang, Wallis and Karodia (2014) stated that book should be available all the time where users can write their complaints and suggestions and which will be checked regularly. And also mentioned that the library unable to satisfy all users, it is important that they have a platform to raise their complaints. This may also serve as a mirror for the library because some users may come up with suggestions which may contribute to changes.

Saika and Gohain (2013) conducted a study on user's satisfaction on library resources and services in Tezpur University (India). The finding shows that majority 71 (44.65%) of the respondent were satisfied with the text books, 63 (39.62%) of the respondent were highly satisfied with the online database resources and 63 (39.62%) of the respondent were also satisfied with the regular supply of newspapers/magazine. The finding also revealed that majority of the respondents were satisfied with the electronic information services, library orientation programme to fresher, current awareness services, reservation of library resources to users, reprographic services. It was however, discovered that users were dissatisfied with the mobile alert services.

Methodology

The survey sought information on postgraduate student's views of library collection, resources, facilities, services and their management. The limitations of the search are that it is limited to the users who are registered for the PG courses during academic year 2021/22 in the library. The multiple questionnaire method was used for this survey. Google form questionnaire were distributed among students through PG Diploma and Masters Student's whatsapp groups for the

purpose of collecting data. As a result, we received responses from 63 out of 75 respondents (84%) for this preliminary study. Most of them were female 35 (55%). All the respondents, especially PG Diploma students were quite content about this survey and shared their ideas and experience for further development. The questionnaire covered aspects such as Library usage, availability of information resources, services and other facilities and Ranking the service quality and satisfaction.

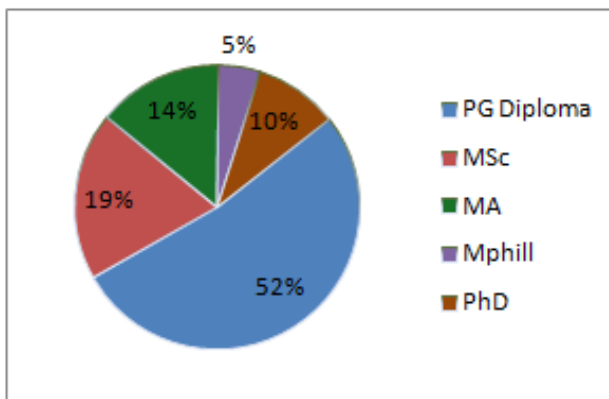


Fig.1 Population according to the course type

Results

The major findings that were generated from this study are:

Library Use

1. Majority of the Students 57% visit the library whenever they need information for their studies/research. 30% visits on weekends, while 10% use the library once a week or more. 03% of the respondents were not responded.

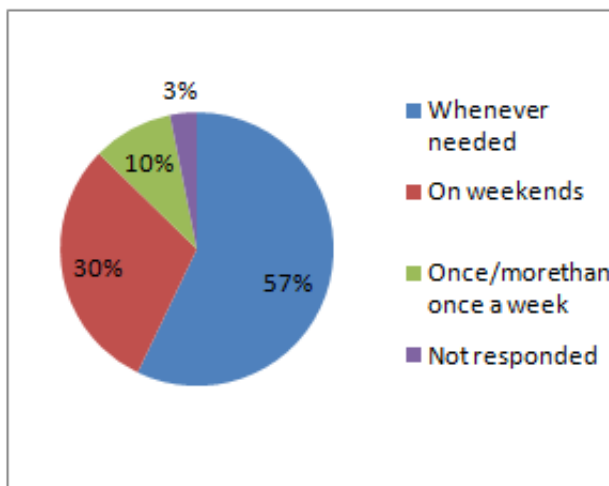


Fig. 2 Distribution of respondents by frequency of visits

2. Table I shows that majority 41% of the respondent’s visits library for reference work. 25% visits library because of completing assignments. 21% visits library for group studies and 13% visits for regular studies.

TABLE I REASONS FOR VISITS THE LIBRARY

Reasons for Library Visit	No of Students	%
Reference work	26	41%
Completing assignments	16	25%
Group studies	13	21%
Regular studies	8	13%
Total	63	100%

Availability of Information Resources, Services and Other Facilities

Library users are basically interested in improving research efficiency by exploring new materials and improving their research skills. Majority of the respondents stated that they mostly used the library for study and research purposes.

Satisfaction Level of the Users Regarding the Resources

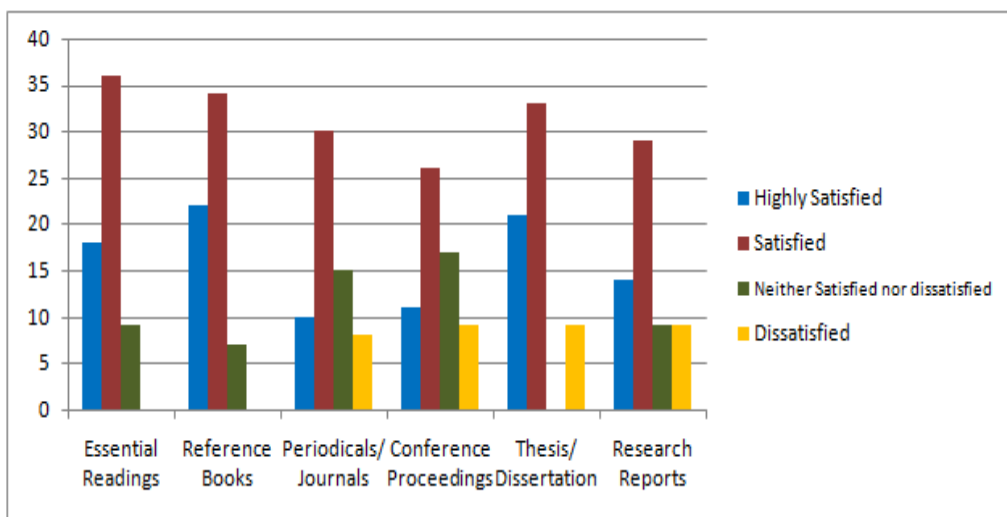


Fig. 3 Satisfaction level of the users regarding the resources

Fig.3 shows that the most of the respondents are satisfied with the resources those already have in the library collection. It was also seen that a mean of respondents were highly satisfied with the essential readings and the reference books. Out of 63 respondents, more than 50% stated that there was a good collection of reference/course books and essential readings. But the considerable numbers of respondents were dissatisfied with the periodicals, conference proceedings, thesis and research reports in the collection. Few students specified that there are not enough copies of text books on art history; moreover there is a need for all latest edition books to be available in the library.

Satisfaction Level of the Users Regarding the Services

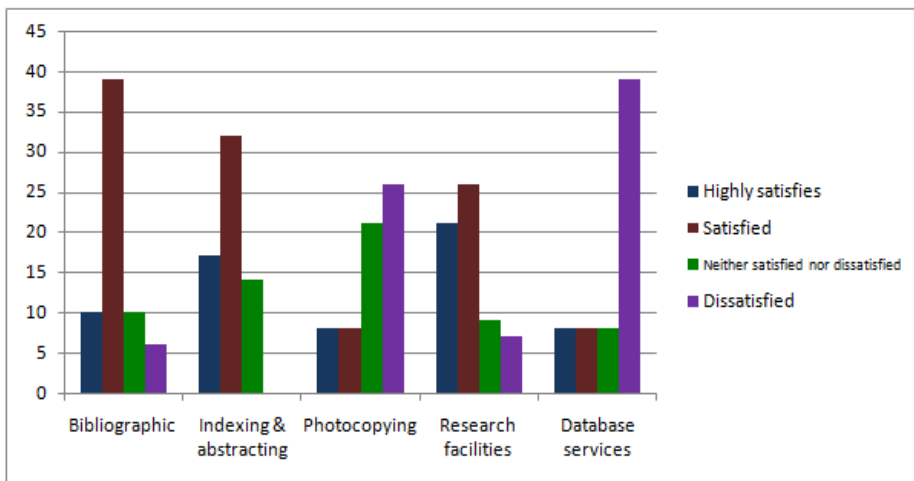


Fig. 4 Satisfaction level of the users regarding the resource services

According to the fig. 4 most of the students were highly satisfied with the bibliographic, Indexing & abstracting services given by the library. The highest number of the respondents (39.57%) indicated that photocopying services were very poor. Students specified that the reason for it being poor was because the photocopying machines were mostly out of service.

Most of the respondents 62% indicated that they were not satisfied with range of e- resources and database services. 12% of respondents equally who stated that range of e-resources and database services were in satisfied level. Most of the respondents specified that there is a need to increase the collection of e –resources that there was a need for more e resources to cater for student demand.

Satisfaction Level of the Users Regarding the Other Facilities

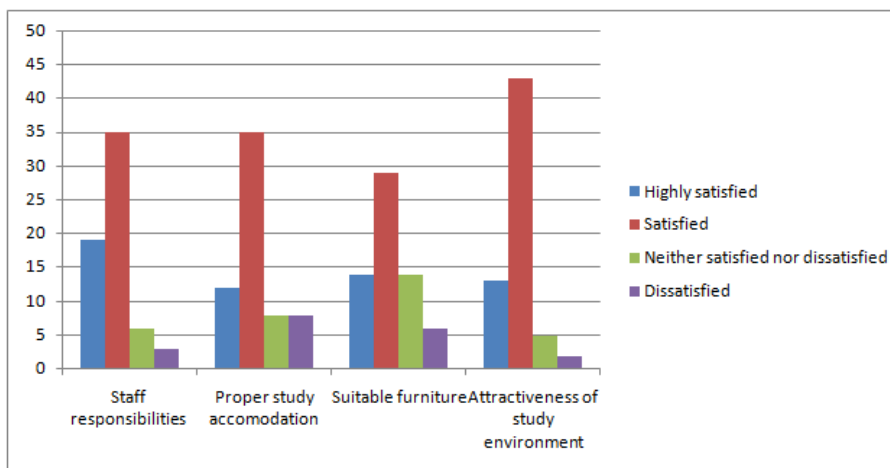


Fig. 5 Satisfaction level of the users regarding the facilities

The responses given by the students are given in fig.5 indicate that the most students 56% were satisfied with the help and support received from the library staff. It indicates that the respondents have positive attitudes towards the library staff and they were satisfied with the helpfulness, approachability and the knowledge of the staff members. This indicates that having a well-qualified staff in terms of knowledge, skills and attitude in a library is an essential fact which positively affects the user satisfaction.

More students were happy with the arrangements of the library resources when inquiring about the proper study accommodation and suitable furniture of the library resources. A higher number of respondents (68.2%) stated that they were satisfied the library environment. 21% said it was highly satisfied while 10.8% specified it as being fair. And also they identified it to be unsatisfied because there is some noise in the library as there were discussion etc. study rooms are not separated. Moreover, respondents complained of space problems on weekends since they are not able to find a place for study. When summarizing the level of satisfaction on library facilities including infrastructure, space and some other facilities were in good condition. Therefore it is important to identify facilities that users showed less satisfaction, in order to take necessary measures to improve those facilities.

Ranking the Service Quality and Satisfaction Such As a Whole

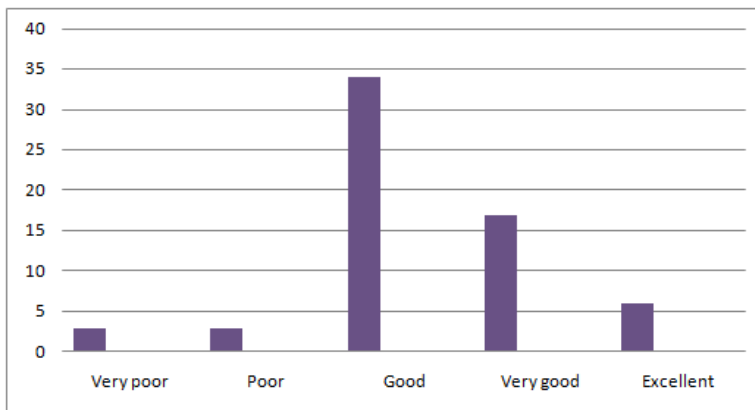


Fig. 6 Service quality as a whole

Students were also asked to rate the overall library service quality based on five Likert scale: very poor, poor, good, very good and excellent. The results show that out of 63 respondents 34 (54%) and 17 (27%) of the respondents rate the overall library service quality as good and very good respectively. The respondents were satisfied with the library services provided, as overall.

Suggestions and Conclusion

The study was to evaluate the services and information resources provided by Library and presented information on the users' satisfaction towards the libraries services, infrastructure and facilities. The study found that, library users were satisfied regarding the services and facilities as well as collection in the library. When taking the results of the study into consideration it reveals that the users are quite satisfied with the resources and facilities provide by Library. The findings suggest that libraries should improve their service, infrastructure and collections as well as the service quality and serve the user's learning and research needs.

The facilities, infrastructure, collections, activities and services of the library can be upgraded and improved from time to time. The findings of the study can be an important input to the library as decisions can be made based on this research. The statistical Information and analysis can be used to plan for improve the policy planning and development.

Based on the analysis of this study, it is evident that majority of the students are satisfied with the resources in the Library. The students have shown preference in using e-resources and databases and also Online Public Access Catalogue (OPAC) is an important tool that could be utilized in order to find out the available resources. The Library already used these methods for dissemination of information for the students. Electronic formats of the required reading has been distributed via email for students since it is a widely used facility among these the students/researches.

It is found in the research that required books on specific subjects are not available in the library, for feedback must this, be taken from students and the collection of the books in the library must be increased according to the requirement of the students. It is much pleased to states that users/Students of this study were not totally dissatisfied with the library information resources and services rendered to them. Overall, the library has received positive response from the participants.

Acknowledgements

The Students of PGIAR for their valuable contribution. The Staff of the PGIAR Library.

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Utilization of Online Search Engines in the Day-to-Day Lives of Residential Undergraduate Students: A Case Study of Sri Krishna Adithya College of Arts and Science (SKACAS), Coimbatore, India

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Abstract

Search engines are important for everyone in their day-to-day lives. This paper explored the usage of online search engines by residential undergraduate first year students at Sri Krishna Adithya College of Arts and Science. The Sri Krishna Adithya College of Arts and Science has hostel facilities for only undergraduate students, and overall, 312 students are residing in the hostel. The present study focuses only on first-year residential undergraduate students. The data is collected using the online questionnaire method. The data collection tool is used online through Google Forms. The online questionnaire will be distributed to the 153 students via WhatsApp. The online questionnaire was completed by 97 students out of 153. The present study aims to analyze the following: department, age, region of respondents, frequency of internet use, time spent using the internet, location of internet use, awareness of search engines, purpose and benefits of using search engines, use of search strategy, and problems with using search engines. It was discovered that 87 students (89.7%) used the internet frequently in their daily lives. According to the study, 51 (52.6%) of the students "always" use the Internet to find seminar proposal material and thesis.

Keywords: Search Engine, Use of Search Engine, User Study, Day to day life, Undergraduate students.

Introduction

People are constantly connected to the internet in their daily lives. Previously, the internet and search engines were uncommon, but now high-speed internet and a variety of search engines are available all over the world. The younger generations are always connected to the internet and frequently search and use search engines. A search engine is a web-based tool that enables users to locate information on the World Wide Web. A search engine is a software programme that helps people find the information they are looking for online using keywords or phrases. Even with millions of websites available, search engines are able to deliver results swiftly by continuously monitoring the Internet and indexing every page they come across. When a user enters a search phrase, the search engine examines the page titles, contents, and keywords it has indexed on the user's chosen website before using algorithms to generate a list of websites, with the more pertinent ones appearing first. Search engines like Google, Bing, and Yahoo are well-known.

A. Sri Krishna Adithya College of Arts and Science Profile

The Sri Krishna institutions are located in Coimbatore, India. The Sri Krishna institutions have five institutions, such as the Sri Krishna College of Engineering and Technology (SKCET), the Sri Krishna College of Technology (SKCT), the Sri Krishna Arts and Science College (SKCAS), the Sri Krishna Adithya College of Arts and Science (SKACAS), and the Sri Krishna Polytechnic College (SKPTC). Sri Krishna Adithya College of Arts and Science (SKACAS), as part of Sri Krishna Institutions (since 1980), was established in May 2015. Sri Krishna Adithya College of Arts and Science (SKACAS) offers 18 undergraduate and postgraduate programmes and four research centers. SKACAS has two major streams: commerce and computer science. The

Department of Commerce has different courses such as Computer Applications (CA), Corporate Secretaryship (CS), Information Technology (IT), Business Process Services (BPS), Professional Accounting (PA), Accounts & Finance (A&F), Banking & Insurance (B&I), and BBA CA and Finance. The computer science stream has various departments such as Computer Science (CS), the Department of Computer Applications (CA), the Department of Information Technology (IT), the Department of Computer Technology (CT), Data Science (DS), and Artificial Intelligence and Machine Learning (AI&ML). SKACAS has four departments in the arts and sciences stream, including mathematics, English, psychology, and Tamil.

Review Literature

From 2000 to 2015, some of the studies examined the use of search engines by undergraduate and postgraduate students. In today's world, everyone has access to the internet and obtains information from various search engines, but there have been no studies on the search engine in recent years. Oni *et al.*, (2021) investigated the use of search engines by Students of Auchi Polytechnic, Auchi, Edo state Nigeria. The study employed a descriptive survey method. Questionnaire was the instrument used for data collection. The study revealed that majority of the students used Google and yahoo search on daily basis. The study also revealed that most students acquired their knowledge of search engine use through self-Study, frequent use of internet, trial and error, online training and friends/colleagues.

Sivasubramanian and Gomathi (2019) attempted to analysis the perspective of the search engines among the faculty members of autonomous colleges in the Coimbatore. The study had the objective of analysis the level of computer and internet proficiency of the faculty members, purpose of using the search engines and evuation of the search engines. The study highlighted the relationship of the designation and their proficiency of computer and internet search skill and proved that difference between using the search engines by their age.

Apuke and Iyendo (2018) investigated the place of the internet in academic research and learning of students, through both quantitative and qualitative research approaches, using 250 undergraduate students in three selected universities within North-Eastern Nigeria. Kurniasih (2018) analyzed how the use of search engines by students, especially by students of the Library and Information Science Program, Faculty of Communication Sciences, Universitas Padjadjaran. This study used the mixed method. The research data was obtained through questionnaires, in-depth interviews, observations and literature studies. The results of the study showed that in learning activities, the respondents used search engines to find the references for college assignments and thesis writing material.

Thenmozhi and Gomathi (2018) observed the availability and use of internet search engines among B.Ed. Students of Sri Vidya Mandir College of Education. Nwokedi and Nwokedi (2017) investigated the Internet Search Engine use behaviour of lecturers in the Faculty of Medical Sciences, University of Jos. The study adopted the survey research design. The entire population of 133 academic staff members in the Faculty was adopted for the research. Descriptive survey was the research method used for the study. The instrument used for data collection was questionnaire. Descriptive statistics such as frequency counts and percentages were used to analyze the data. The findings revealed among others that Google was the most popular search engine amongst the lecturers. Ogbole (2017) determined the types of Online search engines used by undergraduate students in Nigerian Universities. The sample comprised one hundred and fifty-one (N-151) undergraduate students of two selected universities in Ogun and Oyo States. Data were collected from the participants with a self-structured validated questionnaire. Results were obtained through descriptive statistics of simple percentage, mean, standard deviation and

ANOVA were used to test the formulated hypotheses at 0.005 significance level. The findings revealed that the most famous search engines were Google and yahoo. Hussain (2015) discussed the search engines, an effective tool for library professionals.

The study determined the various aspects of search engine including background of search engines, and how search engines work. Further, it analysed the internet search techniques, i.e., basic, advanced and refine search. The paper highlighted the effective use in searching information on internet on the basis of Boolean operators AND, OR, NOT and proximity searching, etc. Finally, it highlighted the categories of search engines. Balasubramanian *et al.*, (2016) investigated the outcome of the use of Google search engine for the choice of material and the reading habits among the research supervisors, research scholars, faculty members and graduate students.

Baro *et al.*, (2010) investigated students' ability to use different Internet search engines (ISEs) in Universities in the Niger Delta Region of Nigeria. To revealed the types of ISEs used, and identify the source through which students acquire the skills. The study adopted a descriptive survey method. Questionnaire and interview method was adopted to collect data. A total of 300 completed and returned copies were used for analyses using frequency counts and simple percentage to answer the research questions, and Z -test statistical tool to test formulated hypotheses.

The study revealed that majority of the students occasionally use Internet search engines to retrieve information resources. Kumar and Rai (2008) described the concept of federated searching and demarcates the difference between metasearching and federated searching which are synonymously used. Due to rapid growth of scholarly information, need of federated searching arises. Advantages of federated search have been described along with the search model indicating old search model and federated search model. Various technologies used for federated searching have been discussed.

Methodology

The present study data were collected from residential undergraduate first-year students at Sri Krishna Adithya College of Arts and Science. The Sri Krishna Adithya College of Arts and Science has undergraduate and postgraduate programmes with residential facilities. These hostel facilities have only undergraduate students, and overall, 312 students are residing in the hostel. The 65 students are in their third year, the 94 in their second year, and the 153 in their first year. Students in the twenty-first century are most aware of and use the internet and social media platforms for study and entertainment. The present study focuses only on first-year residential undergraduate students. The data is collected using the online questionnaire method. The data collection tool is used online through Google Forms. The online questionnaire will be distributed to the 153 students via WhatsApp. The online questionnaire was completed by 97 students out of 153. There were 63.40 percent of respondents. The present study aims to analyze the following: department, age, region of respondents, frequency and time spent using the internet, location of using the internet, awareness of search engines, purpose of using search engines, benefits and satisfaction of using search engines, use of search strategy, and problems in using search engines. The data were analysed using the SPSS statistical package and using simple calculations.

Objectives of the Study

The following are the major objectives of the study:

1. To identify the school and department-wise respondents.
2. To assess respondents by region and age.

3. To determine the frequency with which undergraduate students use the Internet.
4. To find out the time spent using the Internet.
5. To measure the location of internet use by the students.
6. To understand the awareness and purpose of using search engines.
7. To identify the benefits and problems of using the Internet.

Results

TABLE I SCHOOL WISE RESPONDENTS

S. No.	School	Nos.	Percent
1	Commerce	67	69.1
2	Computer Science	30	30.9
	Total	97	100

There are four streams at Sri Krishna Adithya College of Arts and Science: commerce, computer science, management, and arts and sciences. The 15 departments are concerned with commerce and computer sciences. According to Table I, the number of respondents by commerce was 67 (69.1%), followed by 30 for Computer Science (30.9%).

TABLE II DEPARTMENT WISE RESPONDENTS

S. No.	Department	Frequency	Percent
1	B. Com Information Technology	2	2.1
2	B.Com and M.Com Commerce	18	18.6
3	B.Com Accounting & Finance	14	14.4
4	B.Com Business Process Services	2	2.1
5	B.Com Computer Applications	11	11.3
6	B.Com Corporate Secretary ship	3	3.1
7	B.Com Information Technology	2	2.1
8	B.Com Professional Accounting	8	8.2
9	B. Sc Artificial Intelligence & Machine Learning	3	3.1
10	B. Sc Computer Science	8	8.2
11	B. Sc Computer Technology	9	9.3
12	B. Sc Data Science	3	3.1
13	B. Sc Information Technology	4	4.1
14	BBA CA	7	7.2
15	BCA Computer Applications	3	3.1
	Total	97	100

Table II shows the department-wise respondents. The highest response was received by B.Com Commerce, which was 18 (8.6%), followed by B.Com Accounting & Finance, 14 (14.4%), B.Com Computer Applications, 11 (11.3%), B.Sc Computer Technology, 9 (9.3%), B.Com Professional Accounting & B.Sc Computer Science, 8 (8.2%), BBA CA, 7 (7.2%), B.Sc Information Technology, 4 (4.1%), B.Com Corporate Secretaryship, B.Sc Artificial Intelligence & Machine Learning, B.Sc Data Science, BCA Computer Applications received 3 response (3.1%), while B.

Com. Information Technology, B. Com. Business Process Services, and B. Com. Information Technology received the fewest respondents (2.1%).

Age-wise responses are shown in Table III. The highest response was from the 18–20 age group, which was 92 (94.8%), followed by the 20–23 age group, which was 4 (4.1%), and the lowest response was from the 24-26 age group, which was 1 (1%).

TABLE III AGE WISE RESPONDENTS

S. No.	Age	Frequency	Percent
1	18-20	92	94.8
2	20-23	4	4.1
3	24-26	1	1
	Total	97	100

TABLE IV REGION WISE RESPONDENTS

S. No.	Area	Frequency	Percent
1	Rural	58	59.8
2	Urban	39	40.2
	Total	97	100

Table IV reveals that, when responses were divided by region, rural had the largest number of responses (58 and 59.8%) and it was followed by urban, who was next with 39 (40.2%).

The frequency of internet usage is shown in Table V. The internet is now an essential part of everyone's life. The students 87 (89.7%) used the internet frequently in their daily lives, followed by once a week and twice a week (3 and 3.1%, respectively). 4 (4.1%) students occasionally use the internet in their daily lives.

TABLE V FREQUENCY OF INTERNET USE

S. No.	Description	Frequency	Percent
1	Daily	87	89.7
2	Once in a week	3	3.1
3	Twice in a week	3	3.1
4	Occasionally	4	4.1
	Total	97	100

The majority of students, 34 (35.1%), spend 1-2 hours per day on the internet, followed by 30 (30.9%) who use the internet for more than 3 hours. It has been discovered that 19 (19.6%) of students use the internet for 2-3 hours per day. The 14 (14.1%) students use one hour per day.

TABLE VI TIME SPENT USING THE INTERNET

S. No.	Time	Frequency	Percent
1	One hour	14	14.4
2	1-2 hour	34	35.1
3	2-3 hour	19	19.6
4	More than 3 hour	30	30.9
	Total	97	100

TABLE VII LOCATION OF INTERNET USE

S. No.	Location	Frequency	Percent
1	College	9	9.3
2	Hostel	82	84.5
3	Other Places	6	6.2
	Total	97	100

Table VII indicates the location of internet use by students. According to Table VII, the hostel had the most internet users (82 and 84.5%), followed by colleges (9 and 9.3%), and other locations had the least (6.2%).

TABLE VIII AWARENESS OF SEARCH ENGINE

S. No.	Description	Frequency	Percent
1	Aware	83	85.6
2	Not Aware	14	14.4
	Total	97	100

TABLE IX PURPOSE OF USING SEARCH ENGINES

S. No.	Description	Always	%	Sometimes	%	Never	%	N	Mean	Std. Deviation
1	Reference to assignments from articles, journals, theses, article reviews.	47	48.5	47	48.5	3	3.1	97	1.55	.559
2	Looking for seminar proposal material and thesis.	51	52.6	43	44.3	3	3.1	97	1.51	.561
3	Daily information needs.	36	37.1	56	57.7	5	5.2	97	1.68	.569
4	Looking for the problem-solving tips and tricks	46	47.4	46	47.4	5	5.2	97	1.58	.592
5	To search for the terms that are not understood	42	43.3	50	51.5	5	5.2	97	1.62	.585
6	Search for a person's profile and life	44	45.4	29	29.9	24	24.7	97	1.79	.816
7	When too confused about where to look, starts with Google then go directly to their respective specialties, for example for music there is Spotify, movies on YouTube, memes on Instagram.	39	40.2	53	54.6	5	5.2	97	1.65	.578

Table VIII demonstrates that students are aware of search engines; the maximum students aware the search engines was 83 (85.6%) and the 14 (14.4%) students are not aware the search engine.

