



Application of Collaborative Technologies in Academic Libraries: Perception of College Librarians in Maharashtra

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Abstract: Collaborative technologies are software tools and platforms that enable individuals and teams to work together on shared projects, tasks, and goals, regardless of their physical location. These technologies facilitate communication, information sharing, and collaboration in real time or asynchronously. Consequently, knowledge facilitation practices in academic libraries have also changed and need to be analyzed. For this study, an initial review of the literature was conducted to determine the role that ICT and collaborative tools play in academic libraries. This review included a detailed description of collaborative tools in libraries, including their use, viability, application, and influence, as well as a broad perspective on previous studies in the area, with the goal of identifying significant factors related to it. Because it is a descriptive study, the outcome will be derived from information acquired from real-life experiences. For this study primary data has been gathered through a structured questionnaire. Structured questionnaires were used to collect the data from selected librarians of the Maharashtra state. An online survey method was employed and the data was arranged for analysis. The data was gathered through an online structured questionnaire that was circulated through email, ILOSC Google Forum, and librarian's what's app group, which drew 215 responses from Maharashtra state of India during the period from August 2022 to October 2022 and only 202 questionnaires were found to be valid for analysis. The data were analyzed using Microsoft Excel, SPSS analytical tools and visually displayed in accordance with the objectives described. The hypothesis of the current study has been tested by using the statistical tests: One-way ANOVA to test the proposed research hypotheses. This study aims to present a picture of the perspectives of college librarians towards the application of collaborative technologies in academic libraries.

Keywords: Academic Libraries, Collaborative Online Library Services, Collaborative Technologies, Collaborative Tools, Key Competence for LIS Professionals

1. Introduction

Recent ICT trends have changed the way information resources are managed and offered numerous possibilities to manage a large range of information easily. The role of library and information science (LIS) professionals has changed as a result of the amount of information and its

availability in many forms. Several changes were made to the status and goals of librarians and information professionals, as well as library services, in the twenty-first century. The unprecedented spread of knowledge, as well as the significance of electronic communications and mobile technologies in generating, transferring, and accessing information. To deal with these issues, library professionals must shift from being record keepers to information

administrators and finally to knowledge facilitators.

According to new research, a key competence of the workforce in the twenty-first century is collaboration. Collaboration is thus changing academic libraries in higher education in order to create a skilled future workforce. Knowledge Commons, which incorporate technology into infrastructure and system furnishings, are introduced to promote collaboration in academic libraries [1]. Despite technological advances, academic libraries continue to link students to information. The "Learning Commons" has renewed libraries' responsibilities and aims, making them attractive to recent college grads for new reasons [2].

With its huge resources, the internet has also facilitated knowledge, and as a result, librarians and users have developed new skills for adapting to the new library design. Libraries are increasingly playing an important role in extending and improving access to electronic information sources. Furthermore, it has supplied the required facilities and instruments, such as interactive connections. It has also been a rock in terms of establishing a technological environment that supports knowledge. The current research materials that students choose can justify large investments in libraries. This research intends to document librarians' perspectives on the redesign of academic libraries and their services, using the "Collaborative Learning Commons" concept for knowledge facilitation.

What are Collaborative Technologies?

Collaborative tools are a set of technologies and applications that can improve human connection, communication, and collaboration helping the sharing of information, ideas, and knowledge. Collaborative technologies are web applications that enable users to collaborate and interact while creating, analyzing, exchanging, and sharing information [3].

A well-known teaching and learning strategy called collaborative learning involves putting students in pairs or groups to work toward a learning objective. By exchanging ideas within groups, collaborative learning creates an active learning environment and develops strong interpersonal, leadership, problem-solving, and decision-making skills in educators [4].

2. Related Literature Review

Collaboration is a crucial component of research and can happen at any stage of the process. In the academic research workflows of early career scholars, collaborative tools help scholarly knowledge and information practices to minimize the functional gaps [5].

E-collaboration are an instrument that breaks the limits of exercises inside and between establishments. Such innovations are making it simpler than any time for individuals to collaborate regardless of where they end up being. Prevailing with collaboration at a level where it addresses an upper hand requires a wide methodology. Establishments have quickly employed innovative technology, for example, cloud computing and collaboration

tools, which empower their staff to work from a distance and proceed with their organizational tasks, particularly during seasons of emergency. Likewise, establishments center more around their own areas of skill and gain an upper hand by obtaining more extravagant substance and improved arrangements in an imaginative and financially savvy way. Challenging times can give new open doors that should be recognized brilliantly [6].