Table IX shows the purpose of using search engines. The search engine is used by the majority of 51 (52.6%) of the students "always" to find seminar proposal material and thesis, and 36 (37.1%) of the least-used students are "always" using the search engine for their daily information needs. It was discovered that the majority of 56 (57.7%) students "sometimes" used the search engine for

their daily information needs, and 29 (29.9%) of fewer students "sometimes" used the search engine to know the other person's profile and life.

It is further found that the majority of 24 (24.7%) students "never" use the search engine to see the other person's profile and life, and only 3 (3.1%) of fewer students never use the search engine for reference to assignments from articles, journals, theses, and article reviews. and looking for seminar proposal material and theses.

TABLE X BENEFITS OF USING SEARCH ENGINES

S. No.	Description	Frequency	Percent
1	Informative	60	61.9
2	Easy to use	17	17.5
3	Time Saving	4	4.1
4	More useful	16	16.5
	Total	97	100

Table X indicates the benefits of using search engines. 60 (61.9%) of students who use search engines find them informative, while 17 (17.5%) find them simple to use. It has been discovered that 16 (16.5%) students are more useful, while 4 (4.1%) students save time.

TABLE XI USE OF SEARCH STRATEGY

S. No.	Description	Frequency	Percent
1	Using	81	83.5
2	Not Using	16	16.5
	Total	97	100

The most important aspect of search is search strategy. Students in the twenty- first century are familiar with the internet. The search strategy is known and used by 81 (83.5%) of the students, with 16 (16.5%) not using it.

Table XII shows the problems with using search engines. This table analyses the five-point scale such as "strongly disagree," "disagree," "neither agree nor disagree," "agree," and "strongly agree." It has been discovered that the highest number of 36 (37.1%) students strongly agree that they face the problem of no clear explanation of the search results, and 11 (11.3%) fewer students agree.

It was discovered that 24 (24.7%) students strongly agree that they are experiencing the problem of unclear search instructions, and 13 (13.4%) students least strongly disagree.

It was also discovered that 36 (37.1%) students strongly agree that the Internet is too slow, while 11 (11.3%) strongly disagree. It is further found that 32 (33.1%) students strongly agree that they are receiving too much returned information, and 11 (11.3%) students strongly disagree.

TABLE XII PROBLEMS IN USING SEARCH ENGINES

S. No.	Description	Strongly disagree (%)	Disagree (%)	Neither agree not disagree (%)	Agree (%)	Strongly agree (%)	Mean	Std. Deviation	Rank
1	No clear explanation of the search results	16 (16.5%)	21 (21.6%)	13 (13.4%)	11 (11.3%)	36 (37.1%)	3.31	1.550	3
2	The search instructions are not clear	13 (13.4%)	19 (19.6%)	19 (19.6%)	22 (22.7%)	24 (24.7%)	3.26	1.379	4
3	Too slow	11 (11.3%)	19 (19.6%)	18 (18.6%)	13 (13.4%)	36 (37.1%)	3.45	1.444	1
4	Too much returned information	11 (11.3%)	20 (20.6%)	19 (19.6%)	15 (15.5%)	32 (33.1%)	3.38	1.417	2

TABLE XIII SATISFACTION OF SEARCH ENGINES

S. No.	Description	Frequency	Percent
1	Fully satisfied	34	35.1
2	Partially satisfied	42	43.3
3	Least satisfied	10	10.3
4	No comments	11	11.3
	Total	97	100

Table XIII displays the satisfaction of search engines. 42 (43.3%) students were partially satisfied, followed by 34 (35.1%) fully satisfied, 10 (10.3%) least satisfied, and 11 (11.3%) students had no comments.

Discussion and Conclusion

1. Nowadays, all students in any course are aware of search engines and the use of the internet to obtain information. The young generation of 18–21-year-old students is familiar with various search engines and how to find relevant information.
2. Previously, the internet had arrived, and most rural residents were aware that they would be using the internet in urban areas. In today's world, everyone owns a Smartphone and uses a search engine to find information about any location.
3. The frequency with which students use the internet for their studies and other purposes is increasing. If the students have any questions about the subject or other information, they will spend the entire day searching the internet. The residential students are mostly using the internet and search engines in their residential places. Compared to the day scholars, the residential students have more time to use the internet in their residential rooms.
4. The residential students are using the search engine for their seminar proposal material and thesis, their daily information needs, and to find problem solving tips and tricks. The students are then perplexed as to where to look, beginning with Google and then proceeding directly to their respective specialties, such as music on Spotify, movies on YouTube, and memes on Instagram.
5. The search engine information and results are very useful and informative. The search engine is simple to use, and it saves time by eliminating unnecessary searches.

6. The students understand the fundamentals of using a search engine, which terms are indexes in their algorithms, and how to filter more results.
7. The young students' issue with search engines is that they return too much information, sometimes too slowly, and some of the results are unclear.

Many popular search engines are available nowadays, and the majority of people use Google, Yahoo, and Bing search engines. These search engines are user friendly and provide more information. The search engines are mandatory for their living needs. Students in the rural area have difficulty using the search strategy. Hence, all the librarians should conduct a session on searching strategies and techniques for the undergraduate students to learn how to use the search engine and the library's resources.

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Leveraging Social Media for Effective Marketing of Library Products and Services in Medical Libraries

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Abstract

The marketing of library products and services in medical libraries has evolved significantly with the advent of social media platforms. This article explores the impact of social media on promoting and enhancing the visibility of medical library resources and services. It highlights the advantages of utilizing social media platforms for marketing purposes and discusses various strategies that can be employed effectively. Social media provides a unique opportunity for medical libraries to engage with their target users, including medical professionals, researchers, and students, on a broader scale. By leveraging platforms such as Twitter, Facebook, and LinkedIn, libraries can effectively communicate their resources, services, events, and initiatives. This article emphasizes the importance of incorporating social media into the marketing strategies of medical libraries. By doing so, libraries can enhance their visibility, expand their user base, and effectively serve the information needs of the medical community.

Keywords: Social media, Effective marketing, Library products, Library services, Medical libraries, Promoting, Enhancing visibility, Resources, Content creation, Collaboration, Cost-effective, Interactive communication, Timely information

Introduction

In the digital age, libraries face the challenge of adapting to the changing needs and expectations of their users. To remain relevant and reach a wider audience, libraries have embraced the power of social media as a marketing tool. Medical libraries play a critical role in supporting healthcare professionals, researchers, and students in their pursuit of knowledge. However, simply offering a vast collection of resources and services is no longer sufficient.

Libraries must actively promote their offerings and engage with their target audience in meaningful ways. Social media platforms, with their widespread popularity and user engagement, have emerged as invaluable tools for this purpose. Social media offers medical libraries the opportunity to reach a global audience and connect with individuals who may not otherwise be aware of their resources and services. By harnessing platforms such as Twitter, Facebook, Instagram, and LinkedIn, libraries can showcase their collections, highlight specialized services, and promote upcoming events.

These platforms enable libraries to create interactive communities, foster engagement, and facilitate knowledge sharing among users. Moreover, social media provides a platform for libraries to communicate directly with their patrons, gather feedback, and tailor their offerings to better meet user needs. The interactive nature of social media allows libraries to build relationships with their audience and establish themselves as go-to sources of reliable information in the medical field. By embracing social media platforms strategically, libraries can enhance their visibility, expand their user base, and effectively serve the information needs of the medical community.

Understanding the Target Audience

Understanding the target audience is a crucial step in effectively marketing library products and services in medical libraries. It involves identifying the specific user groups, analysing their needs and preferences, and tailoring marketing strategies accordingly:

1. *Identifying the Target Audience in Medical Libraries:* To begin, medical libraries must identify their target audience. This may include healthcare professionals, medical researchers, students, or specific departments within healthcare institutions. By understanding who they are trying to reach, libraries can create marketing campaigns that resonate with their intended users.
2. *Analysing Their Needs and Preferences:* Once the target audience is identified, it is essential to explore deeper into their needs and preferences. This can be accomplished through user surveys, focus groups, or analysing usage patterns and feedback. Understanding the challenges, information requirements, and pain points of the audience allows libraries to develop tailored solutions and services that address their specific needs effectively.
3. *Tailoring Marketing Strategies Based on Audience Characteristics:* Based on the insights gained from analysing the target audience, libraries can customize their marketing strategies. This includes choosing appropriate communication channels, messaging, and content formats that align with the preferences of the audience. For example, if the target audience consists of busy healthcare professionals, concise and easily accessible marketing materials may be more effective.

Furthermore, libraries can highlight the specific benefits and value their products and services provide to the audience. Whether it's comprehensive access to medical databases, research support, or specialized training programs, emphasizing these unique selling points will resonate with the target audience and drive engagement. By understanding the target audience, analysing their needs and preferences, and tailoring marketing strategies accordingly, medical libraries can effectively promote their products and services. This audience-centric approach ensures that libraries are providing relevant and valuable resources that meet the specific requirements of their users, ultimately leading to increased usage and user satisfaction.

Developing a Social Media Strategy

Developing a social media strategy is crucial for medical libraries to effectively market their products and services. This involves setting goals and objectives, selecting the appropriate social media platforms, and creating a consistent brand voice and visual identity. Here's a detailed elaboration on each aspect:

1. *Setting Goals and Objectives:* Medical libraries need to define clear goals and objectives for their social media presence. This could include increasing brand awareness, driving website traffic, promoting specific resources or events, or engaging with the library community. Setting SMART (Specific, Measurable, Achievable, Relevant, Time-bound) goals helps libraries track their progress and measure the effectiveness of their social media efforts.

2. *Selecting the Right Social Media Platforms:* Not all social media platforms are equally effective for reaching the target audience of medical libraries. Researching and understanding the preferences and behaviour of the audience is essential in selecting the right platforms. For example, Twitter may be suitable for sharing quick updates and news, while platforms like LinkedIn or Research Gate may be more effective for engaging with professionals and researchers in the medical field.
3. *Creating a Consistent Brand Voice and Visual Identity:* Maintaining a consistent brand voice and visual identity across social media platforms helps to establish recognition and build trust with the audience. Libraries should define their brand voice, which reflects their personality, tone, and values. Additionally, developing a visual identity, including colours, fonts, and imagery, helps create a cohesive and recognizable brand presence. Consistency in messaging and visuals ensures that the library's social media content is instantly recognizable and reinforces the library's brand image.

By developing a social media strategy that includes setting goals and objectives, selecting the appropriate platforms, and creating a consistent brand voice and visual identity, medical libraries can effectively utilize social media to engage with their target audience, promote their pro

Showcasing Library Resources and Services

Showcasing library resources and services is essential for medical libraries to effectively communicate the value they provide to their users. This involves highlighting collections and databases, promoting specialized services and expertise, and showcasing educational resources and events.

1. *Highlighting Collections and Databases:* Medical libraries can showcase their extensive collections and databases to attract users and demonstrate the breadth and depth of available resources. This can be done through online platforms, such as the library website or social media channels, by featuring key resources, new acquisitions, or highlighting specific databases that are particularly relevant to the medical field. By emphasizing the variety and quality of their collections, libraries can encourage users to explore and utilize these resources.
2. *Promoting Specialized Services and Expertise:* Medical libraries often offer specialized services such as literature searches, research support, or assistance with evidence-based practice. Promoting these services helps users understand the unique expertise and assistance available to them. Libraries can create dedicated web pages, informational brochures, or social media posts that highlight the services they offer, including details on how users can access and benefit from them. Demonstrating the library's commitment to supporting users' information needs and research endeavours enhances its value and fosters engagement.
3. *Showcasing Educational Resources and Events:* Medical libraries frequently organize educational initiatives such as workshops, training sessions, webinars, or lectures. Showcasing these resources and events ensures that users are aware of the learning opportunities available to them. Libraries can advertise these events through their website, social media platforms, or email newsletters, providing detailed information on the topics,

presenters, and registration process. By actively promoting educational resources and events, libraries can foster a sense of community, facilitate knowledge sharing, and position themselves as a hub for continuous learning and professional development.

By effectively showcasing library resources and services, medical libraries can increase awareness, engagement, and utilization among their target audience. Whether it's highlighting collections and databases, promoting specialized services and expertise, or showcasing educational resources and events, libraries can demonstrate their value and support to the medical community, ultimately enhancing their impact and relevance.

Engaging the Audience

Engaging the audience is a key aspect of marketing library products and services in medical libraries. It involves fostering two-way communication, encouraging user-generated content and testimonials, and addressing user inquiries and providing support. Here's a detailed elaboration on each aspect:

1. *Fostering Two-Way Communication:* Engaging the audience goes beyond one-way communication. Medical libraries should actively encourage and facilitate two-way communication with their users. This can be achieved through social media platforms, online forums, or dedicated feedback channels. Libraries should actively listen to user feedback, respond to queries, and participate in discussions. By fostering dialogue, libraries can gain valuable insights, build stronger connections with users, and create a sense of community.
2. *Encouraging User-Generated Content and Testimonials:* User-generated content, such as reviews, recommendations, or success stories, can be a powerful tool for marketing library products and services. Medical libraries can encourage users to share their experiences and insights through testimonials, guest blog posts, or social media shout-outs. Sharing user-generated content not only provides authentic perspectives but also demonstrates the library's impact and value through real-life examples. It also encourages user involvement and builds a sense of ownership within the library community.
3. *Addressing User Inquiries and Providing Support:* Promptly addressing user inquiries and providing support is essential for maintaining engagement and user satisfaction. Medical libraries should establish clear channels for users to reach out with questions, concerns, or requests for assistance. This can include email support, live chat services, or dedicated help desks. By promptly responding and providing knowledgeable support, libraries demonstrate their commitment to user needs and reinforce a positive user experience.

By actively engaging the audience through two-way communication, encouraging user-generated content and testimonials, and addressing user inquiries and providing support, medical libraries can foster a vibrant and interactive community around their products and services. This engagement not only strengthens the relationship between the library and its users but also enhances the library's reputation and credibility within the medical community.

Collaborating with Stakeholders

Collaborating with stakeholders is a valuable approach for marketing library products and services in medical libraries. This involves partnering with healthcare organizations and research institutions, collaborating with medical societies and professional associations, and co-promoting events and sharing resources. Here's a detailed elaboration on each aspect:

1. *Partnering With Healthcare Organizations and Research Institutions:* Medical libraries can establish partnerships with healthcare organizations, hospitals, clinics, and research institutions. These collaborations can involve jointly organizing workshops, seminars, or training sessions on topics of mutual interest. By working together, libraries can leverage the expertise and resources of these institutions, expanding their reach and impact. Collaborative initiatives can also include sharing access to specialized databases, co-creating research guides, or conducting joint research projects, enhancing the value and relevance of library services within the healthcare community.
2. *Collaborating with Medical Societies and Professional Associations:* Engaging with medical societies and professional associations offers opportunities to market library products and services to a specific target audience. Libraries can collaborate with these organizations by offering support in research activities, hosting information booths at conferences or annual meetings, or providing guest speakers for educational events. Partnering with these entities establishes the library's presence within the professional community and strengthens its credibility as a trusted information provider.
3. *Co-Promoting Events and Sharing Resources:* Medical libraries can collaborate with stakeholders to co-promote events, share resources, and cross-promote each other's offerings. For instance, libraries can collaborate with local healthcare organizations to promote library workshops or training sessions to their staff or students. Similarly, libraries can share resources, such as educational materials, research findings, or relevant publications, with their collaborators for wider dissemination. This collaborative approach fosters a sense of cooperation and enables libraries to tap into the existing networks and audiences of their partners.
- 4.

By actively collaborating with stakeholders, medical libraries can extend their reach, enhance their resources, and amplify their marketing efforts. Collaborative initiatives not only benefit the library but also foster a mutually beneficial relationship with stakeholders, leading to a stronger library presence within the medical community and increased utilization of library products and services.

Measuring Success and Making Improvements

Measuring success and making improvements is a crucial step in the marketing of library products and services in medical libraries. It involves utilizing social media analytics and metrics, evaluating reach, engagement, and conversions, and adjusting strategies based on insights and feedback. Here's a detailed elaboration on each aspect:

1. *Utilizing Social Media Analytics and Metrics:* Medical libraries can leverage social media analytics tools to track and measure the performance of their marketing efforts. These tools provide valuable data on metrics such as reach, impressions, clicks, likes, shares, and

comments. By analysing this data, libraries can gain insights into the effectiveness of their social media campaigns, identify trends, and understand user behaviour.

2. *Evaluating Reach, Engagement, and Conversions:* Evaluating reach, engagement, and conversions helps medical libraries assess the impact of their marketing strategies. Reach measures the number of people who have been exposed to library content, while engagement reflects the level of interaction and involvement from users. Conversions refer to desired actions taken by users, such as signing up for a workshop or accessing a resource. By analysing these metrics, libraries can determine the success of their marketing efforts and identify areas for improvement.
3. *Adjusting Strategies Based on Insights and Feedback:* Based on the data collected and user feedback received, medical libraries can make informed decisions to refine their marketing strategies. This may involve modifying content types, adjusting posting schedules, targeting specific audience segments, or experimenting with different approaches. By continuously monitoring metrics, libraries can identify patterns, trends, and areas of improvement, allowing them to optimize their marketing efforts and deliver more impactful messages to their audience.

By effectively measuring success and making improvements, medical libraries can refine their marketing strategies, enhance user engagement, and increase the effectiveness of their promotional efforts. Utilizing social media analytics, evaluating reach, engagement, and conversions, and adjusting strategies based on insights and feedback enable libraries to optimize their marketing initiatives and ensure they are effectively reaching and engaging their target audience.

Overcoming Challenges and Best Practices

Overcoming challenges and implementing best practices are essential for effective social media marketing in medical libraries. This involves addressing common challenges specific to social media marketing in the medical library context and implementing best practices to maximize impact and engagement. Here's a detailed elaboration on each aspect:

1. *Addressing Common Challenges in Social Media Marketing for Medical Libraries:* Social media marketing for medical libraries may face challenges such as limited resources, time constraints, compliance with privacy regulations, and content relevancy. It is important to address these challenges by developing a clear social media strategy, prioritizing content creation and curation, ensuring compliance with regulations, and regularly evaluating and adjusting marketing efforts.
2. *Implementing Best Practices for Maximizing Impact and Engagement:* To maximize the impact and engagement of social media marketing, medical libraries can follow best practices such as defining clear goals, tailoring content for the target audience, utilizing multimedia elements, maintaining consistency in posting, engaging with followers, and monitoring analytics for continuous improvement. It is crucial to stay updated with the latest trends and technologies, explore collaboration opportunities, and actively participate in relevant discussions and communities to enhance the library's social media presence.

By overcoming challenges and implementing best practices, medical libraries can effectively leverage social media as a powerful tool for marketing their products and services. This will enable them to increase visibility, engage with their target audience, and ultimately enhance the value and impact of the library within the medical community.

Benefits

Marketing library products and services in medical libraries through social media provides numerous advantages that contribute to the library's visibility, engagement, and overall success. Here are some key advantages of utilizing social media platforms for marketing in medical libraries:

1. *Expanded Reach and Accessibility:* Social media platforms have a vast user base, allowing medical libraries to reach a broader audience beyond their physical location. By leveraging platforms like Twitter, Facebook, Instagram, and LinkedIn, libraries can connect with healthcare professionals, researchers, students, and other stakeholders from around the world. This expanded reach enhances the accessibility of library products and services to a wider community.
2. *Cost-Effective Promotion:* Traditional marketing methods such as print advertisements or physical event promotions can be costly for medical libraries, especially considering the limited budgets they often operate within. Social media provides a cost-effective alternative, as creating profiles and posting content on platforms are generally free. Libraries can allocate their resources more efficiently, focusing on creating engaging content rather than spending on expensive marketing campaigns.
3. *Interactive Engagement:* Social media platforms facilitate direct and interactive communication with library users. Users can engage with the library through comments, likes, shares, and direct messages, providing valuable feedback, asking questions, or seeking assistance. This two-way communication fosters a sense of community, trust, and loyalty. Libraries can respond promptly, address concerns, and provide personalized recommendations, enhancing user satisfaction and building lasting relationships.
4. *Showcasing Library Resources and Services:* Social media allows medical libraries to showcase their resources, services, and events in a visually appealing and engaging manner. Libraries can share images, videos, and info graphics to highlight their collections, databases, e-books, specialized services, and educational initiatives. The ability to present information in an attractive format captures users' attention and increases the likelihood of exploring and utilizing library resources.
5. *Timely Information Dissemination:* Social media enables medical libraries to provide real-time updates and timely information to their audience. Libraries can announce new acquisitions, upcoming workshops, seminars, webinars, and other events instantly, ensuring users are aware of the latest offerings. This immediacy ensures that users stay informed and engaged, maximizing the utilization of library resources and services.

6. *Collaborative Opportunities*: Social media platforms offer opportunities for collaboration between medical libraries and various stakeholders. Libraries can collaborate with healthcare organizations, research institutions, industry experts, and other libraries to co-promote events, share resources, and engage in knowledge-sharing initiatives. Collaborations enhance the visibility of library products and services by tapping into the existing networks and expertise of these partners.
7. *Measurable Analytics and Insights*: Social media platforms provide comprehensive analytics tools that allow libraries to measure the effectiveness of their marketing efforts. Metrics such as reach, engagement rates, click-through rates, and audience demographics offer valuable insights into user behaviour and preferences. Libraries can analyse these metrics to fine-tune their strategies, tailor content to user interests, and continuously improve their marketing campaigns.

Future Trends in Social Media for Medical Libraries

In recent years, social media has undergone significant transformations, and emerging trends are shaping the way information is disseminated and consumed. For medical libraries, staying attuned to these trends is crucial for effective marketing. Several noteworthy trends include:

1. *Video Dominance*: Video content is experiencing unprecedented popularity across social media platforms. Short-form videos, live streams, and interactive content are becoming increasingly influential. Medical libraries can leverage this trend by creating visually engaging content, such as tutorial videos, virtual library tours, or interviews with healthcare experts.
2. *Rise of New Platforms*: The social media landscape is ever-evolving with the emergence of new platforms. While established platforms like Facebook and Twitter remain vital, medical libraries should explore newer platforms like TikTok, Instagram Reels, or emerging niche platforms to connect with different audience demographics.
3. *Authenticity and Transparency*: Users are gravitating towards authentic and transparent content. Medical libraries can build trust by showcasing behind-the-scenes activities, introducing library staff, and providing transparent information about resources. Authenticity resonates with users and enhances the library's credibility.
4. *Social Commerce*: Social media is becoming an increasingly integrated space for e-commerce. Libraries can explore opportunities to integrate social commerce strategies, such as promoting library products, services, or merchandise directly on social platforms.
5. *Immersive Experiences*: Augmented reality (AR) and virtual reality (VR) are gaining traction, offering immersive experiences. Medical libraries can use AR/VR to create virtual exhibits, 3D models of medical resources, or interactive learning experiences, enhancing user engagement.

Proactive Approaches for Staying Ahead in Social Media Trends

To navigate the dynamic landscape of social media effectively, medical libraries can adopt proactive strategies to stay ahead:

1. **Continuous Learning:** Establish a culture of continuous learning within the library staff. Encourage attendance at webinars, conferences, and workshops focused on social media trends. Stay informed about emerging technologies, platforms, and best practices through relevant publications and industry reports.
2. **Agile Adaptability:** Embrace an agile mind-set that allows for quick adaptation to new trends. Experiment with features on existing platforms and explore emerging ones. Be open to testing new content formats and engaging with users in innovative ways.
3. **Cross-Functional Collaboration:** Foster collaboration among different departments within the library. Cross-functional teams can bring diverse perspectives and skills, enabling the library to respond more effectively to evolving trends.
4. **User-Centric Approach:** Prioritize understanding the needs and preferences of the library's audience. Actively seek feedback through surveys, polls, and direct interactions. Tailor social media strategies to align with user expectations and provide valuable, user-centric content.
5. **Strategic Metrics Analysis:** Implement a robust analytics strategy to measure the performance of social media initiatives. Regularly analyse key performance indicators (KPIs) and user engagement metrics. Data-driven insights will guide decision-making and help optimize future marketing efforts.
6. **Crisis Preparedness:** Develop a crisis management plan for potential challenges that may arise on social media. Be prepared to address issues promptly and transparently. A well-prepared response strategy can mitigate the impact of negative situations.

By embracing these recommendations, medical libraries can proactively adapt to emerging trends, ensuring that their social media marketing efforts remain effective, relevant, and aligned with the evolving expectations of their audience.

Conclusion

In the ever-evolving digital landscape, it is crucial for medical libraries to emphasize the importance of continued adaptation and improvement in their social media marketing strategies. Staying up-to-date with the latest trends, technologies, and best practices is essential for remaining relevant and effective. Libraries should continuously evaluate their efforts, analyse metrics, listen to user feedback, and adjust their strategies accordingly. Social media platforms provide a cost-effective way to share information, disseminate educational content, and showcase library expertise, it serves as a powerful tool for enhancing the library's online presence and establishing meaningful connections with the library users. Social media allows libraries to reach a wide audience, increase visibility, promote resources and services, engage with users, and foster a sense of community. By embracing a mind-set of continuous improvement, libraries can optimize their

social media marketing initiatives, adapt to changing user preferences, and ensure long-term success in reaching and engaging their target audience.

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WhatsApp as a Tool for Knowledge Dissemination and Exchange: A Study of Postgraduate Science Students' Perceptions at Mangalore University, Mangalore

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Abstract

The rapid advancement of communication technologies has revolutionized how individuals interact and share information. One such technology, WhatsApp, has gained significant popularity as a versatile communication tool in various domains, including education. This study aims to explore the use of WhatsApp for academic purposes among postgraduate science students at Mangalore University, Mangalore. The research adopts a qualitative approach, employing interviews and surveys to gather data. A sample of postgraduate science students from different disciplines at Mangalore University is selected for the study. The participants' perspectives on using WhatsApp for academic activities, including information sharing, collaborative learning, and communication with peers and instructors, are investigated. The findings reveal that postgraduate science students extensively utilize WhatsApp for academic purposes. Participants reported that WhatsApp facilitates timely information sharing, enhances collaborative learning, and fosters quick communication with peers and instructors. The ease of use, accessibility, and availability of WhatsApp on mobile devices were cited as major advantages by the participants. However, the study also identifies potential challenges associated with WhatsApp usage for academic activities. These challenges include privacy concerns, information overload, distractions, and blurring personal and educational boundaries. Learning, and facilitates the exchange of educational resources.

Keywords: WhatsApp, Academic usage, Postgraduate science students, Collaborative learning, Communication, Mangalore University

Introduction

Digital communication platforms have become an integral part of our daily lives, and their role in education is rapidly expanding. WhatsApp has gained significant popularity among these platforms due to its ease of use, accessibility, and widespread adoption. This study aims to investigate the use of WhatsApp for academic purposes among postgraduate science students at Mangalore University in Mangalore.

Literature Review

Digital reading and its relevance in education have been widely explored in previous studies, providing valuable insights into students' perceptions and the benefits of using digital platforms for academic purposes. This section will review relevant literature on digital reading, focusing on studies conducted in educational contexts and exploring students' perceptions of using WhatsApp or similar platforms for academic activities. Digital Reading in Education: Several studies have highlighted the advantages of digital reading in educational settings. For instance, Veen and Vrakking (2006) emphasized digital texts' interactive and multimodal nature, promoting active engagement and deeper comprehension among students. Similarly, Leu et al. (2013) argued that digital reading facilitates the development of critical literacy skills, such as evaluating the credibility of online sources and engaging in collaborative meaning-making. Al-Rahmi *et al.*, (2017) conducted a study on using WhatsApp for educational purposes among university students

and found that it enhanced communication, collaboration, and information sharing among students. Similarly, Khalid *et al.*, (2019) reported that WhatsApp facilitated academic discussions and knowledge exchange among medical students. Students' Perceptions of WhatsApp for Academics: Students' perceptions play a crucial role in determining the effectiveness and adoption of digital platforms for academic purposes. Dzulkipli *et al.*, (2018) investigated students' attitudes towards WhatsApp for learning and found that students perceived it as a convenient and efficient tool for exchanging course-related information. However, concerns were raised regarding privacy, distractions, and the reliability of information shared on the platform. Theoretical Frameworks: The Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) are commonly used frameworks to understand users' acceptance and adoption of technology. TAM, proposed by Davis (1989), suggests that perceived usefulness and ease of use significantly influence users' acceptance and usage of a technology. UTAUT, developed by Venkatesh *et al.*, (2003), incorporates additional factors such as social influence and facilitating conditions.

Objectives of the Research

This research investigates the extent and nature of WhatsApp's use for academic purposes among postgraduate science students at Mangalore University. It explores reasons for its use, student perceptions of its benefits and limitations, and factors influencing its adoption and usage patterns. By achieving these objectives, the study aims to contribute to our understanding of digital communication platforms in higher education and provide practical recommendations for educators, administrators, and policymakers.

TABLE I GENDER OF THE RESPONDENTS

S. No.	Gender	Respondents
1	Male	17 (16.8%)
2	Female	84 (83.2%)
Total		101 (100%)

As shown in Table I, the gender of the respondents is quite clear: out of the 101 respondents investigated for this study, the overwhelming majority, 84 (83.2%), were females. In contrast, about 17 (16.8%) were males. Surprisingly, most of the students are females, which is higher than their male counterparts.

Table II indicates the perception of the use of WhatsApp as a learning tool. Among all the respondents, 75 (74.3%) respondents opined that they use WhatsApp daily to communicate with my classmates about matters related to course requirements, followed by 21 (20.8%) respondents weekly with this statement, 2 (2.0%) the respondents opined monthly, whereas 3 (3.0%) of the respondents never opined for the information. Among all the respondents, 48 (47.5%) respondents opined that they daily use WhatsApp to publish course announcements, followed by 34 (33.7%) respondents weekly with this statement, 15 (14.9%) of the respondents opined monthly, whereas 4 (4.0%) of the respondents never opined for the information. Among all the respondents, 34 (33.7%) respondents opined that they use WhatsApp daily to discuss ideas about courses with my classmates, followed by 32 (31.7%) respondents weekly with this statement, 21 (20.8%) of the respondents opined that monthly, whereas 14 (13.9%) of the respondents never opined for the information. Among all the respondents, 39 (38.6%) respondents opined that they weekly use WhatsApp to Seek help related to the course requirements of students who have already taken the courses, followed by 36 (35.6%) respondents daily with this statement, 20

(19.8%) of the respondents opined monthly, whereas 6 (5.9%) of the respondents never opined for the information.

TABLE II USE OF WHATSAPP

S. No.	Statement	Daily	Weekly	Monthly	Never
1	Communicate with my classmates about matters related to course requirements	75 (74.3%)	21 (20.8%)	2 (2.0%)	3 (3.0%)
2	Publish courses announcements	34 (33.7%)	48 (47.5%)	15 (14.9%)	4 (4.0%)
3	To discuss ideas about courses with my classmates	32 (31.7%)	34 (33.7%)	21 (20.8%)	14 (13.9%)
4	Discuss ideas related to courses with instructors	56 (55.4%)	29 (28.7%)	13 (12.9%)	3 (3.0%)
5	Seek help related to the course requirements of students who have already taken the courses	36 (35.6%)	39 (38.6%)	20 (19.8%)	6 (5.9%)
6	Post links to topics and resources related to courses	34 (33.7%)	42 (41.6%)	14 (13.9%)	11 (10.9%)
7	To form student groups for educational purposes	44 (43.6%)	29 (28.7%)	19 (18.8%)	9 (8.9%)
8	Organize meetings with my classmates regarding the assignments and projects required by the instructors	36 (35.6%)	37 (36.6%)	18 (17.8%)	10 (9.9%)
9	Communicate with instructors about office hours and meetings	28 (27.7%)	32 (31.7%)	28 (27.7%)	13 (12.9%)
10	Build good relationships with the instructors	25 (24.8%)	41 (40.6%)	22 (21.8%)	13 (12.9%)
11	To get feedback from course instructors	27 (26.7%)	42 (41.6%)	21 (20.8%)	11 (10.9%)
12	Organize my time to study	52 (51.5%)	29 (28.7%)	13 (12.9%)	7 (6.9%)

Among all the respondents, 42 (41.6%) respondents opined that they weekly use WhatsApp to Post links to topics and resources related to courses, followed by 34 (33.7%) respondents daily with this statement, 14 (13.9%) the respondents opined monthly, whereas 11 (10.9%) of the respondents never opined for the information. Among all the respondents, 44 (43.6%) respondents opined that they weekly use WhatsApp to form student groups for educational purposes, followed by 29 (28.7%) respondents with this statement, 19 (18.8%) of the respondents opined monthly, whereas 9 (8.9%) of the respondents never opined for the information. Among all the respondents, 37 (36.6%) respondents opined that they weekly use WhatsApp to Organize meetings with my classmates regarding assignments and projects required by the instructors, followed by 36 (35.6%) respondents with this statement, 18 (17.8%) of the respondents opined monthly, whereas 10 (9.9%) of the respondents never opined for the information. Among all the respondents, 32 (31.7%) respondents opined that they weekly use WhatsApp to Communicate with instructors about office hours and meetings, followed by 28 (27.7%) respondents who daily and monthly with this statement, whereas 13 (12.9%) of the respondents never opined for the information.

Among all the respondents, 41 (40.6%) respondents opined that they use WhatsApp to Build good relationships with the instructors, followed by 25 (24.8%) respondents weekly with this statement, 22 (21.8%) of respondents opined monthly, whereas 13 (12.9%) of the respondents never opined for the information. Among all the respondents, 52 (51.5%) respondents opined that they daily use WhatsApp to Organize my time to study, followed by 29 (28.7%) of respondents weekly with this

statement, 13 (12.9%) of the respondents opined monthly, whereas 7 (6.9%) of the respondents never opined for the information.

TABLE III USE OF WHAT SAPPERCEPTIONS OF THE FORMAL INTEGRATION OF WHATSAPP IN EDUCATION

S. No.	Description	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1	I think it would be easy to use WhatsApp in my education	10 (9.9%)	5 (5.0%)	17 (16.8%)	55 (54.5%)	14 (13.9%)
2	I would not feel scared and hesitant when using WhatsApp in my learning	10 (9.9%)	7 (6.9%)	17 (16.8%)	46 (45.5%)	21 (20.8%)
3	I think using WhatsApp in my education would be fun	7 (6.9%)	19 (18.8%)	36 (35.6%)	30 (29.7%)	9 (8.9%)
4	If I face technical problems using WhatsApp, I can solve them in one way or another	9 (8.9%)	15 (14.9%)	23 (22.8%)	46 (45.5%)	8 (7.9%)
5	I would like to use WhatsApp in the educational process	8 (7.9%)	5 (5.0%)	21 (20.8%)	54 (53.5%)	13 (12.9%)
6	I think the use of WhatsApp in my education would be helpful	5 (5.0%)	7 (6.9%)	20 (19.8%)	53 (52.5%)	16 (15.8%)
7	I think using WhatsApp in education will cause me social problems	11 (10.9%)	27 (26.7%)	40 (39.6%)	17 (16.8%)	6 (5.9%)

Table III shows the perception of WhatsApp as a learning tool; among all the respondents, 55 (54.5%) respondents opined that they agree that WhatsApp for I think it would be easy to use WhatsApp in my education, followed by 17 (16.8%) of respondents opined undecided with this statement, 14 (13.9%) of the respondents strongly agree, 10(9.9%) of the respondents opined strongly disagree, whereas 5 (5.0%) of the respondents opined disagree for the statement. Among all the respondents, 46 (45.5%) respondents opined that they agree that I would not feel scared and hesitant when using WhatsApp in my learning, followed by 21 (20.8%) respondents who strongly agreed with this statement, 17 (16.8%) of the respondents undecided 10 (9.9%) of the respondents opined strongly disagree, whereas 7 (6.9%) of the respondents opined disagree for the statement. Among all the respondents, 36 (35.6%) respondents opined that they were undecided that I thinking using WhatsApp in my education would be fun, followed by 30 (29.7%) respondents opined agreed with this statement, 19 (18.8%) the respondents disagreed, 9 (8.9%) of the respondents opined strongly agree, whereas 7 (6.9%) of the respondents opined disagree for the statement Among all the respondents 46 (45.5%) of respondents opined they agree that If face technical problems using WhatsApp I can solve them in one way or another, followed by 23 (22.8%) of respondents opined undecided with this statement, 15 (14.9%) of the respondents disagree 9 (8.9%) of the respondents opined strongly disagree, whereas 8 (7.9%) of the respondents opined strongly agreed agree for the statement. Among all the respondents, 54 (53.5%) of respondents opined that they decided that they would like to use WhatsApp in the educational process, followed by 21 (20.8%) respondents who opined undecided with this statement, 13 (12.9%) of respondents strongly agree 8 (7.9%) of the respondents opined strongly disagree. In contrast,5 (5.0%) respondents disagreed with the statement. Among all the respondents, 53 (52.5%) of respondents opined that they agree I think the use of WhatsApp in my education would be helpful, followed by 20 (19.8%) of respondents who opined undecided with this statement, 16 (15.8%) of the respondents strongly agree 7 (6.9%) of the respondents opined strongly disagree. In contrast, 5 (5.0%) respondents disagreed with the statement. Among all the respondents, 40 (39.6%) respondents opined they were undecided I think using WhatsApp in

education will cause social problems, followed by 27 (26.7%) respondents who disagreed with this statement, 17 (16.8%) of the respondents agreed, 11 (10.9%) of the respondents opined strongly this agree. In contrast, 6 (5.9%) respondents strongly agreed with the statement.

Findings

A survey of postgraduate science students at Mangalore University revealed a widespread and positive perception of using WhatsApp for academic purposes. The vast majority find it easy to use, comfortable to engage with, and potentially fun. Many students use it daily for course-related communication, resource sharing, and collaboration. Importantly, most believe it would be helpful for learning and express a willingness to see it formally integrated into education. While some concerns about potential social challenges exist, the overall sentiment surrounding WhatsApp as an educational tool is overwhelmingly positive.

Suggestions

Further research is crucial to understand WhatsApp's impact on education. This includes larger, diverse studies, evaluating learning outcomes, addressing privacy concerns, and providing training and support. Additionally, integrating WhatsApp formally, fostering digital citizenship, collaborating with developers, sharing best practices, and staying updated with evolving technologies are key for educators and institutions to maximize the platform's potential for effective and engaging learning.

Conclusion

The data suggests that WhatsApp is widely accepted and utilized by the surveyed individuals as a tool for educational purposes. Its ease of use, effectiveness in communication and collaboration, and potential benefits for instructor-student interactions contribute to its positive perception as a valuable platform in education. The high daily usage indicates that WhatsApp has become deeply integrated into the respondents' educational routines, supporting their communication with peers and instructors, sharing resources, and organizing study-related activities. The platform offers convenience, instant communication, and accessibility, making it a preferred choice for educational interactions. The positive perceptions regarding the integration of WhatsApp in education reflect the potential of mobile messaging apps to enhance the learning experience. WhatsApp's informal and interactive nature and its widespread adoption and familiarity may contribute to its perceived benefits in educational settings. It is worth noting that the data represents a specific sample of respondents and may not be generalized to the entire population. Additionally, while the survey provides insights into perceptions and usage patterns, further research is necessary to explore the impact of WhatsApp integration in education, including its effectiveness in supporting learning outcomes and addressing potential challenges or drawbacks. Overall, the results suggest that WhatsApp has gained recognition as a valuable tool for educational communication, collaboration, and support among the surveyed individuals, demonstrating its potential for enhancing the educational experience.

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Use of Web-Based Resources and Services by Users of Dr. T.P.M. Library at Madurai Kamaraj University, Madurai, Tamil Nadu: A Case Study

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Abstract

This research explores the use of web based resources and services in libraries, investigating how these digital tools impact information access, retrieval, and user satisfaction. The study aims to analyse the effectiveness of online platforms, identify challenges in their implementation, and propose recommendations for optimizing the integration of web resources to enhance the overall functionality of libraries in the digital age. The present study is an attempt to examine the use of web based resources and services at Dr T.P.M. Library, Madurai Kamaraj University. The study proved that a majority of the respondents accessed the Electronic sources for their academic and research purpose. This present study is majority of respondents opined that overall satisfaction of web based resources and services are very good. Hence the authorities of Madurai Kamaraj University still they have to enhance the electronic environment in the campus of the university.

Keywords: Web Resources, Internet, Online Resources, Electronic information, ICT.

Introduction

Web resources constitute a broad spectrum of online information and tools available on the internet. Ranging from websites and databases to multimedia content, these resources serve diverse purposes, including education, research, and entertainment. As integral components of the digital landscape, web resources offer convenience, accessibility, and up-to-date information. Users can explore this vast digital repository to access knowledge, collaborate globally, and stay informed across various fields of interest. In modern libraries, web resources play a pivotal role in expanding information access beyond traditional print materials. These digital assets encompass a vast array of online databases, e-journals, and educational websites.

By integrating web resources, libraries aim to enhance research capabilities, offering users a dynamic and diverse collection of information. The shift towards digital platforms underscores the importance of adaptability in meeting the evolving needs of researchers and students in an increasingly interconnected world.

Objectives of the Study

1. To study the frequency of use the web based resources and services by the users of Dr. T.P.M. Library in the Madurai Kamaraj University, Madurai, and Tamil Nadu.
2. To study the use of different web resources.
3. To find out the Impact of using web resources.
4. To study the purpose of use the web service.
5. To study the use of web based library services.
6. To study the opinion about the overall satisfaction of web based resources and services.

Methodology

The present study is a descriptive method. The questionnaire method has been adopted to collect the primary data. There are 200 Questionnaires were randomly distributed to the users of DR.

T.P.M Library in the Madurai Kamaraj University, Madurai and 187 filled questionnaires were received back by the researchers. There are 09 questionnaires were rejected due to incompleteness of answers. Hence 172 questionnaires were used for data analysis and interpretation. Data have been collected on December 2023.

Data Analysis and Interpretation

TABLE I GENDER AND AGE – WISE DISTRIBUTION OF RESPONDENTS

Particulars		No. of Respondents	Percentage
Gender	Male	65	37.8
	Female	107	62.2
Total		172	100
Age	20 to 25	56	32.6
	26 to 30	31	18
	31 to 35	35	20.3
	36 to 40	28	16.3
	41 and above	22	12.8
	Total		172

Source: Primary data

Table I reveals the gender and age-wise distribution of respondents. In this study, 65 (37.8%) respondents come to male category while 107 (62.2%) respondents are female category. Hence more than three fifths of the respondents belong to the category of female. Among the overall 172 respondents, 56 (32.6%) respondents belong to the category of age between 20-25, 31 (18%) respondents belong to between 26-30, 35 (20.3%) of them between 31-35, 28 (16.3%) of them between 36-40 and 22 (12.8%) of them between 41 and above age category. Hence most of the respondents belong to the category of age between 20-25.

TABLE II DISTRIBUTIONS OF RESPONDENTS ACCORDING TO RESIDING SECTOR AND STATUS

S.No.	Residing sector	Status (%)				Total N
		Faculty Member	Ph.D Scholar	M.Phil	PG Students	
1	Rural	13 (13.4)	28 (28.9)	6 (6.2)	50 (51.5)	97 (56.4)
2	Urban	8 (10.7)	24 (32)	11 (14.7)	32 (42.6)	75 (43.6)
Total		21 (12.2)	52 (30.2)	17 (9.9)	82 (47.7)	172

Source: Primary data

Table II deals the distribution of respondents according to residing sector. Among the rural respondents, 13 (13.4%) respondents belong to faculty member, 28 (28.9%) respondents belong to Ph.D scholars, 6 (6.2%) respondents M.Phil scholars and 50 (51.5%) respondents belong to PG students respectively. Among the urban respondents, 8 (10.7%) respondents belong to faculty member, 24 (32) respondents belong to Ph.D scholars, 11 (14.7%) respondents M.Phil scholars and 32 (42.6%) respondents belong to PG students respectively.

It is understood from the table III that among the overall married respondents, 13 (23.2%) of them use the internet daily, 22 (39.3%) of them weekly, 9 (16.1%) of them fortnightly, 7 (12.5%) of

them monthly and 5 (8.9%) of them rarely respectively. Among the overall unmarried respondents, 28 (24.1%) of them use the internet daily, 34 (29.3%) of them weekly, 26 (22.4%) of them fortnightly, 16 (13.8%) of them monthly and 12 (10.3%) of them rarely respectively.

TABLE III FREQUENCY OF ACCESSING WEB RESOURCES BY MARITAL STATUS-WISE RESPONDENTS

S. No.	Marital status	Frequency (%)					Total N
		Daily	Weekly	Fortnightly	Monthly	Rarely	
1	Married	13 (23.2)	22 (39.3)	9 (16.1)	7 (12.5)	5 (8.9)	56 (32.6)
2	Unmarried	28 (24.1)	34 (29.3)	26 (22.4)	16 (13.8)	12 (10.3)	116 (67.4)
Total		41 (23.8)	56 (32.5)	35 (20.3)	23 (13.4)	17 (9.9)	172

Source: Primary data

TABLE IV USE OF DIFFERENT WEB RESOURCES N = 172

S. No.	Options	No. of Respondents	% of valid respondents N=172	% of overall responses N=280	Rank
1	E- Journals	67	38.9	23.9	1
2	E- Books	41	23.8	14.6	3
3	E-Theses/dissertations	34	19.8	12.1	4
4	Online Tutorials	18	10.5	6.4	8
5	Online Reference Sources	24	13.9	8.6	5
6	E-Conference papers	21	12.2	7.5	6
7	Online Newspaper	43	25	15.4	2
8	Online databases	19	11	6.8	7
9	Others	13	7.5	4.6	9
Total		280	162.6	100	

Source: Primary data

Table IV discuss the using of different web resources. It is inferred from the above study, among the valid 172 respondents, 38.9% of the respondents opined that use the web resources for e-journals and it has got first rank while 25% of the respondents opined that use the web resources for online newspaper and it has got second rank. Of the 41 respondents, 23.8% use the web resources for e-books and it has got third rank whereas 19.8% respondents opined that use the web resources for e-theses/dissertations and it has got fourth rank while 13.9% respondents opined that use the web resources for online reference sources and it has got fifth rank.

Of the 21 respondents, 12.2% use the web resources fore-conference papers and it has got sixth rank whereas 11% respondents opined that use the web resources for online databases and it has got seventh rank while 10.5% respondents opined that use the web resources for online tutorials and it has got eighth rank. Besides cited above, there are use the web resources for some other purpose also (7.5%) and it has got the ninth rank.

Table V reveals the impact of using web resources. It could be noticed from the above study, 24.4% of the respondents opined that impact of use the web resources for improved teaching and learning and it has got first rank while 21.5% of the respondents opined that expedited the research process and it has got second rank. Of the 32 respondents, 18.6% use the improved scholarly

communication and it has got third rank whereas 16.3% respondents opined that impact of use the web resources for improved professional competency and it has got fourth rank while 14.5% respondents opined that impact of use the web resources for decreased the physical use of libraries and it has got fifth rank.

TABLE V IMPACT OF USING WEB RESOURCES N = 172

S. No.	Options	No. of Respondents	% of valid respondents N=172	% of overall responses N=204	Rank
1	Expedited the research process	37	21.5	18.1	2
2	Improved teaching and learning	42	24.4	20.6	1
3	Improved scholarly communication	32	18.6	15.7	3
4	Improved professional competency	28	16.3	13.7	4
5	Improved peer networking	23	13.4	11.3	6
6	Decreased the use of printed resources	17	9.9	8.3	7
7	Decreased the physical use of libraries	25	14.5	12.3	5
Total N=172		204	118.6	100	

Source: Primary data

Of the 23 respondents, 13.4% use the web resources for improved peer networking and it has got sixth rank whereas 9.9% respondents opined that impact of use the web resources for decreased the use of printed resources and it has got seventh rank.

TABLE VI PURPOSE OF USE OF WEB RESOURCES N = 172

S. No.	Options	No. of Respondents	% of valid respondents N=172	% of overall responses N=296	Rank
1	Study	61	35.5	20.6	1
2	Research	58	33.7	19.6	2
3	Publication	45	26.2	15.2	3
4	To update knowledge	35	20.3	11.8	4
5	General Information	31	18	10.5	5
6	Preparation of teaching	28	16.3	9.5	6
7	Entertainment	17	9.9	5.7	8
8	Others	21	12.2	7.1	7
Total N=172		296	172.1	100	

Source: Primary data

Table VI discusses the purpose of use of web resources. It could be noticed from the above study, 35.5% of the respondents opined that purpose of use the web resources for study purpose and it has got first rank while 33.7% of the respondents opined that research and it has got second rank. Of the 45 respondents, 26.2% use the publication and it has got third rank whereas 20.3% respondents opined that purpose of use the web resources for update knowledge and it has got fourth rank while 18% respondents opined that purpose of use the web resources for general information and it has got fifth rank.

Of the 28 respondents, 16.3% purpose of use the web resources for preparation of teaching and it has got sixth rank whereas 12.2% respondents other purpose and it has got seventh rank and while 9.9 % respondents opined that entertainment and it has got sixth rank.

TABLE VII USE OF WEB BASED LIBRARY SERVICES N = 172

S. No.	Library Services	No. of Respondents	% of valid respondents N=172	% of overall responses N=315	Rank
1	Electronic document delivery service	61	35.5	19.4	1
2	Electronic current awareness service	42	24.4	13.3	3
3	Electronic SDI services	58	33.7	18.4	2
4	Virtual reference desk/Ask-a-librarian	34	19.8	10.8	4
5	Library Webpage/Website	28	16.3	8.9	6
6	Web OPAC	33	19.2	10.5	5
7	Bulletin Board	21	12.2	6.7	8
8	Library blogs	25	14.5	7.9	7
9	Others	13	7.5	4.1	9
Total N=172		315	183.1	100	

Source: Primary data

Table VII discuss the use of web based library services. It could be noticed from the above study, 35.5% of the respondents opined that use of web based library services for electronic document delivery services and it has got first rank followed by 58 (33.7%) electronic SDI services and it has got second rank, 42 (24.4%) electronic current awareness services and it has got third rank, 34 (19.8%) virtual reference desk/ask-a-librarian and it has got the forth rank, 33 (19.2%) web OPAC and it has got the fifth rank, 28 (16.3%) library webpage/website and it has got the sixth rank, 25 (14.5%) library blogs and it has got seventh rank, 21 (12.2%) bulletin board and it has got the eight rank. Besides cited above, there are use the web based library resources for some other purpose also (7.5%) and it has got the ninth rank.

TABLE VIII OPINION ABOUT THE OVERALL SATISFACTION OF WEB BASED RESOURCES AND SERVICES BY RESIDING SECTOR-WISE RESPONDENTS

S. No.	Residing sector	Opinion (%)					Total N
		Very good	Good	Satisfactory	No comments	Not satisfied	
1	Rural	32 (32.9)	19 (19.6)	22 (22.7)	14 (14.4)	10 (10.3)	97
2	Urban	25 (33.3)	15 (20)	17 (22.7)	11 (14.7)	7 (9.3)	75
Total		57 (33.1)	34 (19.8)	39 (22.7)	25 (14.5)	17 (9.8)	172

Source: Primary data

Table VI reveals the opinion about the overall satisfaction of web based resources and services by residing sector-wise respondents. Among the overall rural respondents, 32 respondents (32.9%) report that it is very good with web based resources and services, 19 respondents (19.6%) report that it is good, 22 respondents (22.7%) report that it is satisfactory, 14 respondents (14.4%) have not expressed any comments and 10 respondents (10.3%) report that it is not satisfied respectively.

Among the overall urban respondents, 25 respondents (33.3%) report that it is very good with web based resources and services, 15 respondents (20%) report that it is good, 17 respondents (22.7%) report that it is satisfactory, 11 respondents (14.7%) have not expressed any comments and 7 respondents (9.3%) report that it is not satisfied respectively. Hence a majority of the respondents' opine that overall satisfaction of web based resources and services are good.

Testing of Hypothesis

H_0 - Null Hypothesis

There is no association between the gender of the respondents and their opinion about the overall satisfaction of web based resources and services.

TABLE IX CHI-SQUARE SUMMARY RESULT

Chi- square Calculate Value	Degrees of Freedom	Chi- Square Table Value @ 5%	Inference
0.074	4	9.488	Not significant / Null hypothesis accepted

Source: Computed data

The table value of χ^2 for 4 degrees of freedom at 5% level of significance is 9.488. The calculated value of χ^2 is lower than this table value and hence the Null hypothesis is accepted. It is concluded that there is no association between the gender of the respondents and their opinion about the overall satisfaction of web based resources and services.

Findings

1. More than three fifths of the respondents belonged to the category of female.
2. 32.6% of the respondents belonged to the category of age between 20-25.
3. 56.4% of the respondents belonged to the category of rural.
4. 30.2% of the respondents belonged to Ph.D. category.
5. 67.4% of the respondents belonged to unmarried category.
6. 32.5% of the respondents accessed the web resources weekly.
7. 38.9% of the respondents opined that use the web resources for e-journals and it has got first rank.
8. 24.4% of the respondents opined that impact of use the web resources for improved teaching and learning and it has got first rank.
9. 35.5% of the respondents opined that purpose of use the web resources for study purpose and it has got first rank.
10. 35.5% of the respondents opined that use of web based library services for electronic document delivery services and it has got first rank.
11. 33.1% of the respondents opined that overall satisfaction of web based resources and services are very good.
12. There is no association between the gender of the respondents and their opinion about the overall satisfaction of web based resources and services.

Conclusion

Web resources in the library provide valuable and accessible information, enhancing research opportunities for users. Their convenience, diverse content, and real-time updates make them essential tools for staying current in various fields. However, careful evaluation is crucial to ensure credibility, and libraries must continually adapt to evolving online resources to maintain relevance in the digital age.