Multidisciplinary collaboration is the trademark of 21st-century research. Several academic fields or professional specializations may now collaborate to address an issue. Nowadays, most research initiatives are multidimensional and interdisciplinary, requiring a varied and diverse collection of experience, ideas, and backgrounds to achieve success. Digital humanity is a prime illustration of transdisciplinary collaboration in the twenty-first century. Experts and researchers collaborate to conduct case studies, and information from many disciplines of study is used to reach a shared aim. Multidisciplinary collaboration is visible in numerous disciplines, Health and medical procedures, economic investigations, ongoing cases, and libraries, resource centers, archives, and museums are all examples. Emerging technology has enabled professionals and academics from many areas all around the globe to work on projects as well as research without physically being in the same place. The establishment of global best practices is the product of multidisciplinary collaboration. Applicability of e-collaboration in digital libraries may assist libraries accomplishing their aims and objectives while also better serving their user community [7].

Academic libraries provide instructional outreach in conjunction with the technological services they make accessible to its users. When librarians utilize the same technological services for internal initiatives, they have a greater understanding the mechanisms that drive new technologies, allowing librarians to participate in successful outreach activities as both primary users and facilitator of utilization. To develop healthy knowledge ecosystem within or beyond the campus, collaborative technology environment has been developed through sample applications to test learning and innovation. For these collaborative library technologies, librarians can act as information brokers and can develop their technology proficiency for its utilization [8].

Learners have been forced to confront obstacles in the sphere of higher education as a consequence of strategy change in tackling the present scenario during the Covid-19 epidemic. The digitalization and "open" data have been instrumental in bringing attention to libraries' current knowledge distribution initiatives and customers' accessibility in the area of online learning, including to legal issues surrounding free programs and public source in university education. Due to active collaboration, including the involvement of academic librarians in a variety of blended learning situations around the country Covid-19 pandemic, a larger level transformation was seen [9].

The penetration of the internet and information

communication technology tools has increased human interaction and communication. In order to accomplish a goal, collaborative research is now recognized as essential in all fields, including library and information science. Nigerian librarians use social media as a tool for collaborative research. WhatsApp, email services, Google Docs, Google Drive, Facebook, Telegram, and Zoom app were the most popular social media platforms for research collaborations. It has been agreed that social media platforms and tools make it possible for researchers to connect with others worldwide and share documents with them [10].

Mobile technologies have developed significantly over the past few years. They are now an essential component of our daily lives. Therefore, it makes sense why there is such a strong interest in using mobile technology in the educational process. Sharing three crucial aspects of learning resources—learning contents, learning collaborators, and learning services is the main advantage of this technology. In order to help students, meet a variety of learning outcomes, various forms of collaborative and peer learning are increasingly used in university courses. Mobile technology use in education is now essential as a result. Hence to support collaborative learning a mobile application has been created, developed and deployed based on android operating system [11].

Although faculties in technologically advanced universities are more diverse, dispersed, and socially isolated, effective technology use can also promote faculty collegiality and professional academic growth. Successful collaborative online teams share characteristics such as a sense of social presence, accountability, institutional leadership, and team leadership. Research is essential to collaborative teams because they enable more faculty members to participate and gain from professional academic development [12].

Libraries are moving from a collection-driven approach where greatness was decided in conditional ways, by circulation, by entryway counts, by volume counts. Now libraries are moving especially toward different engagement-based models where the library upholds the educating, learning, community engagement and research streams in different ways and in this settings library, quality is decided in a wide range of ways. Libraries are focused on decisions, strategies, and choices that are best for their home institutions while simultaneously promoting change via dynamic new collaborations. One component of this reshaping or pondering the library is an expanded focus on online consortia arrangements, building shared frameworks, transformational open access agreements, resource sharing and promote lobby, which causes shifting to the collaborative landscape [13].

The review means to define the role of modern librarians in industrial revolution 4.0 era for delivering library information services. The extent of the exploration centers around expressing the management of the role of the librarian. The outcomes show that the role of the librarian incorporates; Visionary, Mediator, Organizer, Corrector, Mentor, Trainer, Policy maker, Information manager, Information disseminator and Knowledge Facilitator [14].