The study proved that a majority of the users of Dr. T.P.M. Library in the Madurai Kamaraj University accessed the Electronic sources for their study and research purpose. Hence the authorities of Madurai Kamaraj University still they have to enhance the electronic environment in the campus of the university. It is useful to motivate the users to use the electronic sources for pursuing their research success.

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Effectiveness of Library Portals of NIRF-Ranked 2023 Private Universities in Uttar Pradesh: An Evaluative Study

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Abstract

With the increasing use of information technology in the academic libraries, the parent organizations are more and more into the online resources either by subscribing or by the open access websites of the publishers. Many of the academic libraries have now moved towards the library portal technology by seeing the value of having the unified interfaces to provide the updated information about the library products, services, and activities. In this paper the author aims to evaluate the contents and the services of the NIRF- 2023 ranked private universities library portals in the region of Uttar Pradesh. The aim of the study is to investigate the most common and preferred category of content available on these selected library portals of the universities. The evaluation is done by framework of the checklist which covers the main categories like Information about the: general things, library's print collection, subscribed resources, library services and the information about how to use the web-based resources. Findings suggest that Sharda University has the excellent score followed by Shiv Nadar University and Amity University respectively. Results show that all the library portals have the information regarding the library services, collection of the library, general information. The existing portals can also improve their contents according to the findings in the study. All the library websites and university websites are considered for the study, with the evaluation framework, which is minimal in nature and covers minimum information categories which can be available on any of the academic library portals of the university.

Keywords: Effectiveness of Library, Portals, Library Services, Framework.

Introduction

University libraries have the main purpose is to provide the knowledge resources which will support the teaching- learning process and support the research activities of the institution. The library satisfied the users' needs by providing the services and material as per the requirement of the user and library portals basically give a gateway to the institutions' resources (online as well as print) by arranging them for the users. It creates the direct link to the native interface of every single resource, whose listing is available on the library websites, but some library websites only provide the alphabetic listings, only very few websites provide the resource discovery facilities, which help users to identify the most suitable resources for their searches. The new search ability in the library portals, deals with the deep web, drilling to database contents where the web search engines are not able to reach.

Library portals fulfil the individual needs of the users, it can be done either the system itself can arrange the delivery and presentation of information contents or by the user himself/herself can customize the category and format of the information displayed. Users can visit the library portals without reaching the libraries, they can access them from anywhere, anytime. That saves the time of the user and increases the importance of information present on the library website/portals. So, the library portal is defined as a single service-provided platform, from which it is possible to see all electronic resources and services of the library and its activities on the single platform.

Seeing the multiple uses of the web portals most of the academic libraries had developed their own web portals, which contains the information about the collection available (print as well as online), and the services. In the digital information era, there is the need for every library to provide its collections and services through a user-friendly interface like the library portal.

Literature Review

Many scholars had focused their study on the library web portals, where their areas revolve around the content analysis of the academic library portals, designing of the web portals for the libraries, evaluation of the portal technology in academic libraries and the usability of the web portals in the university libraries. Muthurasu, C & Suganthi, M (2023), in their article discussed the library portals, the types of web services provided by them also the portals are personalized with the needs of the users.

Kumar, Vinit and Yadav, Sheel Bhadra (2020), analysed that many libraries of academic institutions had adopted the portal technologies. They had evaluated the services and contents of the NIRF Ranked University Library Portals and scored them in the categories of excellent, good, average, and poor.

Mane, Manisha B & Pange, B. M. (2016), their findings show the understanding of the use of university libraries portals. And introduces the connection between the library portals and the knowledge management practices.

Prasanna Kumara B.M., Sachin Y and Divyananda K. (2015), their article explains about the digital library portals' importance in academic learning, providing the 24/7 learning process. Geetha M, Mamatha, KR and Farhana (2013), they studied the usage of the university library porta of the Kuvempu University Library and provide the statistics of the usage results Fatima, N.; Ahmad, N. & Ahmad, S. (2011), finds the level of knowledge about the use of the library portals by the 'Engineering and Technology department, Aligarh Muslim University', with a structured questionnaire.

Objectives

An objective of the study is to:

1. Categorization of the services & contents present of the library portal of the universities.
2. Evaluation of the results.
3. Investigation of the most preferred type of content available on the portals of the universities
4. Find the level of the correlation between the calculated scores and the NIRF rank of the universities.
5. Finally, to recommend the fine practices for the designing, planning & maintenance of the portals of the selected private universities.

Scope and Limitations

Study focuses on the areas of the academic library web portals/websites of the selected universities. The study is bound to the private universities in Uttar Pradesh, which are available in the NIRF Ranking, 2023. The selected universities are Amity University, Shiv Nadar University and Sharda University. The list of universities, their website links, date of data collection and the NIRF Ranks are listed in Appendix 1.

Methodology

The study proceeds with a criterion of checklist-based observation method for the collection of data. Checklist is prepared by the commonly available features and expected services for the

university library portals; help is also taken from the prior knowledge in literature and work of authors. The checklist categories were divided:

1. General information about the academic library
2. Library collection: e-resources and physical
3. Library services
4. Use of social media/web technologies

APPENDIX 1

Name of University/Location	University Website	Library Website	NIRF Rank 2023	Date of Data Collection
Amity University, Noida/Gautam Buddha Nagar	https://www.amity.edu	http://library.amizone.net	35	10th January 2024 to 18th January 2024
Shiv Nadar University/Gautam Buddha Nagar	https://snu.edu.in	https://library.snu.edu.in/	62	10th January 2024 to 18th January 2024
Sharda University/Greater Noida	https://www.sharda.ac.in	https://www.sharda.ac.in/library	87	10th January 2024 to 18th January 2024

After the initial evaluation of the checklists, the university library portals were visited from the time duration 16th January 2024 to 18th January 2024. The availability and absence of the item of checklist under every category was feedin a table matrix.

TABLE I INFORMATION ABOUT THE 'GENERAL INFORMATION' ON LIBRARY PORTALS

About us	Amity University	Shiv Nadar University	Sharda University
History/About us	0	1	1
News Events/Updates	0	1	1
Directory	0	1	1
Library Rules		1	1
Photo Gallery	0	1	1
Library Map/Location/Floor Plans	0	0	0
Membership	0	1	1
FAQ	0	0	0
Date of Update	0	0	1
Contact Us	0	1	1
Feedback	0	0	1
Library Statistics	0	0	0
New Arrivals	1	1	1
Hits	1	1	1
Total	2	9	10

1= presence, 0= absence

TABLE II INFORMATION ABOUT COLLECTION OF LIBRARIES

Library Collections	Amity University	Shiv Nadar University	Sharda University
Books	1	1	1
Periodical	1	1	1
Bound Volume	1	1	1
Special Collection/Rare Books	0	0	1
Manuscripts/Archives	0	0	0
Microform	0	0	0
Films	0	0	0
Thesis/Dissertations	1	1	1
Maps	0	0	0
Electronic Resources	1	1	1
e-journals	1	1	1
e-books	1	1	1
e-databases	1	1	1
Total	8	8	9

1= presence, 0= absence

TABLE III INFORMATION ABOUT THE LIBRARY SERVICES

Services	Amity University	Shiv Nadar University	Sharda University
OPAC	1	1	1
DDS	1	1	1
Bibliographic Services	0	0	0
Reference Services	1	1	1
Reprographic Services	1	1	1
Indexing Services	0	0	0
Reading Room	1	1	1
Internet Access	1	1	1
ILL	1	1	1
Book Circulation	1	1	1
Translation Services	0	0	0
Purchase Suggestions	1	1	1
CAS	1	0	0
Remote Access	1	1	1
Institutional Repository	0	1	1
Total	11	11	11

1= presence, 0= absence

TABLE IV INFORMATION ABOUT THE USE OF SOCIAL WEB TECHNOLOGIES

Web 2.0 Technologies	Amity University	Shiv Nadar University	Sharda University
Social Networks (Twitter/Facebook/LinkedIn/Others)	1	1	1
RSS Feeds	0	0	0
Total	1	1	1

1= presence, 0= absence

TABLE V UNIVERSITY-WISE ANALYSIS

NIRF RANK (2023)	University	Category 1 (14)	Category 2 (13)	Category 3 (15)	Category 4 (2)	University Score (44)	Percent score (%)
35	Amity University Gautam Buddha Nagar	2	8	11	1	22	50.00
62	Shiv Nadar University, Gautam Buddha Nagar	9	8	11	1	29	65.90
87	Sharda University Greater Noida	10	9	11	1	31	70.45
	Category score	21/42	25/39	33/45	3/6		
	Percent score	50	64.10	73.33	50		

Results

A. General Information about the Library

In the first category, it was checked whether the general information is provided on the library portals or not. All the 14 features were identified, and their presence/ absence was checked (Table I). The observations were, from the selected three library portals: all the portals provide the category of new arrivals and hits, only two of the portals provide the information about us, new events, Directory, library rules, photo gallery, membership, contact us. Only one library portal gives the information of floor plan/location, date of update feedback. None of the library portals have the information regarding FAQ, Library Statistics. In this category it was seen that Sharda University provides maximum information followed by Shiv Nadar University and Amity University.

B. Information about the Library's Collection

Academic library portals are the best way to inform users/patrons about the collection of parent institutional libraries, as portals are the best awareness tool for the information. In this category of library's collection, a total thirteen types of resources were identified, where physical and online collections were identified. The evaluation of this category is done in Table II. In this category also Sharda University provides the maximum information, out of 13 points it covers 9 points, closely followed by Amity University and Shiv Nadar University, they both cover 8 points in evaluation. None of the universities have the collection of Manuscript, Microforms and Films on their portals but all the three universities have the collection of electronic resources followed by the print resources and thesis.

C. Information Regarding the Library's Services

In this category fifteen checklist items are selected, and the evaluation of all universities is done in Table III. OPAC is the main feature of the academic library portals, along with the other services like inter-library loan, reprographic services, reference services, reading rooms, internet access, etc. These are some of the distinct services provided by the academic libraries and are the need of the users. OPAC provides the availability of the resource in the library. All the libraries under

observation have the facility of the OPAC, reference services, reprographic services, internet access, book circulation, purchase suggestions. All the university's library portals provide this important information and score the same. From thirteen points all three universities score eleven points but none of them have bibliographic services, indexing services and translation services on their portals.

D. Information Regarding the Use of Social Web Technologies

Social media has gained its popularity in academics also, these social networking websites are the effective way to communicate, market your products and services, connect with users, inform users about the new happenings/ events, and provide the updated information. All the libraries are connected to the social network websites, like LinkedIn, Facebook, Twitter etc. either directly or via parent institution but none of them have a direct portal or link to these social networking sites. None of the libraries have the RSS feed facility about the updates. RSS Feeds help users to subscribe to the feed for any updates done of the library portals.

Category Wise Comparison

In the last section of evaluation of academic library portals of the selected universities in the Table V, show that category wise, the Sharda university scores (more than 75%) followed by the Shiv Nadar University (65.90%) and Amity University (50%). One of the reasons for the Amity University score is that the library portal of the university comes under the intranet of the university (url: amizone.net) which is password protected and open to university users, not available in open domain, so only OPAC service is available for free access. Category-wise analysis is also done to see the most preferred type of content given by the library portals of the under-study universities. Category 3: Information about the library services is available on all library portals, followed by Category 2: Information about the libraries' collection, is present on all library portals. After that the Category 1: Information about the 'general information' on library portals and Category 4: Information about the use of social web technologies, scores the same.

Discussion of Results

A. User Connectivity

All the portals lack the feature of FAQ and library statistics. Feedback from the user is also missing from two library portals, while these features help in the improvement of the quality of services and contents on the portals, RSS feed is missing in all the portals. The reason can be the unwillingness of the higher authorities, or the policies may be the reason.

B. Transparency

Library statistics help administration and library professionals for the decision-making process for the further improvement and selection of the resources for libraries.

C. Currency

Date of update of the library portal is also missing from two of the universities because of the deficiency of full-time staff to manage the library portals.

D. Availability of Online Services

Library portals have the availability of the electronic resources but have missed the traditional library services like the bibliographic services, indexing services, translational services. Reason may be these services nowadays provided by the publishers and other online service provider groups.

E. Visibility of Collection

Only one library portal shows the rare book collection, the reason may be the unavailability of the rare books. For this the library staff must do the collection evaluation studies and find the rare books and get the chance to create the special collection in the library.

F. Uniformity

Finding also shows that there is not uniformity in terms of the contents on the portals, some have the hyperlinks for the sources/service, some universities have the electronic resources and other information regarding the library collection and services by the parent university website and not openly accessible. The reason may be the unavailability of the common framework for library portal contents.

Suggestions

The guideline should be provided by the higher educational authorities about the minimum requirements and things should be on the library portals which should be mandatory contents. Such guidelines help the university librarians to request human resources or trained existing ones, to manage the library portals and guide the other professionals about the content of it. NIRF and other accreditation bodies should include the presence of the fully working and updated library portals for the evaluation.

The librarians should also make efforts to increase the connectivity with their patrons using library portals, provide the basic information about the library like rules & regulation, opening hours of library, library usage statistics etc. Collect their feedback and try to connect with social media also. The portals must have the information about the library collection which should be visible to the patrons.

Librarians should try to provide the important library services on online mode as the reference service, ILL etc. which were earlier on offline mode. Skilled human resources or the training to the existing, efficient library professionals should be considered to install and maintain the academic library portals. The library and IT staff of the university should work in collaboration and specific staff should be recruited for the handling of the library portals.

Conclusion

University library portals are developed with the aim to provide the online services to users, according to their requirements. Portals are the platforms where users can explore the library without being physically present in the wall and building of the library. In the conducted study the contents of the selected university library portals are evaluated and found that all the library portals provide useful information about the services and resources of the library print as well as electronic.

One of the library portals is lacking the necessary information as concerns to the users, the reason behind is that the library portal is under the university intranet framework and not opens in public domain only OPAC facility is available for the online free search. All the library portals are somehow different from each other, as some have the information on the open page of the portal while some provide the hyperlinks to access the specific service and resource. The findings can help in the improvement of the library portals.

Acknowledgement

For the study the website of all three universities is considered which are in open domain along with the web portals of their libraries. It was a great help, and I am thankful to these universities to

find the data from their online platform. Universities under study are Amity University Gautam Buddha Nagar, Shiv Nadar University Gautam Buddha Nagar, and Sharda University Greater Noida.

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Utilization of Social Networks in Academic Libraries

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Abstract

Society has benefited greatly from libraries for a very long period. Academic research, researching key subjects in the news, researching the past, and many other useful duties are all within its purview. A social structure that promotes user engagement and cooperation is known as a social network. Along with these features, it allows users to search, converse, share ideas, and even ask others to join their virtual world. It is commonly known that the original intent of social networking sites (SNS) was to provide a fun way for people to meet and interact. Thanks to advancements in internet technology, patrons can now simply access the library's collection from any location with an online connection. A redesign of the traditional library is necessary to establish a web-connected digital library that is acceptable to users today. The benefits, characteristics, and context of transforming a library into a platform for academic social networking are the main foci of this article.

Keywords: ICTs, Facebook, Social Network, Social connections, Google Plus, Multiple Access, Time Saving.

Introduction

In every aspect of life, social media has made a difference. From checking the news every day to chatting with friends and family, it's all around you. Its power cannot be denied. A large number of people may quickly and easily create, distribute, and share content on this dynamic platform. The content might consist of anything from text to images to videos. Libraries and other organizations can take advantage of social media to promote and sell their wares in a quick and easy way. The feedback they get from clients helps them understand their actual requirements. Nowadays, a lot of libraries reach out to their patrons using social media. It is easy for the library to promote its services and goods. Users have the option to access using a desktop computer, laptop, or mobile phone. It gives patrons the freedom to peruse their library's collection whenever and whenever they like. A large number of people can easily utilize the library at any time, from any location. Libraries have the potential to attract patrons by fostering an online community and providing interesting and useful information

A. Many Forms of Online Social Media

Speeding up the process of meeting new people and expanding existing social networks is the main objective of social networking services. Many distinct kinds of social networking exist, each defined by its own set of rules. Pearson (2010) classifies the 23 distinct social media sites into 2 broad groups. Online communities like Facebook and MySpace as well as electronic publications like Word Press, Blogger, and YouTube. After extensive research, Chue (2010) and Jones (2012) have created three distinct groups: Anybody can create a free account on a user-generated social networking site (SNS). Sites like MySpace, Twitter, and Facebook attract a lot of people. These kinds of SNS allow people to connect with each other regardless of where they are located on the planet. With thousands of users signing up for popular user-generated sites every minute, these platforms make it easy to promote your business online. Social networking sites (SNSs) that allow users to submit an unlimited amount of photos and movies are known as photographic and video SNSs. Word Press and Blogger, two of the most popular blog platforms, allow us to accomplish

both social networking and online marketing. White (2012) identifies seven distinct types of SNS: Relationships with Others: Most people think of Facebook, Twitter, Google Plus, and MySpace when they hear this term. Popular websites for sharing multimedia content include YouTube, Flickr, and Picasa. Business websites: Opportunities for professional growth are the driving force behind the creation of professional social networks. While some cater to a certain industry or interest group, others provide a meeting place for entrepreneurs to make connections. Class 2.0, SQL, Monster, LinkedIn, Nurse Connect, and LinkedIn are just a few examples. Worldwide groups of individuals that share interests and are trying to figure out how to fix problems together make up online communities of information. For example, when we look for information online about home improvement projects or sustainable living, we could find a lot of blogs, websites, and forums full of people asking the same questions. The HGTV Forum, Super Green Me, and Do-it-yourself are some good examples.

Websites for Education- Students collaborate on group projects, conduct independent research, and maintain two-way communication with faculty and classmates through online discussion boards and blogs. The Student Room, e-Learners, and The Math Forum are a few of the famous websites. Domains devoted to pastimes: Research for favored projects or subjects related to personal hobbies is a common reason people utilize the internet. People all over the world who find websites that are dedicated to their favorite pastimes are connected to a vast network of people who share their enthusiasm. This explains the inner workings of the mechanisms that give rise to social networks. Networks based on interests tend to be the most popular. Some examples of hobby-oriented social media sites are Oh My Bloom, Sport Shouting, and My Place at Scrapbook.com.

B. Here are a Few of the Most Popular Social Media Platforms

1. *Facebook*- At now, Facebook has the most active user base of any social networking site, with over 500 million people. Already, Facebook has more users than any other social networking site in the globe.
2. *Twitter*- People who uses this free social networking and micro-blogging service can create and read brief messages called "tweets" that other people have posted.
3. *LinkedIn* - If you have professional connections on LinkedIn, they may be able to help you find the information you need.
4. *MySpace*- The majority of MySpace users are Indian. Even Americans seem to enjoy it.
5. *Orkut*- Orkut is designed to help you meet new people and stay in touch with your old friends.
6. *Imbee* - IMBEE is a fun and secure social media platform that kids from 8 to 14 can use. Avatar creation, message sending and receiving, photo sharing, and blog creation are all features available to members.
7. *43 Things* - Social media users the maximum number of objectives that can be listed is 43 things. Anyone can post their own goals or borrow another person's. The objectives of other members can also be viewed by members. Through the exchange of knowledge and experiences, members help each other complete the tasks on their lists.
8. *Sconex*- Secondary school students use Sconex, a social networking site. In addition to creating a profile and exchanging photos, users may learn more about their peers, write and read messages related to school, clubs, and classes, as well as engage in fun quizzes and see what's popular on campus.
9. *Google+* - The goal of Google+ is to bridge the gap between online and offline sharing. See a few of our recent projects, including circles, events, and hangouts.
10. *Café Mom*- Mothers may find each other and get advice and support on all sorts of topics in the Café Mom community, from style and food to entertainment and more.

11. *Meet me*- flirt, play games, and talk with locals online for free. Meeting new people and making new friends is easy with free webcam chat.
12. *Badoo*- A social network that facilitates communication, dating, and the meeting of new people; it has more than 160 million users. You can join our community and start chatting with strangers anywhere you go.
13. *Meet Up*- It lets people with similar interests organize offline clubs and get-togethers in their local communities throughout the world.
14. *My Life* - If you're looking for a powerful people search engine that will help you reconnect with long-lost buddies, go no further than My Life. Whether we're looking for a long-lost friend, a former flame, or a wonderful neighbour, we'll find them.
15. *Hi5* - Among the many popular social media platforms in India, Hi5 stands out.

The Effect of Social Media on Society

Thanks to web-based social networking services, individuals from all over the world are able to easily interact with one another and share their activities, interests, knowledge, and conversations. Using the internet to make up for lost essentials is influencing every part of daily life, from relationships to education to religion to entertainment to family life. Companies utilize social media as a tool to learn more about the interests and character of job candidates. Candidates have been disqualified in multiple instances due to statements or posts made on social media that subsequently became headlines. More and more students are choosing to focus their academic studies on social networking sites. Many social networking sites have been established with a focus on philanthropic causes. Social networks facilitate digital contact amongst individuals.

Education and Social Networks

In order to better understand user demand for academic purposes, social networks are becoming more important to educators, academics, and students alike. According to a plethora of studies, social networking sites provide chances for education, career advancement, and curriculum development. That place has its limits. Even though most people use social media for non-academic reasons, it nonetheless affects their academic performance. With the help of these social media networks, a plethora of websites have been born. Academic institutions benefit greatly from only a small number of them. The proliferation of academic and professional social networks has made it possible for users to instantly gain knowledge without leaving their present place. Some examples of such networks are LinkedIn, Twitter, and LIS. You can find a wealth of helpful information and connections with other people through these tools.

Libraries and Social Networks (SNS)

The library can benefit from social media by making better use of the resources it has because of the many unique features it offers in this information era. Everyone knows that library users' opinions change all the time. However, social networking sites are mainly utilized for leisure purposes, such as keeping in touch with loved ones. On the other hand, they provide innovative and effective ways for users to connect with them. People in the information community are able to get up-to-date and pertinent data through social media. As a result, libraries should be the first to adopt this new technology and try out some of the key features of social networking sites (SNS), such as private messaging, improved engagement, blogging, forums, social collaboration, interactive learning, media and multimedia, event management, and so on.

In an online environment, people can participate in a variety of activities and share their opinions on social networking sites. Libraries may connect with patrons, and librarians can build

relationships and get involved in their communities using social networking sites. The following objectives of libraries may be achieved by using social network

Objectives

1. To Market Activities

- a. The library has received a fellowship from the SLA conference.
- b. The program, events, and news.
- c. Information on scholarship/Seminar conducted by library.
- d. Data pertaining to financial aid

2. To Raise Awareness of Library Services

- a. New staff (Their expertise & Work).
- b. Checking in (summer session scheduling).
- c. Illustration showing pupils engaged in reading within the library's designated study space.
- d. Upcoming library programs-Staffing the SM/Cataloging and Metadata management librarian position.

3. To Advertise Library Materials and Services

- a. Note: Photograph from a special collection.
- b. Photo documentation of different library sections.
- c. Locating volumes housed in a collection of fine art.
- d. The announcement of new library resources will make their discovery and access much easier.
- e. In digital format.-Recent findings from the establishment
- f. Subject: Library Renovation Update.

4. To Advocate for Novel Approaches to Acquisitions.

5. To Enhance Educational Resources

- a. Please provide a link to an internet site that can assist you with managing your research citations at our reference work.
- b. Conducting research for school assignments using Google Scholar.
- c. A research guide to help you with your class assignments.

6. To Advertise Research Manuals, Exhibition Guides.

- a. The goal is to establish rapport with incoming college freshmen.

7. To Interact With Members of the Scholarly Community.

Users believe that SNS is more convenient and pleasant for communicating with library staff than traditional methods since it provides more information in a shorter amount of time. Therefore, users are curious about online help. The use of these social networking sites, such as Facebook, YouTube, Twitter, blogs, etc., by library professionals makes it simple to develop a certain level of information literacy among users concerning library services.

A professional can moderate discussions regarding library services, academic advising, job placement aid, and other topics with students, teachers, patrons, and other academic luminaries.

Positive Aspects of Social Media

1. It promotes library services and brings this information to library users more directly;
2. It advocates for basic training.
3. It encourages people to talk to one another and the library staff.
4. It promotes dialogue among and across departments within the library.
5. In order to improve library services, it makes it easier to get user feedback, and promoting library resources on social media will lead to more people using those resources.

Drawbacks of Social Media

1. A lack of free time to engage in social media.
2. Uninformed identification theft and careless disclosure of personal information.
3. Libraries are not adequately funded. Library staffing shortage.
4. Librarians' interest in and engagement with social media has been on the decline. Workers at the library lack sufficient knowledge in information technology.
5. A course load that is not suitable for life after graduation.
6. Librarians' apathy toward continuing their education through lectures and seminar

Conclusion

A lot of people who use traditional libraries can save time by using SNS instead of looking for books or even asking if a book is available at a certain library. Among other things, users can use instant messaging to inquire about the availability of books or the library's hours of operation. Access to the internet allows patrons to peruse the holdings of other libraries, just as they would with offline access. Additionally, we can discover the opinions of experts in the subject on a particular book or the best book on a particular subject that is currently accessible. We should say "Humans are Social Networking Animals" instead of the cliché "Humans are social animals." When looking for the best job appointments, people rely heavily on social networking services (SNS). Upgrading and adapting to modern technology is the responsibility of library professionals for the benefit of their careers and the services provided to current library customers.

When academic libraries post on social media, it's as a group, not a person. It is expected that all messages be written in a respectful and official manner. Increasing user engagement is one of their key objectives, along with improving the usability and marketing of services and goods. Connecting people with high-quality content is one of the primary functions of social media. The library uses all posts that are relevant and informative for the benefit of its users. That being said, library services could vary.

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Analyzing Public Sentiment towards the G20 Summit - 2023: A Twitter-Based Study Using Sentiment Analysis

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Abstract

The purpose of the above research paper is to provide a comprehensive analysis of sentiment towards the G20 summit 2023 in India, using a dataset of tweets and natural language processing techniques. The study aims to contribute to the literature on the use of social media data for understanding public opinion and behaviour related to global events. The findings of the study may be useful for policymakers and researchers interested in understanding public sentiment towards the G20 summit and related issues. This study conducts sentiment analysis on 10,000 tweets related to the G20 summit 2023 using Twitter API to collect and NLTK and VADER for analysis. The language of the tweets extracted was in English and were during the period of 1st January 2023 to 6th April 2023. We have used Matplot lib for visualization of the data. The sentiment analysis revealed positive sentiment, such as excitement and optimism, and negative sentiment, such as scepticism and criticism of G20 2023 policies and decisions. The number of positive tweets was 5606, negative tweets were 1263, neutral tweets were 3131, and the overall compound score was 0.238195. The insights gained from the sentiment analysis can inform policy makers, analysts, and researchers about public attitudes towards the G20 summit 2023 and the global economy.

Keywords: Sentimental analysis, public opinions, g20 2023 summit, g20 India, social media, Twitter

Introduction

The Group of Twenty (G20) summit is an international forum that brings together the world's leading economies to discuss and address global economic issues (Smith (2021) Johnson (2020)). The G20 summit is a platform for member nations to discuss policies that can contribute to economic growth, promote global trade, and tackle pressing global challenges such as climate change, poverty, and inequality. As the world gears up for the 2023 G20 summit, it is important to evaluate public sentiment towards the event and the issues that it will address.

Sentiment analysis is a subfield of natural language processing that aims to identify, extract, and categorize subjective information from text (Indurkha & Damerau, 2010). Its objective is to determine the sentiment or attitude of the author towards a particular topic or entity. Sentiment can be classified as positive, negative, neutral, mixed, or ambivalent. Sentiment analysis has a wide range of applications, including brand monitoring, market research, customer service, and political analysis (Pang & Lee (2008), Liu (2012), Mehrotra & Kumar. (2020), Bird, Klein, & Lopper (2009)). Social media platforms, online reviews, news articles, customer feedback, blogs and forums, call centre transcripts, and public datasets are all sources of information that can be used for sentiment analysis (Smith, 2021). Sentiment analysis can be performed using various techniques, including rule-based methods, lexicon-based methods, and machine learning-based methods (Liu, 2012). The accuracy of sentiment analysis can be affected by various factors, including the use of slang, sarcasm, and irony, as well as the context and cultural background of

the users (Choudhury, Gamon, Counts & Horvitz, 2007). Social media platforms, such as Twitter, have become a rich source of data for sentiment analysis (Liu, 2012 & Jones & Lee, 2018). The aim of this paper is to demonstrate the usefulness of sentiment analysis in understanding public opinion towards global events such as the G20 summit. We will use NLTK and VADER to analyze data from social media platforms, news articles, and other sources to evaluate the public's sentiment towards the 2023 G20 summit. Our analysis will provide valuable insights for policymakers and stakeholders who are interested in understanding public opinion on the topics that will be discussed at the summit. This study will explore the application of sentiment analysis using NLTK and VADER in evaluating public sentiment towards the 2023 G20 summit. Our findings will provide valuable insights for policymakers and stakeholders interested in understanding public opinion on the topics that will be addressed at the summit.

Literature Review

Sentiment analysis on social media data has become increasingly popular in recent years, as it provides valuable insights into public opinion and attitudes towards a variety of topics. In the context of global events such as the G20 summit, sentiment analysis can be particularly useful for policymakers and stakeholders seeking to understand public sentiment towards important issues.

Previous studies have utilized various sentiment analysis techniques on social media data, including Natural Language Toolkit (NLTK) and Valence Aware Dictionary and sEntiment Reasoner (VADER). For example, a study by Hasan, Khan & Ahmad (2018). Used VADER to analyze tweets related to the G20 summit in Hamburg, Germany. The study found that the sentiment towards the summit was generally negative, with concerns about climate change and trade dominating the conversation.

Another study by Hu, He, Chen & Ma (2020) used NLTK to analyze tweets related to the G20 summit in Osaka, Japan. The study found that sentiment towards the summit was generally positive, with discussions focused on topics such as trade, climate change, and economic growth. Other studies have also explored the use of sentiment analysis on social media data in the context of global events. For instance, a study by Li, Zhang, Jiang, Wu, & Xu (2019). Utilized VADER to analyze Twitter data related to the United Nations Climate Change Conference. The study found that sentiment towards the conference was generally positive, with discussions focused on topics such as climate change policy, renewable energy, and sustainable development. Similarly, a study by Liu, Wang, Wu & Su (2019). Used machine learning techniques to analyze social media data related to the World Economic Forum. The study found that sentiment towards the forum was generally positive, with discussions focused on topics such as economic growth, technology, and innovation. In addition to analyzing sentiment, other studies have explored the use of social media data to understand public opinion and behavior related to global events. For example, a study by Ma, Xu, Zhang, & Liu (2020). Used Twitter data to investigate public opinion towards the G20 Osaka summit in 2019. The study found that public sentiment towards the summit was generally positive, with discussions focused on topics such as trade, climate change, and economic growth.

Similarly, a study by Ahmed *et al.*, analyzed social media data to investigate public opinion towards the United Nations General Assembly. The study found that sentiment towards the assembly was generally positive, with discussions focused on topics such as climate change, human rights, and international relations. These studies demonstrate the potential of social media data for providing insights into public opinion and sentiment towards global events. Our study builds on this literature by providing a detailed analysis of sentiment towards the G20 2023 summit in India, using both NLTK and VADER to analyze a large dataset of Twitter data. Overall,

these studies demonstrate the value of sentiment analysis in understanding public sentiment towards important global events. Our study adds to this literature by providing insights into public sentiment towards the G20 2023 summit in India, using both NLTK and VADER to analyze a large dataset of Twitter data. This study builds upon these previous works by utilizing NLTK and VADER to analyze tweets related to the G20 2023 summit in India. This study provides valuable insights into public sentiment towards this important global event and highlights the usefulness of sentiment analysis in understanding public opinion on social media platforms.

Objectives

The objectives of the study are:

1. To conduct a sentiment analysis of tweets related to the G20 summit – 2023 in India using NLTK and VADER;
2. To identify the top most common words and active users in the Twitter dataset;
3. To determine the distribution of tweets by time, day, and month and
4. To assess the presence and frequency of important keywords related to the G20 summit, such as climate change, finance, trade, and sustainable development.

Methodology

There are four main steps included in the process, that can be illustrated using a diagram in the below:

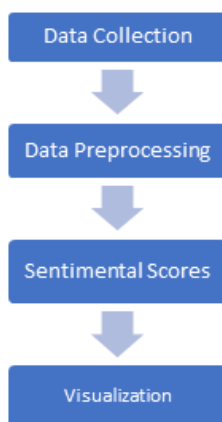


Fig.1 Overview of the Methodology for this study

A. Data Collection

This is the first step in the process; here we have collected the required data from Twitter. As we know, Twitter is popular social media where the users can post their opinion on anything. These can be extracted by using Twitter API (Ahmed, Hossain & Dutta (2019). For this study, we have downloaded a maximum of 10,000 English tweets using keywords like # g20 2023 OR #g20 India, and posts from January 01st 2023 to April 06th 2023.

B. Data Processing

Data extracted from Twitter is not fit for sentimental analysis as it will not give accurate results, this data is basically unstructured and contains noise, and unwanted symbols, URLs, punctuations etc., Data preprocessing is an essential step in sentiment analysis that involves cleaning, transforming, and preparing the raw textual data for further analysis. To obtain appropriate and

correct results, we are mandated to clean the dataset through an array of techniques available at our exposure (Smith, & Johnson (2019) Smith (2019)). The main steps included in the process are Text cleaning, Tokenization, Stopword removal, Lemmatization, Part-of-speech (POS) tagging. In this study, we have also analyzed:

1. The number of tweets posted per month.
2. The number of tweets posted in day.
3. The number of tweets posted at a particular time.
4. The number of tweets posted by verified account and non-verified account.
5. The number of times the verified account mentioned key words like finance, trade, climate change, sustainable development, green development.
6. The time at which most number of tweets are posted.
7. The number of tweets posted in each month.
8. Top ten accounts with most number of tweets.
9. Most number of likes for a tweet.
10. Most positive and negative tweets and most common words used.
11. We have analyzed all the above for better understanding of the tweets posted by the various users.

C. Sentimental Scores

In this part, we have given the scores (Positive, Negative, Neutral and compound) by using NLTK and pre-trained VADER sentiment analyzer. After performing sentiment analysis on the preprocessed tweets, we have calculated the sentiment scores for the entire dataset. We have analyzed the sentiment scores to identify patterns and trends in public opinion about the G20 2023 summit. We have used visualization tools to represent the sentiment scores and identify patterns and trends. We also conducted a sentiment analysis of the tweets to identify the most common positive and negative words used in the tweets. VADER-Valence Aware Dictionary and sEntiment Reasoner classifier which was based on both rule-based and lexicon approaches. The preprocessed tweets are passed as an input into the lexicon model and aspects are generated. Based on the aspect term extraction a sentiment score is assigned between -1 to + 1. The compound value is the summing of values for features in the lexicon and it can be normalized between -1 (Negative) to +1 (Positive) Hutto & Gilbert (2014).

D. Visualization of Data

There are several plotting libraries available for the Python programming language available for visualization of data like Matplotlib, Seaborn, Plotly, Bokeh, ggplot, Altair. We have used Matplotlib for visualization of data in this study. We have mostly used bar graphs to represent the data for appealing visualization.

E. Limitations of this Study

The study includes the use of a single social media platform (Twitter) for data collection and analysis, which may not be representative of the overall sentiment towards the G20 summit. Additionally, the study only analyzed tweets written in English, which may limit the generalizability of the findings. While the sentiment analysis provides some valuable insights, further research could build on these findings and explore the topic in more depth. For example, a more detailed analysis of the content of the tweets could provide greater insights into the specific themes and topics that are driving the conversation. Additionally, a more targeted analysis of tweets from specific user groups, such as government officials, civil society organizations, or media outlets, could provide insights into the different perspectives and priorities of these groups.

Results and Analysis

The associated table I of the same is shown below:

TABLE I TOP TEN MOST TWEETED USERS

S. No.	Usernames	Number of Tweets
1	Orfonline	869
2	T20org	496
3	ORFMumbai	319
4	raisinadialogue	297
5	ORF_CNED	185
6	airnewsalerts	154
7	orfecon	140
8	orfgeotech	110
9	U20India	103
10	PBNS_India	90
Total		2763

A. Top Ten Most Tweeted Users

The below plot graph shows the top ten most tweeted users:

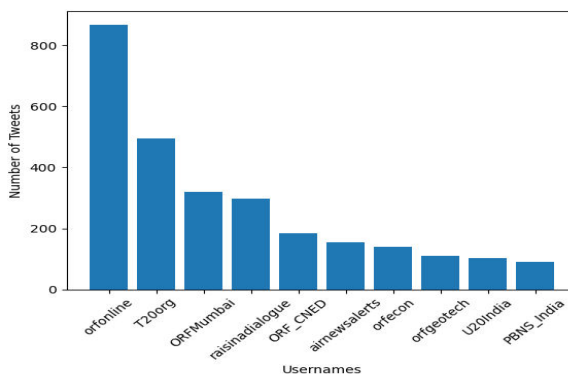


Fig. 1 Top ten most tweeted users

The top ten most tweeted users include a mix of media outlets, think tanks, and official G20 handles. This suggests that a diverse set of stakeholders are engaging in the conversation about the summit on Twitter. This information is useful for identifying the most influential Twitter users who are actively engaged in discussing the G20 summit. We can use this information to explore the potential impact of their tweets on the overall sentiment analysis of the summit.

B. Tweets by Verified and Non- Verified Account

The below figure shows the number of tweets posted by verified and non- verified accounts.

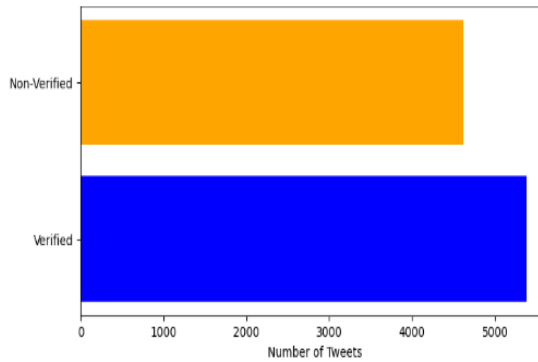


Fig.2 Plot graph of Verified and non-verified account

It is found that about 5380 tweets are from verified account and 4620 tweets are from non-verified account. So, it is about 53.8% of tweets is from verified account and 46.2% of tweets are from non-verified account. The fact that about 54% of tweets are from verified accounts could indicate that there is more interest and engagement from official sources or credible voices. The intention behind calculating this is to know how many accounts which are verified, and non-verified users actually interested in this discussion. Score is slightly more for the verified users; it is not a bad trend. The tweets came from verified accounts suggests that these accounts are more likely to be credible sources of information about the G20 summit. This could have an impact on the sentiment of the tweets, as users may be more likely to trust information from verified accounts.

C. Number of Tweets per Day

The below table II shows the number of tweets by day.

TABLE II DAY-WISE NUMBER OF TWEETS

S. No.	Day	Number of Tweets
1	Sunday	892
2	Monday	1416
3	Tuesday	1792
4	Wednesday	1161
5	Thursday	1392
6	Friday	1943
7	Saturday	1404
Total		10000

The below fig.3 shows the number tweets posted by users by day name.

The breakdown of tweets by day of the week suggests that Monday to Friday are the busiest days for discussion, with Friday having the highest number of tweets. This could reflect the fact that the summit is typically held over the weekend. We can explore whether there are any differences in sentiment between different days of the week, and whether this has any bearing on the overall sentiment analysis of the G20 summit.

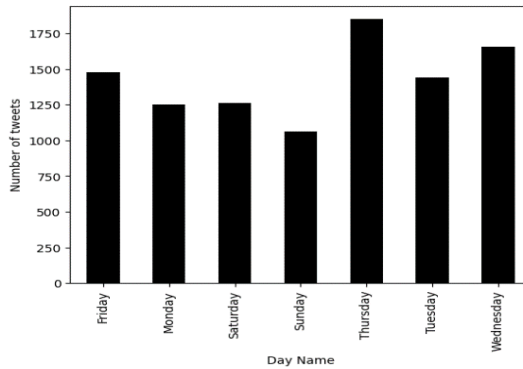


Fig.3 Plot graph showing the number tweets per day

The number of tweets posted on different days of the week is also an interesting finding. For example, the fact that there were more tweets on Friday than any other day suggests that users may be more engaged with G20-related content on the last day of the workweek. This could have an impact on the sentiment of the tweets, as users may be more likely to express positive or negative sentiment depending on their mood.

D. Tweets per Month

The below table III shows the tweets per month.

TABLE III NUMBER TWEETS PER MONTH

S. No.	Month	Number of Tweets
1	January	177
2	February	4601
3	March	4562
4	April	660

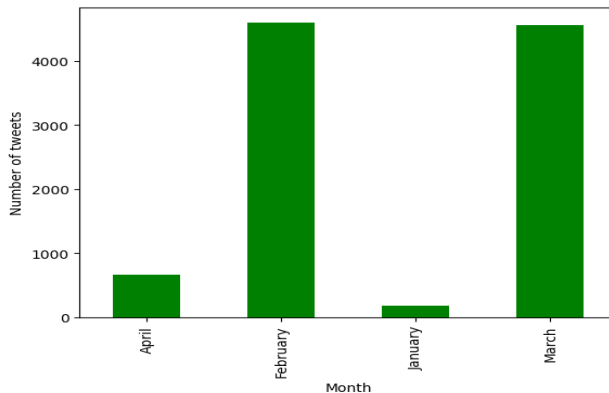


Fig.4 Plot graph showing the tweets per month

We could see that there are highest number of tweets were posted in the months of February and March. The fact that there were significantly more tweets in February and March than in January

and April suggests that Twitter users may be more engaged with G20-related content when the summit is closer in time.

E. Number of Tweets Posted In a Particular Hour

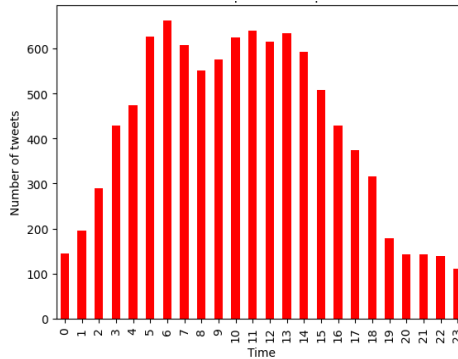


Fig. 5 Plot graph showing the number of tweets posted in a particular hour

The most tweets were posted at 6:00, with a total of 662 tweets. The fact that the most tweets were posted at 6:00 may indicate that this was a peak time for discussion and could provide some insight into when the public is most engaged in the topic. This information is useful for understanding when Twitter users are most active in discussing the G20 summit. This can help us to identify patterns in sentiment over time, which can be further analyzed to understand how sentiment changes in response to different events or announcements.

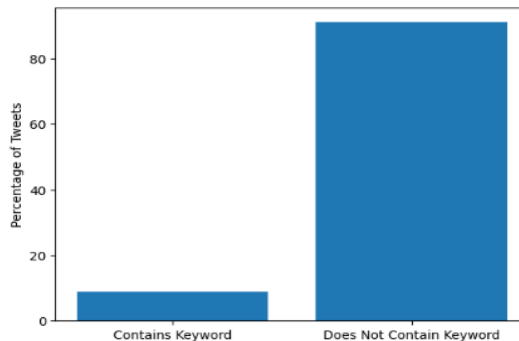


Fig. 6 Plot graph showing the tweets which contains the keywords

F. Keyword Frequency in Tweets

We have tried to find out the important keywords like Finance, Trade, Climate change, Green development, and sustainable development as these are important topics and are in the priority to be discussed in the summit. So, we have tried to find out how many users have also mentioned these keywords in their tweets, and we found out that about 894 times out of 10000 tweets have mentioned about these keywords in their tweets, which is about 8.94% and which is not a positive trend.

G. Topmost Common Words Used in Tweets

The below table IV the top ten most commonly used words in the tweets

TABLE IV MOST COMMON WORDS USED IN TWEETS

S. No.	Common Words	Number of Times
1	India	10490
2	presidency	2926
3	gindia	2890
4	meeting	2181
5	gorg	2165
6	global	1814
7	minister	1548
8	world	1088
9	country	1078

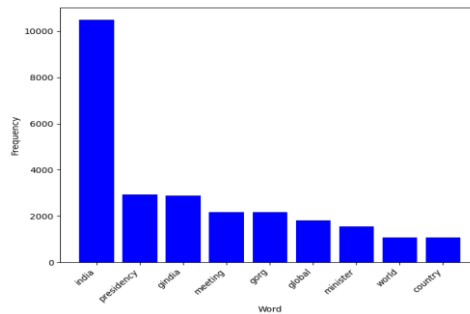


Fig.7 Plot graph showing the most common words used in tweets

The most common words in the corpus are "India", "presidency", "GIndia", "meeting", "Gorg", "global", "minister", "world", and "country". This suggests that India's presidency of the G20 summit was a significant topic of discussion among Twitter users. The most common words in the tweets seem to centre around India's presidency of the G20, the meetings and interactions between countries, and global issues more broadly. This indicates that Twitter users are largely focused on the main themes of the summit, which is not surprising.

H. Overall Sentiment Score

Let's have a look at the overall sentiment score of the tweets we have extracted. We have calculated the sentiment scores in four different categories i.e, Positive, Negative, Neutral and Compound score. Let us have look at the pie chart which shows the overall sentiment of the dataset or tweets we have extracted.

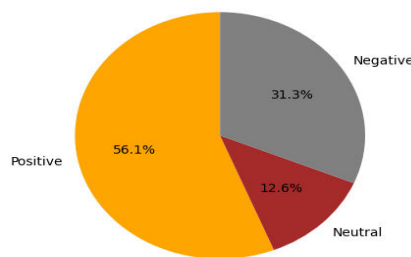


Fig. 8 Pie chart showing overall sentiment of the dataset

The number of Positive tweets: 5606
The number of Negative tweets: 1263
The number of Neutral tweets: 3131
Overall compound score is calculated as 0.238195.

I. The Tweet with the Most Replies

The below is the tweets with most replies, “Today is embarking on a trip to Kazakhstan Uzbekistan and India it will be my first time as secretary visiting Kazakhstan and Uzbekistan and I look forward to advancing our central Asian partnerships from there will head to India for the g ministerial”. It is found that about 892 replies got for the tweet and about 832 retweets and 7595 likes have got for the above tweet. The fact that the tweet received 892 replies indicates that it generated a significant amount of engagement and sparked discussion among Twitter users. The high number of replies suggests that the tweet's content resonated with the audience and encouraged them to express their opinions or ask questions. With 832 re-tweets, the tweet was shared by many users, possibly reaching a wider audience beyond the original tweet's followers. Retweets are often seen as a form of endorsement or agreement with the tweet's content. The substantial number of retweets suggests that the tweet's message was considered valuable or important by many users. The tweet received 7,595 likes, indicating that a large number of users appreciated the content and found it interesting or informative. Likes are a common way for Twitter users to show their approval or support for a particular tweet. The high number of likes suggests that the tweet resonated with a significant portion of the audience. On the whole, the tweet generated considerable engagement in the form of replies, retweets, and likes. It seems to have captured the attention of Twitter users and sparked interest and discussion around the mentioned topics of visiting Kazakhstan, Uzbekistan, and India, as well as advancing central Asian partnerships.

J. Most Positive Tweet

The most positive tweet is “Most positive tweet: congratulations to India for great hosting of g20 encouraged to see chairs summary reporting agreement on importance of mob's climate finance cities food security a fair intel tax system amp more a vital step toward strong sustainable growth amp move to net zero”. This tweet expresses a positive sentiment and highlights the achievements of India in hosting the G20 summit. It applauds the agreement on important issues such as climate finance, cities, food security, and a fair international tax system. The tweet emphasizes the significance of these agreements in promoting strong and sustainable growth, as well as the transition towards a net-zero future.

K. Most Negative Tweet

And the most negative tweet is “rule of law does not rule of might Ursula von says on Russia Ukraine war its war of arrogance where neither side decided to fall back in India arrogance destroys the poor weak now politic empowerment from the populated population soon is imp for us g My Leader Amrita Dhawan”. This tweet expresses a negative sentiment and discusses various issues. It mentions the Russia-Ukraine war and criticizes both sides for their arrogance and failure to de-escalate. It also mentions how arrogance in India affects the poor and weak. The tweet further emphasizes the importance of political empowerment from the populous population, suggesting that it is crucial for bringing about positive changes. The hashtag #My Leader Amrita Dhawan” implies a specific context or political affiliation. The positive tweet celebrates India's hosting of the G20 summit and the agreements reached on important global issues. On the other hand, the negative tweet criticizes the behaviour of both sides in the Russia-Ukraine conflict and highlights the negative impact of arrogance on the poor and weak in India, while advocating for

political empowerment. On the whole, our results suggest that Twitter users are generally positive about the G20 summit, but there are specific issues like climate change, finance, trade, and sustainable development that are significant topics of discussion among users. The insights and interpretations outlined above can be used to provide a comprehensive analysis of sentiment towards the G20 summit using NLTK and VADER. By exploring patterns in sentiment over time, based on specific topics and themes, and based on user credibility, you can provide a nuanced analysis of the sentiment towards the G20 summit and identify potential areas for improvement.

Discussion

The results of the sentiment analysis of the G20 summit 2023 using NLTK and VADER provide some interesting insights into the public's perception and engagement with the summit. The analysis showed that the majority of tweets were positive (56.06%), followed by neutral (31.31%) and negative (12.63%). The most common words used in the tweets included 'India', 'presidency', 'global', 'meeting', and 'country'. The most tweeted users were ORF online, T20org, and ORF Mumbai. The tweets were also posted mostly on Tuesdays, Fridays and Mondays, and in the month of February. The top ten tweeted users represent a diverse set of stakeholders, indicating that there is significant interest in the summit from a wide range of perspectives. The breakdown of tweets by day and month also provides some insights into when the public is most engaged in discussing the summit. The fact that Monday to Friday are the busiest days for discussion and that February and March had the highest number of tweets could indicate that people are most engaged in discussing the summit during the work week and in the months leading up to the event. The most active day for tweeting was Friday, and the most active month was February. The results also indicated that some users or organizations had a higher influence on the discussion on Twitter.

The most common words in the tweets centre around India's presidency, the meetings and interactions between countries, and global issues more broadly, suggesting that Twitter users are largely focused on the main themes of the summit. The high number of positive tweets indicates that the public is generally optimistic about the summit's outcomes. However, there are still a significant number of negative and neutral tweets, which could indicate areas of concern or criticism. The results also provide some insights into when and how the public is engaging with the topic on Twitter. The fact that the most tweets were posted at 6:00 and that Monday to Friday are the busiest days for discussion suggest that people are most engaged in the topic during the work week. The breakdown of tweets by month suggests that interest in the topic peaks in the months leading up to the summit. One interesting finding was that the sentiment towards the G20 summit was generally positive, despite the challenges posed by issues such as climate change and global inequality. This suggests that Twitter users may be optimistic about the potential for the G20 to address these issues and highlights the importance of continued efforts to promote global cooperation and sustainable development. The analysis also revealed patterns in sentiment over time, with the most tweets posted on Mondays and Fridays, and the most common words and keywords changing over the course of the year. These patterns can be further explored to gain a deeper understanding of the factors that influence sentiment towards the G20 summit.

Suggestions for Further Research

There are several areas where further research could be conducted. The study could be extended to other social media platforms, such as Facebook and Instagram, to get a more comprehensive understanding of public sentiment towards the G20 summit. Furthermore, it would be interesting to investigate the sentiment of tweets from users of different regions and countries to get an idea of how different regions perceive the G20 summit. Our study has several limitations that future research can address. Firstly, our analysis only covers 10,000 tweets, which may not be

representative of all tweets related to the G20 summit. Future research can expand the sample size to include a larger number of tweets to obtain a more accurate representation of sentiment. Secondly, our analysis only uses one sentiment analysis tool, VADER. Future research can explore the use of other sentiment analysis tools to compare the results and evaluate the accuracy of sentiment analysis. Thirdly, our analysis only focuses on English language tweets. Future research can consider analyzing tweets in other languages to obtain a more comprehensive understanding of sentiment towards the G20 summit. Another area for further research could be to investigate the potential impact of social media influencers on sentiment towards the G20 summit. By analyzing the tweets of high-profile Twitter users, it may be possible to gain insights into how these individuals shape public opinion and influence the sentiment of Twitter users towards the G20. Additionally, a comparison of the sentiment analysis of tweets in different languages could shed light on any differences or similarities in how people from different countries are engaging with the topic.

Conclusion

In conclusion, the sentiment analysis of the G20 2023 summit using NLTK and VADER provides some valuable insights into the public's perception and engagement with the topic on Twitter. The sentiment analysis of 10,000 tweets showed that the majority of tweets were positive. The topmost tweeted users were ORF online, T20org, and ORF Mumbai. The most common words used in the tweets included 'India', 'presidency', 'global', 'meeting', and 'country'. The tweets were mostly posted on Tuesdays, Fridays, and Mondays, and in the month of February. The findings suggest that Twitter users had a positive sentiment towards the G20 2023 summit. The results also highlight the importance of continued efforts to promote global cooperation and sustainable development and suggest that social media platforms such as Twitter can play a valuable role in promoting public discourse and shaping public opinion. The analysis provides a foundation for further research in areas such as multilingual sentiment analysis and the impact of social media influencers on public opinion. By building on these insights, it may be possible to gain a more comprehensive understanding of the sentiment towards the G20 summit, and to develop more effective strategies for promoting global cooperation and sustainable development. The fact that a diverse set of stakeholders are among the most tweeted users and that the majority of tweets are positive suggests that there is widespread interest and optimism about the summit's outcomes. However, there is still a significant number of negative and neutral tweets, suggesting that there are areas of concern or criticism that should be addressed. However, further research is needed to explore the topic in more depth and to provide a more nuanced understanding of the conversation and its implications. The sentiment analysis itself shows that the majority of tweets are positive, with an overall compound score of 0.238195. This could indicate that Twitter users are generally optimistic about the summit and its outcomes. However, it is important to note that there is still a significant number of negative and neutral tweets, and that these could provide important insights into areas of concern or criticism.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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The Growing Influence of Social Media and Its Impact on Academic Libraries

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Abstract

Every one of the individual in the world deep falls down in a social media to communicate with people in remote areas. The people using the social media in India will increase day by day. The social media tools have become important communication tools for attract everyone with its unique features of update information. This paper discussed about the various social media tools used by the librarians and the types of services provided on social media platform. The impact of social media on library services studied simultaneously.