The use of collaborative technologies (CTs) for the creation, sharing, transfer, and retention of knowledge by therapy team members (TTMs) in psychiatric hospitals has been found useful as well as active engaging. Team members had a favorable attitude towards the usage of CTs to support knowledge management procedures and practices [15].

The prevalence of digital learning environments has significantly increased thanks to technology's transformation of postsecondary education. When adult educators approach instructional design, they must think about how to implement research-based strategies that maintain the caliber of instruction and deliver technology-based instruction that is pertinent to adult learners. Collaborative digital literacy practices have been cited as one strategy that is very effective [16].

An online WordPress blog has been used to promote the physical and digital resources of Booth Library. The blog is now a seamless component of the library's website which was built using WordPress software installed on the library's server. This blog helped for increased website content, reusable and adaptable booklists, a sense of ownership, and improved morale for those who assist in curating book displays and writing blog posts. It demonstrates how a free WordPress blog can be used as a collaborative versatile tool to promote library resources and establish connections with users [17].

For universities to successfully navigate the challenges of complex, dynamic environments, they must develop effective forms of collaboration. Though collaboration is a complex idea that involves a high level of human relationships and is widely acknowledged to be important, there are many potential obstacles to creating a successful collaborative partnership. This study aims to clarify the factors, including power imbalances between various professional groups in a collaborative relationship, that influence collaboration between academics and library staff [18].

Internet have become institutionalized both in out private and professional relationships. But in education it has progressed from a source of knowledge to a form of communication to something like a widely used launch pad for learning as well as collaboration [19].

Distance learning presents a number of difficulties for the lecturer and the student in establishing and sustaining a connection and commitment. Communication issues, low student motivation, high course drop-out rates, providing support remotely, and a sense of isolation or a lack of a student community are some of the difficulties that must be overcome. One method for overcoming these difficulties is the use of collaborative technologies like wikis or document-sharing platforms [20].

Teachers and students play an essential part to play as being in charge of the education system. One method for raising the standard of teaching and learning in higher education could be the introduction of blended learning. In higher education, blended learning has gained popularity as a delivery method and as a way to approach course design. Blended learning's main appeal stems from the need to offer

more engaging educational opportunities while also recognizing the potential of the Internet and information and communications technology. The field of library and information science (LIS) has been significantly impacted by information and communications technologies (ICTs). The use of digital technologies requires careful consideration and through integration into pedagogy, which reflects carefully articulated instructional and learning outcomes, as the LIS sector is deeply grounded in digital technology [21].

There are socio-technological effects of integrating cutting-edge information technology into the University of Illinois' Spurlock Museum, a museum of global history and culture. It talks about putting computer-supported cooperative work (CSCW) and computer-mediated communication (CMC) into practice in a museum. The future of museum informatics will be influenced by studies like these of collaborative activities within the museum [22].

3. Objectives of the Study

- 1) To identify communication skills used by the library professionals for interactive and efficient support especially to their learner community.
- 2) To investigate the Information and Communication Technologies (ICT) skill trends in modern research support libraries.
- 3) To identify the Collaborative Technology skills for offering value added online library services by the library professionals.
- 4) To ascertain the perception of the library professionals towards the application of Collaborative Technologies for enhanced user's learning.
- 5) To ascertain the barriers associated with the implementation of Collaborative Technologies in academic libraries.

4. Statement of the Problem

Libraries will undoubtedly continue to use new ICT since it provides increasingly visible access to information. This progress cycle will be characterized by constant change. Driving long-term change necessitates a more in-depth understanding of progress and varied change management tactics. Collaborative technologies are now being used as a

medium for educational engagement and information sharing. As library customers get more acquainted with their ICT surroundings, particularly collaborative developments, competition among libraries and other alternative information sources that incorporate collaborative innovations into their offerings has grown.

5. Hypotheses Design

The study continued with the accompanying hypotheses:

- 1) Academic libraries in Maharashtra have not adopted right collaborative technology skills.
- 2) Librarians of Maharashtra do not show any positive attitude towards adoption of collaborative technologies.