Keywords: Social Media, Library services, WhatsApp, Telegram, e-resources.

Introduction

Science and technology have brought about marvelous development and change in almost all walks of life. Information Communication and Technology (ICT) has saturated our work and lives. The emergence of information technology which includes social media has brought a change in librarian services rendering and users' attitude towards the way library resources is being used. Today, social media has affected human life to a great extent and the library has also changed accordingly. Social media is also widely used in daily information use. Social media has become an effective tool for sharing information. Due to social media, geographical distance between people has reduced and people have come closer to each other and obviously the borders between countries are blurred. Social media is understood to mean web-based technologies for social interaction using highly accessible techniques to transform and broadcast media monologues into social dialogues. According to Merriam-Webster, Social Media is a form of electronic communication (as Web sites for social networking) through which users create online communities to share information, ideas, personal messages, and other content (as videos). Social media is also the creation and maintenance of personal and business relationships especially online (Facebook, Twitter, Instagram, YouTube and so on).

Anwar, Muhammad and Tang Zhiwei (2020) their paper has highlighted the combination between the libraries and social media. The present research has also taken into an account to see the liability and possibilities of social media usage in the libraries. This study describes the number of aspects of among libraries a social medium. Social media provides a major platform for the libraries to promote their sources and services. This study has also marked the number of social media usage in the libraries. The impact of social media on libraries looked positive and every individual library is using social media tool to interact with the library users, e.g. Facebook, Twitter, MySpace, Wikis, and YouTube and also identified the benefits, purposes, and issues of using social media in the libraries. Finally the study has revealed that the libraries should adopt social media tools to create a virtual environment for library users where they can access the library sources and services. Social media can be helpful to create a massive bridge between library users and library resources and services. Sahu, Srikanta and Naik, Pranoy (2019) their paper describes about the use of social media in Binghamton university libraries. Authors have taken Facebook, twitter, YouTube and Pinterest for study. The study focus two aspects: type of content published and user engagement to evaluate the response. Chakrabarti, Abhijit (2016) his paper presents the symbiotic relationship between the libraries and social media for the creation of

digital environment in the LIS domain. It is noted that 21st century librarianship witnesses huge changes in the field of Library and Information science. As a result of which many changes in the LIS domain have altered the forms of information and nature of services but the basic role of the libraries - to cater the information according to need and demand of the users- is the same. The paper discusses how the social media can be exploited for the benefit of the users of library. Ravi Kumar, Chegoni (2015) his paper deals with concept of social networking and its application to Academic library services for a pro-active awareness and training to educate both the LIS professional and the Teaching Faculty, Students and Research Scholars on the in valuable importance of utilizing social networking in academic library services in digital environment.

Collins, Garyand Quan-Haase, Anabel (2012) in their study they discussed about the social media adoption rates and practices in academic libraries in the province of Ontario over a fourteen month period beginning in April 2010. Findings indicate that while interest in social media technologies amongst librarians has plateau, patrons of academic libraries are using these tools in increasing numbers. Outcomes suggest that libraries should attempt in the future to create more original content in areas of patron interest as well as utilize their preferred platforms with greater regularity.

All above studies shows the increased influence of social media on libraries, even librarians had to develop their libraries. Librarians use various social media for their users to keep abreast them about various library collections and services. Hence in the present study, the author has decided to study how librarians have adopted social media in their libraries.

Objectives

1. To study the various social Media tools used by librarians.
2. To study the type of services provided on social media by librarians.
3. To study the Impact of social media on library services.

Scope

In the present study, the researcher has decided to study the colleges affiliated to Sant Gadge Baba Amravati University Amaravati. 398numbers of colleges affiliated to Sant Gadge Baba Amravati University Amaravati. Out of them 150 colleges which are affiliated to this University from Amaravati District are selected for the present study. The college librarians from theses colleges are selected for the present study.

Methodology

The researcher used questionnaire method for collecting data. Total 150 questionnaires were distributed amongst the librarian and data was analyses and the conclusion has been drawn. Whenever needed the literature have been searched for this study.

Analysis of Data

The world has become closer because of social media. It should not be an exaggeration to say that as the society developed due to social media tools. Today's society can be called an information society because of the extraordinary importance of information that has acquired. Having this information at our disposal or transferring this information quickly has become important. Therefore, librarians have to use updated services all the time to ensure that this information reaches maximum number of readers. Hence social media is becoming an effective tool for sharing information. The present study set out to study how much librarians are aware of or have a focus on social media. Total 150 questionnaire have been distributed out of which 140 duly filled questionnaire have been collected and the data has been analyzed and conclusion has been drawn.

A. The Various Social Media Tools Used by the Librarians

The above table I portrays the different Social Media tools used by the librarians to market their library products and resources. It was noted that 99% used WhatsApp as the main tool used by the librarians which is, followed by Youtube and Telegram 85% and Facebook 77% and the least used was LinkedIn 41%.

TABLE I THE VARIOUS SOCIAL MEDIA TOOLS USED BY THE LIBRARIANS (N=140)

S.N.	Social Media Tools	Response	(%)
1	Blog	57	40
2	Website	67	47
3	WhatsApp	139	99
4	Telegram	120	85
5	Facebook	98	70
6	LinkedIn	58	41
7	YouTube	119	85
8	Twitter	89	63
9	Instagram	112	80

B. Type of Contents Posted On Social Media by Librarians

The promotion of library resources and services is being greatly impacted by social media in libraries and information centers. All of the library's users are gathered in one place via various social media platforms to exchange opinions and thoughts on the pertinent material they have access to. Social media is also giving library professionals a tone of room to build a virtual environment that will increase their ability to provide services. How using social media helps librarians to bridge the gap between library patrons and the materials and services they provide is also studies on the present work and it is displayed in table II.

TABLE II TYPE OF SERVICES PROVIDED ON SOCIAL MEDIA BY LIBRARIANS (N=140)

S. No.	Contents	Response	(%)
1	To interact with the users	139	99
2	Marketing the library services	120	85
3	Live discussion	67	47
4	To display the user statistics	98	70
5	To get the feedback from the users	112	80
6	To update the users with current information of the library	101	72
7	To attract new users	112	80
8	Event promotion	132	94
9	Resource promotion	125	89
10	Library service Promotion	135	96
11	Sharing e-resources	134	95

The table II highlights the various types of services provided on social media by librarians. All the respondents agreed that they used social media tools because they are the best tool to interact with the users, marketing the library products and resources, promote the library usage and providing

quick responses. 99% librarians agreed they used social media for interaction with students, followed by 96% for library service promotion, 94% for event promotion. 89% for resource promotion and 80% used for collection of feedback from students and to attract new users.

C. The Impact of Social Media on Library Services

Social media are growing up rapidly with none break. A number of the social media is putting an excellent impact on library services. Social media are using in libraries to deliver information to their potential users. Hence how social media has affected library services is studied in the table III.

TABLE III THE IMPACT OF SOCIAL MEDIA ON LIBRARY SERVICES

S.N.	Impact of Social Media	Response (%)			
		Strongly Agree	Agree	Disagree	Neutral
1	Increase in use/demand of e-resources	65	15	20	00
2	Increase in demand of web based services	76	20	4	00

Table III shows that 65% librarians strongly agreed about the increase in use/demand of e-resources which is followed by 15% and 76% librarians strongly agreed about the increased in demand of web based services. This shows that the usage of web services among students has increased due to the use of social media in library services.

Conclusion

Librarians are reaching out to their readers using various social media this obviously has an impact on library services. In the present study it was found that librarians have maximum use of WhatsApp, Telegram, Youtube and Instagram in their libraries. Most of the librarians used social media to interact with their students, promotion of library services, sharing r-resources, library event promotion etc. finally is identified that usage of the web based services by the students is increased due to the impact of social media.

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Fostering Information Literacy through Zotero Reference Management Tool among the Faculty of PCACS: A Case Study

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Abstract

The purpose of the present paper is to investigate the familiarity and use of reference management software (RMS) by faculties in PCACS. Through this study, an attempt was made to analyze the different approaches which librarians can take to provide help in use of Bibliographic Management Software (BMS) and bibliographic referencing. In an academic and research environment, dissemination of research findings through scholarly articles is a common practice throughout the world. Managing references has always been a difficult task in reporting research results. Referencing and citations, especially referring to well-received and widely read research findings forms the cornerstone of any research. Referencing and proper citing of the references are key components in a research process. To overcome these basic challenges use of BMS could be a possible solution. It is suggested that information literacy instruction that focuses on the effective use of BMS could pave way for a better resource utilization and use.

Keywords: Information Literacy, Citation, Bibliography, BMS, Zotero

Introduction

Information Literacy Competency Standards for Higher Education, prepared by The American College and Research Libraries (ACRL, 2000), refers to the use of a standard referencing style as a competency of an information-literate person. In an academic and research environment, dissemination of research findings through scholarly articles is a common practice throughout the world. Often research findings are supported and disputed through earlier findings. Such findings are normally referred to as citations and references for the readers to ascertain the validity of the claim the researchers make. Normally, the research results are reported in various forms, although journal articles play a primary role in their dissemination. Monographs, conference publications and reports also play a pivotal role in publishing research results. While researchers pay meticulous attention to the timely publication of their results, they often fail to correctly cite the source of their references. Browne *et al.* (2004) reported that there is at least one error in half of the references. Sahu and Abraham (2000) claims that authors do not adhere to accepted citation standards and styles. It is evident from citation studies that authors give very little care to the referencing and citations; this in turn results in inaccurate bibliographic references.

Managing references has always been a difficult task in reporting research results and producing academic writings. Bibliographical information of cited references needs to be provided properly, so that readers may find them if they need to refer. It is time-consuming to write down the bibliographic information of references manually, and, more importantly, this would invariably produce some errors. Within the literature, the inaccurate bibliographical information stemming from references has been considered as a major hurdle in the retrieval of these resources (Steele, 2008).

Referencing and citations, especially referring to well-received and widely read research findings forms the cornerstone of any research. With the recent advancements in information and communication technologies (ICT), the practice of citation and bibliographic referencing has

become much easier. To an extent, the scholarly communication paradigm, the dissemination of research findings as well as the referencing formats, methods and methodologies have taken a huge change.

The advancement of the Internet, awareness of copyright, plagiarism and scientific value of research are some of the important aspects which have led both researchers and publishers to advocate for proper citation of the material in academic writings (McCullen, 2003; Howard and Davies, 2009). For the purpose of streamlining citation and referencing issues, a number of software tools which enable the researcher to more efficiently manage bibliographic content and creation are available both in open source as well through commercial license. These specialized software packages allow researchers to manage a compendium of references which are available in myriad formats and efficiently disseminate the research findings with very little referencing flaws. The dissemination of research findings as scholarly articles often warrants laborious prerequisites. Referencing and proper citing of the references are key components amid meticulous planning on revealing the research findings in a research process. To keep the true spirit of research etiquette complete, one needs to give due attention to all the different resources one has referred in the course of the research.

In the process of research and the subsequent dissemination of research results, referencing poses a number of problems. References are often available in various formats. Different formats need different types of encoding into the reference sections. The next major challenge is sorting the innumerable references one has accumulated for an article. To overcome these basic challenges related to content development and citation management, the use of Bibliography Management Software (BMS) could be a possible solution to search, store, annotate, communicate and present the research output and citation in a professional and organized manner. The basic prerequisite for such an undertaking is proper awareness of such applications, their functioning and use. It is suggested that information literacy instruction that focuses on the effective use of BMS could pave way for a better resource utilization and use.

The purpose of this study is to assess the familiarity of BMS among the faculty of Pillai College of Arts, Commerce and Science (PCACS) to see the extent to which they are aware of BMS. A workshop organized on Zotero and based on that a questionnaire survey was conducted to ascertain the awareness level and use of BMS and citation styles among PCACS faculty.

A. Profile of PCACS Learning Resource Centre (LRC)

Pillai College of Arts, Commerce and Science permanently affiliated to the University of Mumbai and recognized by U.G.C. under 2(f) and 12(B). The college is ISO 9001:2015 certified and is accredited by NAAC with the prestigious 'A' Grade in all the three cycles of accreditation. University Grants Commission, New Delhi has conferred Autonomous Status to on 24th June, 2019. The institution has risen from a simple beginning in 1998 to be the most popular institution catering successfully to the needs of rural, urban and global students with 13 under-graduate and 5 post graduate programmes to over 5000 students. The Library has the collection of more than 38000 books and provided remote access to more than 1,00,000 e-books and 6000 e-journals subscribed under UGC N-LIST programme. Library conducts regularly Information Literacy Programmes for students and faculty members to explore it's valuable learning resources.

B. Bibliographic Management Software (BMS)

Bibliographic Management Software (BMS), Citation Management Software or Personal Bibliographic Reference Management Software are basically software packages meant for scholars and authors to use for recording and utilizing bibliographic citations and references

(Francese, 2013). The purpose of BMS is to collect, organize, synthesize and cite references during the process of writing scholarly content either for a research result or report. The backbone of the BMS package is a database of records with complete bibliographic details. The bibliographic records stored in the database can be used to generate selective lists of articles in different formats required by publishers and scholarly journals (Gall and Brahma, 2006). There are various software packages which are available in both commercial (EndNote, Reference Manager) as well as open source mode (JabRef, Mendeley, Zotero) for the efficient management of references. These software packages can be used as desktop installations for offline usage as well as for storing bibliographies online which can be accessed anywhere, anytime. The BMS also helps in searching references online based on Z39.50 protocols. Z39.50 is an international standard client-server, application layer communications protocol for searching and retrieving information from a database over a TCP/IP computer network (NISO, 2002). Modern reference management packages can also be integrated with word processing software so that a reference list in the appropriate format is produced automatically as and when an article is written, reducing the risk that a cited source is not included in the final reference list. These packages also have a facility to import the details of publications and to export these details as subject bibliographies.

Bibliographic databases often provide an avenue to create a personal database of selected references either by importing them from an online research database or by inputting manually. This database is then searchable, enabling a user to select needed references for a paper and automatically format the bibliography in a few seconds. On the other hand, BMS applications are designed to help researchers gather and utilize bibliographic information as effectively and efficiently as possible and help the researchers to construct a database to be used interactively in the process of writing.

C. Citation/Referencing Styles

In library usage, the term citation refers to a written reference to a specific work or portion of the work (book, articles, dissertation, report, etc.) by a particular author, editor, composer, etc. (Reitz, 2004, p. 142). There is a standard format of presenting the citation in a citing document. This is popularly known as citation or referencing styles. Citation and referencing styles play a crucial role in the dissemination of research results. The citation style varies in the case of different subject fields of study, but includes the minimum information required to identify the cited document. The awareness of styles helps in proper citation and formatting the bibliography at the time of writing scientific papers or books. A number of different citation styles and standards are followed by academicians world over. Most notable among them are American Psychological Association, Modern Language Association and Chicago Styles along with publishers opting for their own journal citation styles (ACS Citation Style, IEEE and Nature).

D. Benefits of Using Bibliographic Management Software

The major benefit of using BMS starts with its unique support of handling huge amount of bibliographic data as a single unit. It helps in organizing the vast bibliographic details by guiding to gather, organize and utilize bibliographic details. The basic functioning of BMS allows authors to generate their reference at the end of the research article and to provide citation at the parenthetical or footnote or endnote levels. They provide users with an avenue to import references from large database which could be manipulated at the later stage of research. Some of the BMS packages provide facilities to create multiple databases with an unlimited number of references.

Most of the BMSs give an option to store the bibliographic information in remote locations for easy access from anywhere the researcher wants it. Most of the BMS packages also support all the

major bibliographic formats and styles. Most of the packages provide periodic backup of bibliographies, which is a relevant base for research. Further, most of the packages also work across major operating systems to enable users to choose the relevant system(s) they prefer. Some packages provide data exporting and importing facilities for easy migration from one package to another. Inserting citations and their bibliographic information in the paper manually would easily lead to errors in content and ordering, and hinder the retrieval of cited documents. Bibliographic, reference or citation management software packages will assist with the management of a bulk of references, and provide consistency in referencing. Empirical data confirm that using these software packages will minimize human errors in referencing, and, by facilitating the referencing process, will lead to higher scientific production.

Data Analysis and Interpretation

TABLE I GENDER WISE RESPONDENTS

S. No.	Gender	No. of Respondents	Percentage (%)
1	Male	21	52.50
2	Female	19	47.50
Total		40	100.00

Table I Shows that 21 (52.50%) male and 19 (47.50%) female faculty members participated in this workshop. It shows that there is no much gender difference exists among the participants.

TABLE II PRIOR EXPERIENCE OF RESPONDENTS ON SIMILAR SEMINAR/WORKSHOP

S. No.	Response	No. of Respondents	Percentage (%)
1	Yes	00	00.00
2	No	40	100.00
Total		40	100.00

Participants asked to reveal their experience on any kind of seminar or workshop they have attended in their previous career on reference management tool or bibliographic management software. It is interesting to mention here that none of them have attended any workshop or seminar. From Table II it indicates that i.e. 0 %.It reveals the need and advantage of conducting workshop in PCACS.

TABLE III USE OF STYLE MANUALS

S. No.	Style Manuals	No. of Respondents
1	APA	13 (32.5%)
2	Harvard	08 (20.0%)
3	Chicago	00 (00.0%)
4	MLA	00 (00.0%)
5	IEEE	03 (7.5%)
6	Any other	06 (15.0%)

Figures in Parentheses Indicate Percentage

Table III Indicates that 13 i.e. (32.50%) responded they use APA style manual followed by 6 (i.e.15 %) respondents they use other type of style manuals for their academic work.

TABLE IV MEANING OF PLAGIARISM

S. No.	Meaning	Percentage (%)
1	Failing to use the correct format when citing your sources	24 (60.00)
2	Using the idea of another person in your work instead of using only your own ideas	18 (45.00)
3	Improperly interpreting the authors in your source	31 (77.50)
4	Including the ideas of another person in your writing and failing to cite them	14 (35.00)
5	Can't Say	07 (17.5%)

Figures in Parenthesis Indicate Percentage

Table IV reveals that majority of the respondents i.e., 31 (77.5%) responded improperly interpreting the authors in your source followed by 24 (60.0%) failing to use the correct format when citing your sources. A very less number 7 (17.5%) responded they can't say about meaning of plagiarism. It shows the awareness level of faculty in PCACS.

TABLE V IMPACT OF WORKSHOP ON RESEARCH/ACADEMIC WORK

S. No.	Impact of Workshop	No. of Respondents	Percentage (%)
1	Strongly Agree	27	67.50
2	Agree	13	32.50
3	Not Sure	00	00.00
4	Disagree	00	00.00
5	Strongly Disagree	00	00.00
Total		40	100.00

TABLE VI FAMILIARITY WITH THE CONTENT OF PRESENTATION BEFORE WORKSHOP

S. No.	Familiarity Level	No. of Respondents	Percentage (%)
1	A lot	00	00.00
2	Quite a lot	12	30.00
3	A fair amount	08	20.00
4	A little	17	42.50
5	Nothing	03	07.50
Total		40	100.00

TABLE VII QUALITY OF CONTENT PRESENTED IN WORKSHOP

S. No.	Quality of Material	No. of Respondents	Percentage (%)
1	Very Good	17	42.50
2	Good	13	32.50
3	Fair	07	17.50
4	Poor	03	07.50
5	Very Poor	00	00.00
Total		40	100.00

Table V reveals that the respondents asked to give their opinion on impact of workshop on their future research or academic work. Majority of the respondents 27 (67.50%) strongly agreed followed by 13 (32.50%) agreed. It shows the importance of conducting workshop on BMS.

Table VI Indicates that majority of the respondents 17 i.e., (42.50%) responded a little followed by 12 (30.00%) responded quite a lot.

Table VII Shows that 17 (42.50%) responded quality of material used for presentation is very good followed by 13 (32.50%) responded good. It will help to improve the quality of presentation in arriving workshops.

TABLE VIII LEVEL OF KNOWLEDGE GAINED THROUGH WORKSHOP

S. No.	Level of Learning	No. of. Respondents	Percentage (%)
1	A lot	19	47.50
2	Quite a lot	12	30.00
3	A fair amount	08	20.00
4	A little	00	00.00
5	Nothing	01	02.50
	Total	40	100.00

Table VIII Indicates that 19 (47.50%) responded they have gained a lot followed by 12 (30.00%) responded quite a lot .A very few respondents i.e.08 (20.00%) responded fair amount.

Conclusion

In this changing library environment, users sometimes face difficulties in getting their desired information. In this context, information literacy programmes on specific subjects or core skills seems to be quite effective and proves to be an indispensable programmes for libraries. Every library must introduce this kind of programme for larger interest of library. In the modern era libraries are not expected simply to satisfy the information needs of the users but to create information needs by trying to create awareness of information sources and techniques. It is expected that the Information Literacy will play an important part in revitalizing downtown of Education system in India. Information literacy is not a destination, it is an ongoing journey, and it is the key to lifelong learning.

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Poultry Farmers in Namakkal: Exploring Mobile Phone Usage for Accessing Information

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Abstract

This study delves into the information-seeking patterns of poultry farmers in the Namakkal district of Tamil Nadu, specifically focusing on their use of mobile devices. A sample of 155 respondents, selected randomly from various regions within the district, participated in the research. Out of the 155 questionnaires that were distributed, 142 were fully completed and returned by the respondents. The results indicate that a notable proportion of poultry farmers are young individuals with a middle school education, hailing from diverse socioeconomic backgrounds. They primarily reside in nuclear or single-family households, with family sizes typically ranging from 7 to 15 members, and manage small to medium-sized land holdings. Poultry farming constitutes their primary occupation. The study reveals that there is a moderate level of familiarity with and utilization of information and communication technology tools for accessing agricultural information among these farmers. This exploration sheds light on the information-seeking practices of poultry farmers in the Namakkal district, pinpointing areas where support and knowledge dissemination could enhance their efficiency and overall success in the poultry farming sector.

Keywords: Poultry farmers, Information-seeking Behavior, Mobile phones usage, Namakkal district, Technology Adoption.

Introduction

This article aims to understand the extent and patterns of mobile phone usage among poultry farmers about accessing information related to their farming practices. Poultry farmers in Namakkal employ mobile phones to access information pertinent to their farming endeavours. Utilizing mobile phones empowers farmers in efficient farm management and informed decision-making. Mobile phone usage is widespread among farmers, with each farmer possessing at least one mobile phone (Mariki, M., 2022). Even though the widespread use of mobile phones among poultry farmers in Namakkal, the adoption of these devices for record-keeping remains limited. Only 30% of farmers record farm activities in dedicated logbooks, as highlighted by Gopalasundar, R. (2021). Farmers primarily use mobile phones for communication and basic functions, such as vaccination reminders and mobile money transactions, Aram, I. A., & Sakthivel Murugan G. (2020). Mobile advisory services are effective in providing farmers with knowledge and skills related to crop management, farming technologies, and government schemes, Jayalakshmi, M., *et al.*, (2022). Additionally, mobile applications have been developed specifically for farmers, providing them with information on improved varieties, pest and disease control measures, livestock management, and fertilizer recommendations, Palanisamy, A., & Bharadwaj, N. (2018). In summary, the significant use of mobile phones plays a crucial role in supporting poultry farmers by facilitating access to significant information for their farming activities."

Bist, P. R., *et al.*, (2016) stated that ICT is a crucial initiative for providing better services. ICTs play a vital role in communicating improved and scientific technologies that can enhance production and productivity. Hence, it is essential to leverage ICTs to disseminate knowledge and

information effectively, leading to better farming practices and outcomes. The reliable and timely exchange of information can enable farmers to adopt innovative techniques and make informed decisions, ultimately contributing to the growth and development of the agricultural sector.

Significance of Accessing Information in Farming

Gaining access to information is pivotal in agriculture, enable farmers to make informed decisions crucial for establishing practicable and sustainable farm enterprises. Farmers seek diverse information from multiple sources to refine their methodologies and embrace innovative technologies, ultimately attractive yield and income. An in-depth understanding of farmers' information requirements, their access to resources and the resulting impact in various production contexts is imperative for optimizing extension and advisory services. Recent studies underscore the substantial positive influence of accessing information from formal sources, including public channels and mass media, on cotton output and the value of output per unit area (Nikam, V., *et al.*, 2022). Soundar, G., *et al.*, (2017), a mobile application is explored as a valuable tool for farmers, providing detailed insights into various farming activities. This innovative application aims to offer farmers guidance on essential tasks and delve into comprehensive details, ultimately empowering them with knowledge crucial for effective and informed agricultural practices. Despite the potential benefits of mobile applications in disseminating agricultural information, Krishna, A., and Naik, G. (2020) highlight challenges in the delivery process. These challenges contribute to gaps in crop production practices, emphasizing the need for effective solutions and strategies to bridge the information dissemination divide in agriculture.

Poultry Farmers Embracing Mobile Phone Utilization

Poultry farmers in Tanzania are gradually more adopting mobile phones to access improved information on chicken farming (Shapa, M., *et al.*, 2021). Decision support systems, particularly designed for mobile use, have been developed to provide dependable information to small-scale poultry farmers. These systems empower farmers to make well-informed decisions on the subject of their farming activities (Iddi, H., *et al.*, 2023). In spite of these advancements, women poultry farmers look challenges related to bandwidth costs and poor network connectivity, hindering their access to critical information (Iddi, H., *et al.*, 2022). The use of mobile phones for improved chicken farming information is influenced by a variety of socio-economic factors, together with age, education level, and occupation (Asogwa Samuel Chibuzor, *et al.*, 2022). Farmers usually perceive mobile expert systems for poultry farming forecasting as beneficial, even though there might be differences in judgment between male and female farmers (Rajakumar, G., *et al.*, 2022).

Objectives of the Study

1. To examine current mobile phone usage
2. To identify information needs
3. To assess technological proficiency
4. To analyze socioeconomic factors
5. To investigate information-seeking behaviour.

Methodology for Data Collection

To examine up-to-date mobile phone usage amongst poultry farmers in Namakkal district, a mixed-methods approach will be employed. A survey questionnaire will be developed to weigh up usage patterns, as well as device types, frequency, and purposes. Random sampling will be used to select spokesperson farmers for participation. In-depth interviews will complement the survey to provide deeper insights. Identifying information needs will involve focus group discussions and key informant interviews, focusing on topics similar to poultry health and market environment.

TABLE I SOCIO-ECONOMIC CHARACTERISTICS OF THE RESPONDENTS

Variables	Frequency	Percent
Gender		
Male	92	64.8
Female	50	35.2
Age		
Less than 31	30	21.1
31 – 40	48	33.8
41 – 50	25	17.6
51 - 60	27	19.0
Above 60	12	8.5
Marital Status		
Single	26	18.3
Married	116	81.7
Educational Level		
Illiterate	27	19.0
School education	75	52.8
Graduate	40	28.2
Household Size		
1-2	29	20.4
3-4	91	64.1
5-6	11	7.7
Above 6	11	7.7
Marketing Experience		
1-10	74	52.1
11-20	45	31.7
21-30	12	8.5
Above 30	11	7.7
Membership to Market Association		
Yes	90	63.4
No	52	36.6
Monthly Income		
less than 50,000	18	12.7
50,000 – 100,000	57	40.1
100,000 – 150,000	18	12.7
150,000 – 200,000	17	12.0
Above 200,000	32	22.5

Table I presents the socio-economic characteristics of the respondents, enlightening a unbiased distribution in terms of gender, with 64.8% males and 35.2% females. The age distribution is diverse, with the majority falling within the 31-40 age range. Most respondents are married

(81.7%), have received some level of school education (52.8%), and have a household size of 3-4 members (64.1%). In terms of marketing experience, over half have 1-10 years of experience, and significant portions (63.4%) are members of market associations. The monthly income distribution is varied, with 40.1% earning between 50,000 and 100,000. Technological proficiency will be assessed through skill evaluations and direct clarification of mobile phone use. Socio-economic factors will be gathered throughout demographic surveys and document analysis. We will collect information about how people search for information by asking them questions, observing them, and talking to them. To gain a thorough understanding of how mobile phones are being used in poultry farming, we will be conducting open-ended surveys and detailed case studies to identify any challenges and barriers that may exist.

Selection Criteria and Sample Size

To ensure a comprehensive understanding of mobile phone usage among poultry farmers in Namakkal, we will select participants based on geographical representation, farm size diversity, and demographic variation, including factors like age, gender, education level, and occupation. Our sample size aims for at least 155 poultry farmers, randomly chosen from different regions within Namakkal. Out of the 155 questionnaires that were distributed, 142 questionnaires were returned by the respondents. Additionally, we'll engage with 10-15 key informants, such as agricultural experts, to gain insights into information needs and potential challenges faced by poultry farmers. This diverse and targeted approach will help us explore how various factors influence mobile phone utilization in poultry farming. Adjustments to the sample size and criteria will be made based on available resources and research objectives.

TABLE II TYPES OF ICTS USED BY THE POULTRY FARMERS

Profile		No. of Respondents	Percentage (%)
Availability of ICT facilities	Yes	142	100.0
Types of ICTs used for poultry marketing	Mobile phone only	92	64.8
	Mobile phone and social media platforms	50	35.2
Social Media use	Yes	71	50.0
	No	71	50.0

TABLE III LEVEL OF USAGE OF ICTS AMONG POULTRY FARMERS

Profile		No. of Respondents	Percentage (%)
Mobile Phone	Very often	126	88.7
	Not often	16	11.3
Radio	Not often	8	5.6
	I do not use it in marketing	134	94.4
Television	Not often	10	7.0
	I do not use it in marketing	132	93.0
Social Media Platform	Very often		
	Not often		
	I do not use it in marketing		

Table II highlights the types of ICTs used by poultry farmers, representing that all respondents have access to ICT facilities. The majority of respondents (64.8%) use only a mobile phone for

marketing, and 35.2% use both a mobile phone and social media platforms. In addition, 50.0% of respondents engage in marketing through social media.

Table III provides insights into the level of ICT usage amongst poultry farmers, revealing that mobile phones are broadly used (88.7% very often), whereas other traditional media similar to radio and television are less frequently utilized.

TABLE IV LEVEL OF ACCESS OF ICTS AMONG POULTRY FARMERS

Variables	Response of farmers (*Multiple response)									
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	F	%	F	%	F	%	F	%	F	%
ICT devices enough needs	2	1.4	8	5.6	15	10.6	51	35.9	66	46.5
ICT devices easily accessible	3	2.1	5	3.5	25	17.6	63	44.4	46	32.4
Internet speed meets requirements	4	2.8	12	8.5	22	15.5	56	39.4	48	33.8
Internet connection consistently reliable	6	4.2	9	6.3	20	14.1	58	40.8	49	34.5
Software applications readily available	5	3.5	15	10.6	20	14.1	58	40.8	44	31.0
Adequate technical support available	3	2.1	7	4.9	25	17.6	48	33.8	59	41.5
Training programs resources ICT skills available	3	2.1	9	6.3	25	17.6	56	39.4	49	34.5
Resources support learning development in ICT	4	2.8	11	7.7	20	14.1	58	40.8	49	34.5

Table IV illustrates farmers' responses to various aspects of their access to ICT facilities, reflecting a diverse range of sentiments. For the statement "ICT devices enough needs," a substantial 82.4% of farmers either agree or strongly agree that their ICT devices meet their needs. Similarly, for "ICT devices easily accessible," the majority (76.8%) express agreement or strong agreement, emphasizing the perceived ease of access to ICT devices. Regarding internet-related factors, a significant proportion of farmers (73.2% to 75.3%) affirm that internet speed meets requirements and the connection is consistently reliable. In terms of software applications, technical support, and training programs/resources for ICT skills, a notable percentage (72.3% to 76.7%) express positive sentiments, indicating perceived sufficiency and availability of these resources. Furthermore, for "Resources support learning development in ICT," 75.3% of farmers agree or strongly agree, emphasizing the perceived support for enhancing ICT skills. In general, the responses suggest a positive inclination amongst farmers toward their access to ICT facilities, indicating a favourable environment for the integration of technology in their agricultural practices.

Findings

I learned that in Namakkal, poultry farming is primarily dominated by men from diverse age groups. It presents an opportunity to embrace technology adoption across all demographics, and mobile phones have become an essential tool for farming activities. However, there is a significant gap in using these devices for record-keeping, which can be improved. To make informed decisions, access to information is vital, and mobile phones can play a pivotal role in providing valuable farming knowledge. Although women farmers face challenges like poor network connectivity and high bandwidth costs, it highlights the need for targeted solutions. Hence, a mixed-methods approach study is proposed to gain a nuanced understanding of mobile phone

usage patterns, information needs, technological proficiency, and socio-economic factors that influence poultry farmers in Namakkal. The study can offer valuable insights, leading to practical solutions to bridge the gaps and improve the overall farming practices of the community.

Conclusion

The findings of the study highlight a positive preference between the poultry farmers in Namakkal District towards utilizing mobile phones in their farming practices. This presents an outstanding opportunity to enhance the integration of mobile technology in agriculture. The study also identifies the need for improving record-keeping practices and addressing the challenges that obstruct information access, especially for women farmers. With its diverse sample and comprehensive methodology, the proposed research holds great promise for providing actionable insights to bridge these gaps. Ultimately, this can lead to more informed and sustainable farming practices in the region.

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Mobile Technology Integration in Libraries: Enhancing Accessibility and User Experience

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Abstract

The paper, highlighting the importance of mobile technology in modern libraries and its impact on user experience, and the potential benefits for both librarians and patrons. Mobile technology facilitates seamless access to digital collections and electronic resources. Whether through mobile apps or optimized websites, users can explore e-books, audiobooks, and other multimedia content conveniently. Libraries that embrace mobile technology demonstrate their ability to adapt to evolving user needs and technological trends. This adaptability ensures that libraries remain relevant and continue to be valuable community resources. Mobile technology gives libraries the ability to gather and examine user behaviour, preference, and trend data. The development of collections, customization of services, and general library management can all be accomplished with the use of this data.

Keywords: Mobile Technology, Library Mobile Service, Mobile Apps, Library Applications

Introduction

Mobile technology has become increasingly significant in the context of libraries, transforming the way information is accessed, shared, and managed. It provides users with anytime, anywhere access to library resources. Patrons can search catalogues, access digital collections, and retrieve information on the go, enhancing the overall accessibility of library services. Mobile technology facilitates the easy distribution and access of digital collections, including eBooks, audiobooks, and digital media. Users can borrow, read, and listen to materials directly on their mobile devices without the need for physical visits to the library, and it can be used for scanning barcodes or RFID tags on library materials. Libraries began to digitize collections, making them accessible online. Electronic databases, e-journals, and other digital resources became integral to library services. The proliferation of mobile technology in the 21st century brought about a new era for libraries. Mobile apps and responsive websites allowed users to access library services, search catalogues, and borrow materials using smartphones and tablets. The ongoing evolution of libraries reflects a continuous effort to adapt to changing technological landscapes, meet the evolving needs of users, and remain vital hubs for information, education, and community engagement. Here we discussed Mobile Technology Integration in Libraries: Enhancing Accessibility and User Experience.

Literature Review

LI, M. and Liu, L., (2023) studied how students perceived augmented reality in a mobile learning environment. The aim of this research was to facilitate mobile learning by allowing students to access information content in an authentic environment and via augmented reality. This was accomplished through the integration of mobile and situated learning approaches. In order to incorporate campus plants into the college life technology curriculum, the research included developing an augmented reality and situational learning system. Students engaged in mobile learning, and the study looked at how notebook users learned on computers. Students at colleges participated in the experiment. The questionnaire survey covered interactions with the environment, system quality, and textbook content. According to the study, students who used mobile learning augmented reality (MLAR) could swiftly integrate this into the learning

environment and easily read the entire textbook at each learning location without spending too much time looking for what they needed. Learners who used MLAR were highly motivated to study plants at the learning site because they wanted to use the augmented reality technology to view virtual plant models. Students that used MLAR during their fieldwork enjoyed using augmented reality for extra learning.

Prakash, R., (2022) Studied Use of Mobile Technology in Library Services. New technologies have always been used by libraries to support other libraries. Our goal is to offer our clients effective and efficient services. Obtain quick access to the data you require. Libraries have always been at the forefront of technology development and are a great example. Using additional ICTs to enhance or automate services. ICT has helped libraries improve their offerings. Regardless of geographic limitations, this high-tech domain provides users with real-time assistance. Library adoption of mobile technologies is currently being investigated, as the mobile environment has grown substantially. Libraries and readers all over the world are now in close proximity thanks to mobile technology. The main techniques that large libraries employ to offer services via mobile devices are covered in the current article. The widespread availability of mobile applications offers convenient and tailored access to library resources. The difficulties with mobile apps and library services were the main topics of this article.

Objectives

1. To find out about mobile technologies and their relevance to library services.
2. To explore the development and utilization of library-specific mobile applications.
3. To discuss the advantages of integrating mobile technology into library services and potential challenges.
4. To analyse how mobile technology enhances the overall user experience in libraries.
5. Discuss how mobile technology facilitates access to digital collections and e-resources.

Mobile Technologies and Their Relevance to Library Services

Mobile technologies have become integral to modern library services, transforming the way patrons access information, engage with resources, and interact with library staff.

1. *Smartphones:* It provides ubiquitous access to library resources, allowing users to search catalogues, access digital collections, and receive real-time notifications. The applications of Library apps for smartphones offer features such as e-book borrowing, event notifications, etc.
2. *Tablets:* Tablets offer a larger screen for enhanced reading experiences, making them suitable for accessing e-books, digital magazines, and other multimedia content. The applications of Libraries can leverage tablet applications for interactive learning experiences, virtual tours, and collaborative projects.
3. *Mobile Apps:* Dedicated library apps streamline access to resources, catalogs, and services, enhancing user experience and engagement. The main Features of the mobile apps are personalized recommendations, and interactive elements contribute to user convenience and satisfaction.
4. *Augmented Reality (AR) and Virtual Reality (VR):* AR and VR technologies offer immersive experiences within the library, such as virtual tours, interactive exhibits, and educational simulation.

Libraries that embrace these technologies can adapt to the changing needs of their patrons, provide innovative services, and create more dynamic and interactive environments.

The Development and Utilization of Library-Specific Mobile Applications

The development and utilization of library-specific mobile applications have significantly transformed the way libraries interact with patrons and provide services

A. Development of Library Mobile Apps

- i. *Needs Assessment:* Before development, libraries assess the needs and preferences of their patrons and also enhances the overall user experience.
- ii. *Feature Identification:* Libraries identify features based on user feedback, industry trends, and the library's unique offerings.
- iii. *Integration with Library Systems:* Library mobile apps integrate with existing library management systems, ensuring real-time updates on catalog availability, due dates, and other account information.

B. Utilization of Library Mobile Apps

- i. *Catalog Access and Search:* Patrons can easily search for library materials, check availability, and place holds or renew items directly through the mobile app.
- ii. *Digital Collections:* Patrons can borrow and read e-books or listen to audiobooks directly within the app, expanding the library's reach beyond physical collections.
- iii. *Account Management:* Users can manage their library accounts. This self-service functionality reduces the need for in-person interactions.
- iv. *Event Calendar and Registration:* It allowing users to view and register for upcoming programs, workshops, or classes. This promotes community engagement and participation.
- v. *Feedback Mechanisms:* Libraries use mobile apps to collect feedback from users, allowing them to continuously improve services based on user input and preferences.

Advantages of Integrating Mobile Technology into Library Services

A. Enhanced Accessibility: Mobile technology allows users to access library resources, catalogs, and services from anywhere, providing increased convenience and flexibility.

B. Improved User Engagement: Mobile apps offer interactive features and personalized recommendations, fostering greater engagement and connection between the library and its patrons.

C. 24/7 Access to Resources: Libraries can extend their services beyond traditional operating hours, allowing patrons to access digital collections, renew items, and engage with resources at any time.

D. Efficient Communication: Mobile technology facilitates efficient communication between libraries and patrons through ensuring users stay informed about events, due dates, and new arrivals.

E. Innovative Learning Experiences: Mobile technologies, such as augmented reality (AR) and virtual reality (VR), can provide innovative and immersive learning experiences, making the library a dynamic space for education and exploration.

F. Community Building: It incorporating features like user reviews, discussion forums, and social media integration, creating a sense of belonging among library patrons.

G. Quick Access to Information: Users can quickly access information using mobile apps, such as scanning book barcodes for details or checking the availability of resources in real-time.

Potential Challenges of Integrating Mobile Technology into Library Services

- A. *Technical Barriers:* Some users may face technical barriers, such as compatibility issues with their devices or difficulty navigating mobile apps, especially for those who are not tech-savvy.
- B. *Cost of Development and Maintenance:* Developing and maintaining a mobile app requires financial resources. Smaller libraries may find it challenging to allocate budgets for app development and updates.
- C. *Training and Digital Literacy:* Both library staff and patrons may require training to effectively use and manage mobile technologies. Promoting digital literacy is essential to ensure everyone can benefit from these services.
- D. *Maintenance of Content Quality:* Ensuring the quality and accuracy of digital content, especially in digital collections, requires ongoing attention and maintenance.
- E. *Digital Preservation Challenges:* Libraries must address digital preservation challenges to ensure the long-term accessibility and integrity of digital resources in the face of evolving technologies and formats.

Mobile Technology Enhances the Overall User Experience in Libraries

- A. *Accessibility and Convenience:* Users can search catalogs, check due dates and access digital collections without being confined to library premises, promoting a more inclusive and flexible library experience.
- B. *Efficient Search and Discovery:* Users can easily explore the library's collection, receive personalized recommendations, and access relevant information, enhancing their ability to discover new resources.
- C. *Self-Service Options:* Users can manage their accounts independently, reducing the need for manual interventions and enhancing the overall efficiency of library operations.
- D. *Innovative Learning Experiences:* Libraries become dynamic spaces for exploration, education, and interactive engagement, attracting users with innovative and educational content.
- E. *Community Building:* Users can connect with each other, share recommendations, and actively participate in library-related discussions, creating a more vibrant and connected community.
- F. *Enhanced Communication:* Users can easily reach out to library staff, ask questions, or seek assistance, promoting a more interactive and responsive relationship.

- G. *Multimedia Access*: Users can consume multimedia content on their preferred devices, expanding the range of available resources and catering to diverse learning preferences.

As libraries continue to adapt to technological advancements, mobile technology remains a key driver in creating a more user-centric and engaging environment.

Mobile Technology Facilitates Access to Digital Collections and E-Resources

It enhances user convenience, expands accessibility, and provides a seamless experience for patrons seeking digital materials.

A. Mobile Apps for Digital Collections

- i. *Access Anytime, Anywhere*: Patrons can explore e-books, audiobooks, digital magazines, and other electronic resources at their convenience, whether they are at home, on the go, or within the library premises.
- ii. *User-Friendly Interface*: Users can easily navigate through the app, making it simple to discover and access a wide range of digital resources.
- iii. *Personalized Recommendations*: Patrons receive tailored suggestions, enhancing their exploration of digital collections and encouraging them to discover new materials.
- iv. *Download and Offline Access*: Users can download e-books or audiobooks, making it convenient for them to read or listen even when they do not have an internet connection.

B. Mobile-Friendly Websites

- i. *Browser-Based Access*: Users can easily search, view, and interact with digital collections without the need to download a dedicated app.

C. Barcode Scanning and Quick Access

- i. *Barcode Scanning for Information*: Users can scan a book's barcode in the library to retrieve details, availability, or additional resources related to that item.

D. New Arrivals

- i. *Real-Time Updates*: Patrons stay informed about the latest digital resources, encouraging them to explore and borrow new materials.

E. Integrated Search and Discovery

- i. *Advanced Search Functionality*: Users can efficiently find the digital content they are interested in, improving the search and discovery experience.
- ii. *Multimedia Access*: Patrons can engage with a diverse range of multimedia materials, expanding the scope of digital collections beyond traditional formats.

F. Secure Access and Authentication

- i. *Secure Login Processes*: Users can access electronic resources with confidence, knowing that their personal information is secure.

Practical Recommendations for Libraries Looking To Integrate Mobile Technology Successfully

1. Conduct a Needs Assessment

2. Define Clear Objectives
3. Select Appropriate Technologies
4. User-Centric Design
5. Collaborate with Stakeholders
6. Promote Digital Literacy
7. Prioritize Privacy and Security
8. Integrate with Existing Systems
9. Start with Pilot Programs
10. Provide Regular Updates and Support
11. Promote and Market Mobile Services
12. Gather and Analyze Data
13. Stay Informed about Technological Advances

Conclusion

Mobile technology significantly enhances accessibility, allowing users to access library services and resources anytime, anywhere. Mobile technology plays a pivotal role in shaping the future of libraries by providing enhanced accessibility, transforming learning spaces, facilitating personalized experiences, and fostering community engagement. The strategic integration of emerging technologies and a data-driven approach contribute to the evolution of libraries into dynamic, user-centric, and technologically advanced institutions. The ongoing adaptation to user needs and technological trends positions libraries as innovative hubs for learning, exploration, and community interaction.

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Usage of Social Networking Sites among Students in National College, Trichy: A Study

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Abstract

The study addresses the significance of SNS in the context of increasing internet usage and technological advancement. It recognizes SNS as integral to everyday life, where communication barriers are diminishing. The research underscores the growing need for access to resources and the continued utilization of SNS. The study aims to analyze SNS usage among students and emphasizes the importance of creating awareness about leveraging SNS for academic purposes. Such awareness, it posits, can enhance students' academic performance, paving the way for success in their future career endeavors. The structured questionnaire method is adopted, consisting of 22 questions covering demographic details and SNS usage patterns. Out of 160 questionnaires distributed, 87.5% were successfully collected from National College students.

Keywords: SNS, Social Networking Sites, Academic enhancement, Utilization of SNS

Introduction

Every aspect of a man's existence will eventually involve networking because he or she is a social being internet and social media are today's generation of people's all-time favorites in the current age of scientific and technology discovery and explosion before the advent of internet chatting and the sharing of multimedia resources places like tea shops guilds libraries etc served as the center for thoughtful talks and serious disputes this paradigm change from face-to-face conversation to online sharing and chatting has greatly expanded the discourses reach and visibility governments in some nations have however restricted a few SNS because they pose a national security threat further degrading the state of the populace (jacobs 2015). Many nations, including China, Iran, Vietnam, Pakistan, and Eritrea, have prohibited certain social networking sites (SNSs). For instance, after a disturbance in Urumqi in 2009, China suspended access to Facebook and Twitter (Tam, 2016).

India is the third-largest internet user globally, with a net gain of 14% annually, according to Internet Live Stats (2014). Mobile technologies greatly facilitate this 14% annual surge in users. Given that mobile technology is used by 75% of the nation's students to access social media. The student community at the higher education level makes extensive use of highly resourceful networks. The nation's traditional research methods have undergone a revolutionary change as a result. The chances and possibilities offered by this range of online venues, meanwhile, have not yet been completely tapped for educational purposes.

Review of Literature

Alim, S. (2023) discovered that the social media for higher education career counselling in the UAE Past studies have shown that young people in the UAE feel unprepared for the workforce, underscoring the need to raise the standard of career counselling. Social media is growing in popularity, and when combined with career counselling, it can increase options for students. The UAE is using social media as an information source rather than an interactive workspace, according to the present use of social media in job counselling. Universities in the UAE primarily

employ online career planning tools. One of the key causes is that the use of social media in career advising puts pressure on practitioners in terms of content moderation. Using social media in the UAE is subject to rigorous privacy restrictions, which can pose problems. Universities in the UAE must comprehend what their student's desire in terms of career guidance delivery if social media is to be successfully integrated into the offering of career help. Balamurugan, T., and Aravinthan, M. (2023) demonstrated how respondents were distributed based on their SNS influence. Throughout the years, social networking sites have evolved from being user-based sites with a small number of users to a phenomenon that has become a platform for a large number of users. Yet, the expansion and development of social networking sites has raised significant worries among parents and educational authorities over the possible threats that university students may face as they commonly use online social networking for information gathering.

With more students creating profiles and entering personal information into social networking sites, the use of these sites by university students warrants considerable scrutiny. The increased participation on the websites by the student community may have a negative effect on one student's daily life. This may impede student's ability to grow academically and participate in society. The table also displays the associated mean scores and standard deviation. According to the results, 77.50% of respondents said that social media sites have a strong influence, 18.55% said it has a moderate influence, and 3.95% said it has a low influence. Nonetheless, the average score for all the subgroups is (2.72), and the standard deviation (0.530) shows that the respondents believed SNS to have a significant influence.

Research Methodology

A. Aim of the Study

The aim of the study is to find the "Usage of Social Networking Sites among students in National College, Trichy: A Study".

B. Objectives

1. To find the various social Networking Sites being used by the students.
2. To discover the reasons for using Social Networking Sites.
3. To find the number of hours spent on using SNS per day.
4. To evaluate the purpose of using SNS.
5. To analyze the benefits of using Social Networking Sites.

C. Hypothesis

1. There is a significant association between the Gender of the respondents and the number of hours spent on using SNS per day.
2. There is no significant association between the age of the respondents and the purpose of using SNS.

D. Research Design

Research is a thorough investigation into a particular topic to come to a more accurate solution to an issue. Research methodology is a methodical approach to problem-solving. The research design is the fundamental framework or a strategy for a study that directs the gathering of data and data processing.

E. Method of Data Collection

Structured questionnaire method has been adopted for the present study. The study consists of a total of twenty two questions divided into two major parts. Part I deals with demographic details and Part II deals with usage of social networking sites: purpose, reason, barriers, strategies,

benefits, Threats. There are total 160 questionnaires were distributed to the students of National College in that 140 (87.5%) questionnaires were received back by the students.

TABLE I DISTRIBUTION OF RESPONDENTS BY THEIR AGE

S.NO.	Age	Frequency N=140	Percentage
1	Below 21	89	63.6
2	21-24	46	32.9
3	25and above	5	3.6
	Total	140	100

The age analysis of respondents indicates that 63.6% belong to the below 21 age group, 32.9% belong to the 21-24 age group and 3.6% of the respondents belong to the 25and above age group.

TABLE II DISTRIBUTION OF RESPONDENTS BY THEIR GENDER

S.NO.	Gender	Frequency N=140	Percentage
1	Male	87	62.1
2	Female	53	37.9
	Total	140	100

The table II shows that the majority of the respondents are male 62.1% and 37.9% of respondents are female

TABLE III DISTRIBUTION OF RESPONDENTS BASED ON PROFILE IN SNS

S.NO.	Profile in SNS	Frequency N=140	Percentage
1	Yes	136	97.1
2	No	4	2.9
	Total	140	100.0

TABLE IV DISTRIBUTION OF RESPONDENTS BASED ON USING SNS

SNS	YES	NO	Percentage
Whatsapp	97.9	2.1	100
Instagram	70	30	100
Telegram	65.7	34.3	100
Youtube Channel	57.1	42.9	100
Facebook	49.9	52.1	100
Twitter	29.3	70	100
Linkedin	16.4	83.3	100
Pinterest	15	85	100
Google+	15	85	100

The table IV shows the majority of respondent's SNS usage, among the SNS platforms Whatsapp was the highly used SNS and Google+ had low usage among the students

TABLE V DISTRIBUTION OF RESPONDENTS BASED ON HOURS SPENT USING SNS

S. NO.	Hours spend	Frequency N=140	Percentage
1	Less than 30 minutes	22	15.7
2	Above 2 hours	58	41.4
3	30 minutes to 2 hours	60	42.9
	Total	140	100

The table V shows the distribution of respondents by hour spent. 43% of the respondents spend 30 minutes to 2 hours, 41% of the respondents spend an hour spend above 2 hours, and 16% of the respondents spend an hour less than 30 minutes.

TABLE VI DISTRIBUTION OF RESPONDENTS BASED ON PURPOSE OF USING SNS

Purpose Of Using SNS	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	%
Share Knowledge and Creative Ideas	32.1	42.9	17.9	1.4	5.7	100
Chat With Friends as Well as Interact With Lecturers	32.1	44.3	16.4	4.3	2.9	100
Improve Communication Skill	30	42.1	20	3.6	4.3	100
Share the Information With Students Having Common Interest	27.9	42.9	22.1	4.3	2.9	100
Provide Collaborate Communication Through Text, Audio & Videos	27.9	37.1	23.6	6.4	5	100

The majority of the students agree's that they were using SNS to chat with friends as well as interact with lecturers, secondly they agree that they were using SNS to share knowledge and creative ideas.

Hypothesis

A. Hypothesis 1: There is a significant association between the Gender of the respondents and the number of hours spent using SNS per day.

Gender	Number of hours spent on using SNS per day			Total	Statistical Inference
	less than 30 minutes	Above 2 hours	30 minutes to 2 hours		
Male	12	41	34	87	$X^2=3.106$ $df=2P=.212P>0.05$ Not Significant
female	10	17	26	53	
Total	22	58	60	140	

The chi-square test is used to test the above table. From the results, it is found there is no significant association between the Gender of the respondents and the number of hours spent using SNS per day. Hence the above-said hypothesis is rejected.

B. Hypothesis 2: There is no significant association between age of the respondents and the purpose of using SNS. The chi-square test is used to test the below table. From the results, it is found there is no significant association between the age of the respondents and the purpose of using SNS. Hence the above-mentioned null hypothesis is accepted.

Age	Purpose		Total	Statistical Inference
	Low	High		
Below 21	58	31	89	$X^2=5.861$
21-24	20	26	46	df=2
25 and above	3	2	5	P=.053
Total	81	59	140	P>0.05
				Not Significant

Conclusion

This study deals with the Usage of Social Networking Sites among Students at National College, Trichy. The increase in internet usage and advancement in technology are fuelling Social Networking Sites to be reckoned with as part and parcel of everyday life. SNS is a vast field of communication where barriers are fast fading while the growing need for access to resources is now of great significance. This will continue to utilize the social Networking Sites at a greater level. The research aids to analyze the usage of SNS among Students in National College, Trichy. The effective awareness to utilize the SNS for academic purposes among students needs to be given. This will help the students to excel in their studies and ultimately will help all of their career endeavors in the future.

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Revealing the Effects of AI-Based Chat GPT on Higher Education Institution Libraries

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Abstract

This analysis study investigates the ramifications and impacts of coordinating AI-based conversational specialists, explicitly Chat GPT, into higher education institution libraries. With the advent of cutting edge natural language handling models, the major role of artificial intelligence in instructive settings is developing quickly. This study plans to examine what Chat GPT can mean for different parts of advanced education institution libraries, including user commitment, data recovery, and general library services. This paper proposes a hypothetical structure called "IDEE" for educative AI based knowledge, for example, involving Chat GPT and other generative artificial intelligence in training, which incorporates recognizing the ideal results, deciding the suitable degree of mechanization, guaranteeing moral contemplations, and assessing effectiveness. This study on investigated the open doors and difficulties of involving Chat GPT in higher education institution libraries within the proposed hypothetical system.

Keywords: AI-Based, Chat GPT, higher education, institution libraries.

Introduction

In recent years, the fast progression of innovation has altered different ventures, and libraries are no exemption. With the rise of AI consciousness and Chatgpt, libraries have had the option to improvethair administrations and give a much really improving experience for supporters. AI refers to the improvement of computer frameworks fit for performing tasks that would ordinarily require human insight, like discourse acknowledgment or direction. Chatgpt is an innovation that permits remote charging for electronic gadgets. In libraries, Artificial intelligence has opened up new roads for further developing productivity in recording and coordinating tremendous assortments of books and other resources. Astute calculations can now quickly handle information, decreasing difficult work essentially. Besides that the artificial intelligence fueled proposal frameworks empower administrators to recommend customized perusing materials in light of user inclinations. This improves the library user fulfillment as well as advances discoverability of different substance. Chargpt innovation has likewise carried accommodation to library clients. With remote charging stations decisively positioned all through library spaces, supporters can undoubtedly charge their electronic gadgets without the requirement for strings or connectors. As an easy to use computer based intelligence application, Chat GPT can be utilized as an instructive device to encourage teachers' and students' abilities to explore and engage in with the quickly impacting universe of simulated intelligence with certainty and understanding.

What is Chat GPT?

Chat GPT is a sort of huge language model. It enormous language models are a sort of AI that use deep learning techniques to analyze and generate text. Chat GPT is a kind of large language model made to produce human-like text in NLP errands (Shen *et al.*, 2023). It is intended to create human-like text in view of an enormous corpus of text information and is prepared to perform different language undertakings, like responding to questions, composing stories, com-presenting code, and producing papers. This framework of Chat GPT is GPT-3, the third model created for NLP projects (Entrepreneur, 2023; Thorp, 2023), which was as of late moved up to GPT-4. We mentioned that Chat GPT account for itself.



Fig.1 Chat GPT

Chat GPT is based upon the GPT (Generative Pre-prepared Transformer) design, a strong structure for regular language handling. What separates Chat GPT is its capacity to produce cognizant and logically significant reactions in a conversational way. Prepared on huge datasets, Chat GPT has a profound comprehension of sentence structure, setting, and the subtleties of human language. I am Chat GPT, a huge language model created by Open AI. I am intended to produce human-like reactions to an extensive variety of normal language input, including questions, proclamations, and commands. It was prepared on a tremendous measure of text information from the web, including books, articles, and sites, utilizing a profound learning calculation called a transformer. Thus, I can comprehend and answer many subjects, including science, history, recent developments, and mainstream society. My study is to give supportive and enlightening reactions to the library users to aid different tasks that require normal language handling.

Improving Library Administrations with AI Based Innovation

Artificial Intelligence (AI) has reformed in different enterprises, and libraries are no special case. With the coordination of computer based artificial intelligence innovation, libraries have had the option to improve their administrations and services to deal a more customized insight to benefactors. One critical manner by which AI is changing libraries is through keen suggestion frameworks. By investigating users inclinations, understanding history, and acquiring designs, AI calculations can recommend significant books, articles, or other library resources and services for customized to individual interests. This recovers time for clients as well as acquaints them with new materials they might have disregarded.

Computer based AI controlled chatbots have additionally become vital devices in libraries. These virtual assistants can offer moment help by answering normal inquiries connected with library approaches, opening times, book accessibility, and the sky is the limit from there. This saves librarians time from tedious assignments and permits them to focus in on additional mind boggling users needs. Moreover, AI innovation empowers better assortment the executives via robotizing inventorying processes. By using AI calculations, libraries can effectively group and label books in view of their substance or classification.

The Role of AI in Library Automation and Organization

AI (artificial intelligence) has changed different ventures, libraries are no special case. In recent years, computer based artificial intelligence has emerged as an amazing resources for library automation and association, improving the effectiveness and openness of library administrations. One key role of AI in libraries is mechanizing routine errands for example, cataloging and classification. By utilizing AI calculations, simulated intelligence frameworks can investigate tremendous measures of printed information to precisely sort books, articles, and different other

resources. This automation saves the librarians in huge time and exertion that can be diverted towards additional perplexing assignments. Besides, simulated intelligence controlled chatbots have become priceless resources in libraries by giving moment and help to patrons.

These chatbots influence regular language handling capacities to comprehend user inquiries and propose pertinent suggestions or replies. They can assist user with looking for resources, find things inside the library or even give customized reading ideas in light of past inclinations. Another crucial perspective where artificial intelligence assumes a pivotal part is in information analysis. Libraries produce significant measures of information connected with acquiring designs, resources, usage and user conduct.

Executing Chatgpt Innovation for Efficient Library Management System in Higher Education Institutions

In recent years, libraries have been embracing the utilization of AI and Chatgpt innovation to smooth out their activities and upgrade user experience. This imaginative mix has changed the manner in which libraries deal with their resources, mechanize processes, and offer customized types of assistance to benefactors. Chatgpt innovation refers to the use of accusing stations prepared of artificial intelligence controlled programming in library settings. These charging stations not just give a helpful way to users to charge their gadgets yet in addition offer a scope of highlights that enhance library the executives.



Fig. 2 Executing Chatgpt Innovation

For example, these stations can follow utilization designs, screen gadget similarity and even recommend pertinent library resources in light of user inclinations. By carrying out Chatgpt innovation in libraries, heads can productively oversee resources portion and assortment improvement. The simulated intelligence part empowers robotized information investigation, permitting libraries to settle on informed conclusions about buying new materials or redistributing existing ones in based on the utilization patterns. Besides, it furnishes curators with significant experiences into benefactor conduct and interests, empowering to them likewise administrations.

Advantages and Benefits of Artificial Intelligence and Chatgpt

AI and Chat GPT have altered the manner in which libraries capability, significantly upgrading the user experience. These innovations offer various advantages that add to a more proficient and helpful library environment. Artificial intelligence controlled remote helpers give moment to help

the library users, addressing to their questions and directing them through library resources. These shrewd frameworks can grasp natural language and help with research requests, book proposals, and try and assist with exploring complex information bases. By utilizing simulated intelligence innovation, libraries can guarantee that users get fast and precise reactions to their inquiries, saving time and working on by and large fulfillment.

Moreover, Chatgpt stations coordinated inside libraries permit users to advantageously charge their electronic gadgets while using library administrations. This kills the requirement for users to haul around cumbersome chargers or quest for accessible electrical plugs somewhere else. By providing charging offices inside the library premises, users can flawlessly proceed with their work or access computerized resources without interferences brought about by low battery levels.

1. *Enhanced Learning Resources:* Chat GPT's natural language processing capabilities have revolutionized the way students' access learning resources. In arts colleges, it can assist with literature analysis, language translation, and creative writing. Science students, on the other hand, benefit from AI-driven assistance in complex problem-solving, data analysis, and understanding intricate scientific concepts.
2. *Personalized Academic Support:* The versatility of Chat GPT allows for personalized academic support. Students can seek assistance with coursework, receive explanations for challenging concepts, and even engage in interactive learning sessions. This personalized approach caters to the diverse needs of students pursuing both arts and science disciplines.
3. *Language Translation and Cultural Exchange:* In a state as culturally diverse as Tamil Nadu, language can be a barrier for students from different regions. Chat GPT's language translation capabilities facilitate seamless communication, fostering cultural exchange and collaboration among students with diverse linguistic backgrounds.
4. *Innovative Research and Project Development:* Arts and science students alike benefit from the innovative problem-solving capabilities of Chat GPT. Whether it's generating creative ideas for an art project or assisting in the formulation of hypotheses for scientific research, AI plays a crucial role in pushing the boundaries of creativity and knowledge acquisition.
5. *24/7 Accessibility to Academic Support:* The availability of AI-driven chat systems ensures that students have access to academic support around the clock. Whether they have questions about assignments, need clarification on lecture topics, or seek guidance on research projects, Chat GPT's constant availability contributes to a more flexible and efficient learning experience.
6. *Preparing Students for Future Careers:* Exposure to AI in academic settings prepares students for the technological landscape they will encounter in their future careers. Familiarity with AI tools like Chat GPT equips arts and science graduates with valuable skills in critical thinking, problem-solving, and adaptation to evolving technologies.
7. *Challenges and Ethical Considerations:* While the impact of AI in arts and science colleges is overwhelmingly positive, it is crucial to address challenges and ethical considerations. Institutions must ensure responsible AI use, considering issues such as data privacy, transparency, and the potential biases embedded in AI models.

Benefits of Chat GPT

1. *Conversational Engagement:* Chat GPT excels in generating human-like responses, making it a valuable tool for conversational applications. Whether used in chatbots, virtual assistants, or customer support systems, Chat GPT can engage users naturally, providing a seamless and interactive experience.
2. *Content Creation:* Content creators can leverage Chat GPT to brainstorm ideas, draft articles, or generate creative content. Its ability to understand context and produce coherent text makes it a valuable collaborator for writers, marketers, and anyone in need of content generation assistance.
3. *Language Translation:* Chat GPT has demonstrated proficiency in language translation tasks. Its multilingual capabilities enable it to translate text between various languages, facilitating communication and breaking down language barriers.
4. *Educational Support:* In the realm of education, Chat GPT can serve as a personalized tutor or assist students with homework. It can answer questions, explain concepts, and provide additional learning resources, contributing to a more interactive and dynamic learning environment.
5. *Coding Assistance:* Programmers and developers can benefit from Chat GPT's coding assistance. By understanding natural language queries about code, it can offer suggestions, debug errors, and provide explanations, enhancing the efficiency of software development processes.
6. *Innovative Problem Solving:* Chat GPT can be employed as a tool for brainstorming and problem-solving. Its ability to understand context and generate diverse responses can aid in exploring innovative solutions across various domains, from scientific research to business strategy.
7. *Human-Machine Collaboration:* The collaborative potential of Chat GPT extends to working alongside humans in a variety of fields. It can assist professionals by providing information, generating reports, or aiding in decision-making processes, contributing to increased productivity and efficiency.

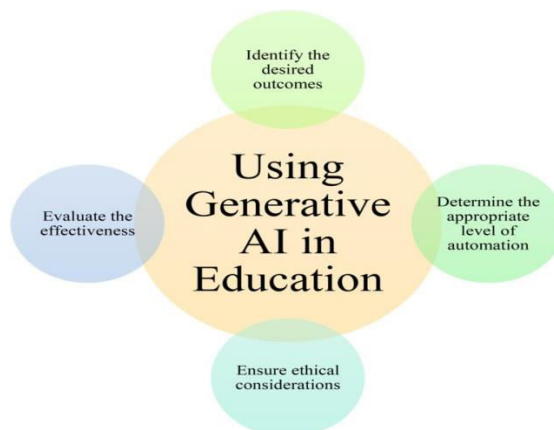


Fig.3 Using generative AI in Education

The IDEE System for Involving Chat GPT in Advanced Higher Education Institutions

Prior to involving Chat GPT or other generative AI in training, recognizing the goals of the application is significant. This guarantees that the utilization of innovation lines up with wanted results. Contingent upon the targets, it could be appropriate to fully automate the teaching or learning experience using educative AI or to involve it as an enhancement to conventional instructing techniques. The moral ramifications of utilizing educative computer based intelligence should be care-completely considered, including likely predispositions, and their effect on teachers and students. It is critical to assess the adequacy of educative artificial intelligence in accomplishing the ideal results.

A moving illustration of the utilization of Chat GPT in instruction is the advancement of virtual coaches for language learning. Utilizing Chat GPT, a virtual guide can give customized criticism and discussion rehearses for language learners. The virtual guide can likewise adjust to the students' level and speed, consequently giving an exceptionally modified opportunity for growth. This can be particularly useful for students who don't approach face to face language mentors or really like to learn on their timetable.

Conclusion

The use of Chat GPT and other generative AI in higher education institution can provide students with highly personalized and interactive learning experiences; however, it is important to approach its integration into educational practices responsibly and ethically, with the support of a sound theoretical system. This will guarantee that instructive foundations can exploit new advances and stay up with the changing scene of higher education system. This paper investigates a few expected benefits, constraints, future exploration bearings and ideas for involving Chat GPT in instructive settings. As AI based advancements keep on developing, the joining of Chat GPT in advanced education libraries presents the two potential opportunities and difficulties. While offering the potential for upgraded user experiences, further developed availability and customized administrations, it is fundamental for instructive organizations to painstakingly explore moral contemplations and guarantee that the execution of artificial intelligence lines up with the qualities and standards of advanced education. The groundbreaking patterns saw in this examination highlight the requirement for continuous exploration and smart joining methodologies to outfit the maximum capacity of simulated intelligence in advanced education in library settings. Future examination in this field incorporates creating and assessing AI based instructive devices, exploring the benefits and challenges in various educational contexts, assessing the impact on student learning outcomes, making ethical considerations and examining their effectiveness in different situations.

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Impact and Use of Social Media among Postgraduate Students for Academic Progress

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Abstract

In recent days Social Media can help to support teachers to communicate with students when they are outside of the classroom; students are active users of Social Media for academic purposes as well as for personal use. This paper aims to explore the impact of Social Media usage on the students of Postgraduate students and examine the Social Media usage pattern based on the gender, Department, settlement area, and problems faced while using Social Media. Data were collected from 50 Postgraduate students of various departments from Bharathiar University. The simple random method was used for data collection. A well-structured questionnaire was used for data collection. The main findings are that 44 percentage of the users agreed that Social Media enhances their learning skills, so it is clear that Social Media has a positive impact on users learning. Nearly half of the respondents disagreed with postponing their academic tasks on spending more time on Social Media, and more than 52 percentage of the respondents strongly agreed that Social Media has become a part of my daily routine. 30 percentage of the students used Social Media for almost 3 hours and teenagers who use Social Media for three or more hours every day are at an increased risk of depression and other mental health problems (Social Media Addiction Statistics- the Lanier Law Firm). The student should practice to reduce social media usage other than educational purpose.

Keywords: Postgraduate Students, ICT, Social Media, Academic Progress, Online Learning Platform.

Introduction

Millions of individuals throughout the world use Social Media websites regularly. It's an internet platform that fosters social relationships between people. The internet is home to a large number of Social Media websites. The internet has become essential and there has been a surge in interest in using internet-based communication tools in recent years. An increasing number of tools have been developed for maintaining social connections. (Aljuboori, 2020). The most widely used Social Media platforms include Facebook, Orkut, Twitter, LinkedIn, YouTube, and WhatsApp. Postgraduate students have a special chance to establish contacts in the real world and pursue their academic goals using Social Media. These websites provide a range of chances for educational advancement, knowledge exchange, and the development of a digital persona that enhances scholastic success.

Every kind of learner community explores these Social Media platforms to improve the teaching-learning process (Dzogbenuku *et al.*, 2019). Students can clarify complicated theories and share resources in their field by using Research Gate and Academia.edu to exchange knowledge and ideas. LinkedIn is helping experts and students connect professionally. They had no trouble establishing connections with professionals in the same field and subject. Twitter keeps students informed and facilitates discussion on topics relevant to their academic needs. Information on

academic conferences, workshops, and seminars can be effectively disseminated through Facebook and Twitter. Students can learn about and take part in events that are related to their areas of interest. Students are encouraged to see videos linked to their studies on YouTube, a free video-sharing service. The present study is about the impact and use of Social Media among Post Graduate students for Academic Progress.

About the Study Area

The Bharathiar University was established at Coimbatore by the Government of Tamil Nadu in February 1982 under the Bharathiar University Act, 1981 (Act 1 of 1982). The erstwhile Postgraduate Centre of the University of Madras formed the core of the Bharathiar University, which was functioning at Coimbatore before 1982. University Grants Commission (UGC) recognized Bharathiar University in 1985 for grants. The University has 39 Departments, offering 54 post-graduate programs besides offering M. Phil and Ph.D programs. The University is an affiliating University.

The jurisdiction of the University covers the districts of Coimbatore, Erode, Tirupur, and The Nilgiris with 133 affiliated colleges. The National Assessment and Accreditation Council have accredited the University with an 'A++' Grade in the Fourth cycle assessment. Bharathiar University is marching towards becoming a World Class University by garnering a ranking in the International arena. Times Higher Education Young Universities World Ranking ranked our University in the range of 201 to 250. We stand at 15th rank under the category of University and 24th among the top 100 institutions in the MoE's National Institute Ranking Framework (NIRF 2022) ranking. In 2021, Bharathiar University secured a ranking in the range of 801-1000 in the Times Higher Education World University Rankings.

Review of Literature

Abdul (2023) According to the research, students use Social Media for academic purposes as a scientific and reliable source for their education major. 73% of students use Social Media to get educational and academic information. The most used Social Media platform in the academic sector is YouTube, followed by WhatsApp. In addition, Facebook and other Media are also used. The positive aspects of Social Media for academic purposes for students include; the facilitation of academic data collection and the reduction of time and costs. Lalnunpuii, Esther and Ngurtinkhuma, R K., (2021), the purpose of this article was to investigate how social networking sites affect Mizoram College of Nursing, Aizawl students.

One hundred students were given a structured questionnaire, of which ninety-six were returned properly completed. The study's conclusions showed that every student knew about SNSs and that the majority of them had multiple accounts. The most widely utilized SNSs were discovered to be Facebook, YouTube, and Instagram. Lack of privacy, inadequate internet access, online fraud, and a lack of technological expertise are the main issues that students deal with when utilizing SNSs.

Valdez, G.F.D., *et al.*, (2020) carried out research to determine the level of social networking use, the perceived advantages of Social Media, and the potential of Social Media to enhance study habits among nursing students in Turkey, Israel, Iraq, Oman, and the Philippines. The study used a quantitative cross-sectional analysis of 1137 nursing students' survey responses. According to the study's findings, Facebook is the most often used website for academic work, and SNSs have been essential in fostering connections. SNSs currently have a significant impact on students' lives as well. According to (Al-Menayes, 2015), Social Media use itself has no bearing on academic

achievement; rather, it's the addiction and amount of time spent on it that does. Apuke (2016) revealed that the majority of students at the university (70%) would rather chat on Social Media than use it for anything else. Additionally, research showed that students who use Social Media more frequently than their peers often perform less academically, which has negative effects on them. Gok .T (2016) Some recommendations based on the findings could be presented as follows: a) the positive and negative effects of Social Media on students, parents, etc. should be explained to them by experts (psychologists, sociologists, etc.); b) the usage of technology devices during instruction time should be limited and/or prevented because of negative impacts on students' concentration in the schools/universities; c) the research should be performed on students at different levels to generalize the findings. Onyeka *et al.*, (2013) showed students' use of social networking sites had no negative impact on their academic performance.

Objectives of the Study

1. To find out the tools used for access to Social Media
2. To access the Most Frequently used Social Media
3. To identify problems in using Social Media
4. To analyze the impact of Social Media use

Research Methodology

For this study, we carried out a literature survey of the available data for collection of secondary information. The study was a descriptive research design. The postgraduate students of Bharathiar University are the target population. Simple random sampling techniques were for data collection. A well-designed questionnaire was used for collecting data. The responses were taken from the students of various departments like Arts, Science, Social Science and Computer Science. A total 55 questionnaires were distributed, and among that 50 filled-in questionnaires were received and taken for the data analysis.

Data Analysis

TABLE I DEMOGRAPHIC DETAILS SHOWING GENDER, PURSUING YEAR, DEPARTMENT AND SETTLEMENT AREA OF THE RESPONDENTS

Demographic Factors		No. of Respondents	Percentage
Gender	Male	19	38%
	Female	31	62%
Pursuing Year	I Year	14	28%
	II Year	36	72%
Department	Arts	21	42%
	Science	17	34%
	Management	12	24%
Settlement Area	Urban	38	76%
	Rural	12	24%

As observed from the table I, the majority of the respondents are female 31 (62%). 72 percentage of the students pursuing their II year. Nearly half of the respondents 21 (42%) are from the arts group. The majority of the respondents 38 (76%) are living in urban areas.

TABLE II BASIC INFORMATION TO ACCESS SOCIAL MEDIA

Items		No. of Respondents	Percentage
Tools used for accessing Social Media	Mobile Phone	28	56%
	Laptop	19	38%
	PC	3	6%
Social Media Learned through	Trial basis	29	58%
	Guidance from Family/Family Members	6	12%
	Guidance from Friends	15	30%
Social Media Using Frequency	Below 2 Hours	18	36%
	Almost 3 Hours	15	30%
	Almost 5 Hours	9	18%
	More than 5 Hours	8	16%
Social Media Usage Enhance Learning Skills	Yes	22	44%
	No	16	32%
	Neutral	12	24%

Data presented in Table II indicates the basic information about accessing Social Media of the respondents. More than half of the respondents used their mobile phones to access Social Media 28 (56%). More than half of the 29 (58%) respondents learned Social Media on trial basis. According to our data, 16 percentage of the students were using Social Media for more than 5 hours. 44 percentage of the users agreed that Social Media enhances their learning skills.

TABLE III MOST FREQUENTLY USED SOCIAL MEDIA SITES

Most Frequently Used Social Media	Total No. of respondents	Percentage
Facebook	38	76%
Discussion Forums	12	24%
Blogs	26	52%
YouTube	39	78%
Twitter	38	76%
Pinterest	12	24%
LinkedIn	28	56%
WhatsApp	42	84%
Note: Multiple options allowed		

The study shows from table III indicates the most frequently used Social Media platform. The Majority of the respondents (84%) prefer Whats App frequently.

The study shows from Table IV, 64 percentage of the respondents were addicted while using Social Media, and 52 percentage of the respondents received undesired messages, links, and images while using Social Media.

TABLE IV PROBLEMS FACED WHILE USING SOCIAL MEDIA

Problem faced while using Social Media	Total No. of respondents	Percentage
Cyber bullying	12	24%
Too much content	18	36%
Depression	12	24%
Jealousy and Constant Competition	22	44%
Spamming	26	52%
Facilitates Laziness	18	36%
Addiction	32	64%
Note: Multiple options allowed		

TABLE V IMPACT OF USING SOCIAL MEDIA

Impact of using Social Media	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree	Total No. of respondents and percentage
I use Social Media platforms always	30 (60%)	18 (36%)	0 (0%)	2 (4%)	0 (0%)	50 (100)
Social Media has become a part of my daily routine	26 (52%)	20 (40%)	2 (4%)	1 (2%)	1 (2%)	50 (100)
At times I use my Social Media platform in class while receiving lectures	8 (16%)	7 (14%)	3 (6%)	14 (28%)	18 (36%)	50 (100)
I use my Social Media platforms to carry out my academic assignments	24 (48%)	16 (32%)	4 (8%)	4 (8%)	3 (6%)	50 (100)
I use social networking sites for collaborative learning.	11 (22%)	26 (52%)	0 (0%)	4 (8%)	9 (18%)	50 (100)
I use social networking sites to create my social identity	16 (32%)	21 (42%)	0 (0%)	11 (22%)	2 (4%)	50 (100)
I lose track of time while using Social Media	22 (44%)	16 (32%)	0 (0%)	2 (4%)	10 (20%)	50 (100)
I usually postpone my academic tasks to spend more time on Social Media.	6 (12%)	3 (6%)	10 (20%)	23 (46%)	8 (16%)	50 (100)
While using Social Media it is difficult for me to concentrate on my studies.	8 (16%)	5 (10%)	8 (16%)	14 (28%)	15 (30%)	50 (100)

From Table V, 60 percentage of the students are always on Social Media platforms as they strongly agreed. 52 percentage of the respondents strongly agreed that Social Media is part of their daily routine, and 16 percentage of the respondents strongly agreed that use Social Media platforms in class while receiving lectures.

48 percentage of respondents strongly agreed with their usage of Social Media for academic purposes only. More than half of the respondents agreed that social networking sites for collaborative learning. 42 percentage of respondents agreed to use Social Media to create their social identity. 44 percentage of the respondents are strongly agreed for lose track of time while

using Social Media. 46 percentage of the respondents strongly disagreed that postponing their academic work. 15 percentage of the respondents strongly disagreed with the difficulty of concentrating on their studies while using Social Media.

Conclusion & Recommendations

As of January 2023, 467.0 million people in India used Social Media, making up 32.8 percentage of the country's total population. Everyone has an online connection to everyone else. The student body was eager to use Social Media, wanted to stay current on Social Media news, and wanted to be involved. We draw a significant conclusion from this study. Thirty percentage of students reported using Social Media for roughly three hours a day. According to statistics from The Lanier Law Firm on Social Media addiction, teenagers who use the platform for three hours or more a day are more likely to experience depression and other mental health issues. Social Media has a beneficial effect on users learning because 44% of users agreed that it improves their ability to study. Nearly half of respondents disagreed that students should postpone their academic tasks to spend more time on Social Media. More than 52% of respondents strongly agreed that Social Media has become a part of their daily routine; therefore, the student should practice to reduce social media usage other than educational purpose.

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About the Editors



Dr. K.S. Shivraj serves as Chief Librarian at Manipal University Jaipur, Rajasthan, India. He has contributed 40 papers to International and National Conferences and 55 articles to refereed journals. Additionally, he holds the position of Editor-in-Chief for two Research Journals in Library Science and has edited three books. Dr. Shivraj served as Co-Principal Investigator for a DSIR, Govt. of India Project and has supervised four M.Phil and five Ph.D. candidates. Recognized for his contributions, he received the Best Librarian Award from the Indian Academic Library Association in 2012 and the Quality Librarian Award from KL University. He organized three International Conferences in collaboration with universities in Sri Lanka, Dubai, and Thailand, along with several National Conferences and Workshops on various topics. He previously held the position of President at the Rotary Club of Coimbatore Delite and recently received the Top 50 Outstanding Librarians across India award from Ulektz Wall of Fame. Currently, Dr. Shivraj serves as the Editor-in-Chief of the Indian Journal of Information Sources and Services, a SCOPUS indexed journal.



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