6. Methodology

An initial review of the literature was conducted to determine the role that ICT and collaborative tools play in libraries. This review included a detailed description of collaborative tools in libraries, including their use, viability, application, and influence, as well as a broad perspective on previous studies in the area, with the goal of identifying significant factors related to it. Because it is descriptive study, the outcome will be derived from information acquired from real-life experiences. For this study primary data has been gathered through a structured questionnaire. Structured questionnaires were used to collect data from selected college librarians of the Maharashtra state. Online survey [23] method was employed and the data was arranged for analysis. The data was gathered through an online structured questionnaire that was circulated through email, ILOSC Google Forum, librarian's what's app group, which drew 215 responses from Maharashtra state of India during the period from August 2022 to October 2022 and only 202 questionnaires were found to be valid for analysis. The data were analyzed [24] using Microsoft Excel and SPSS analytical tools and visually displayed in accordance with the objectives described above. The hypothesis of the current study has been tested by using the statistical test: One-way ANOVA to test the proposed hypotheses of the research. The results of the analysis were presented in the appropriate tabular and graphical form with proper interpretation in the respective pages.

7. Survey Results

Table 1. Skills on communication channels.

Sr. No	Description	1	2	3	4	5	Total	Mean	Rank	Std. Dv
1	Mobile Apps	27	24	20	24	107	202	3.79	6	3.58
2	WhatsApp	8	13	16	34	131	202	4.32	3	3.95
3	Telegram	20	23	18	23	118	202	3.97	5	3.72
4	Google Groups	8	14	11	49	120	202	4.28	4	3.91
5	Telephone	7	8	21	41	125	202	4.33	2	3.94
6	Synchronous Chat	33	31	15	26	97	202	3.61	7	3.45
7	Email	8	11	14	31	138	202	4.39	1	4.00

Note: 1- Strongly disagree, 2- Disagree, 3- Neutral, 4 – Agree & 5- Strongly agree

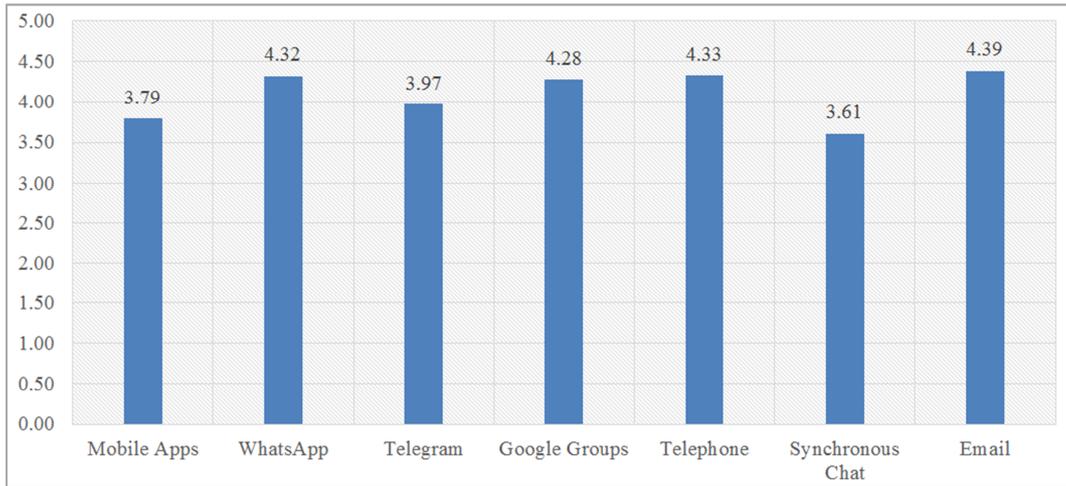


Figure 1. Skills on communication channels.

Interpretation: Table 1 & Figure 1 shows the Skills on communication channels by the librarians of the college libraries in Maharashtra. The communication channels have been group into Telephone, Google groups, Mobile apps,

Telegram etc. The highest mean value (4.39) has arrived at the respondent's level at E-mail, followed by Telephone (4.33), WhatsApp (4.32), Google Groups (4.28), Telegram (3.97), Mobile Apps (3.79) & Synchronous Chat (3.45).

Table 2. Skills on ICT.

Sr. No	Description	1	2	3	4	5	Total	Mean	Rank	Std. Dv
1	Library Websites, Consortia	27	24	20	24	107	202	3.79	6	3.58
2	E-Books/E-Journals/E- Thesis/E-Newspaper/E-Reports	10	13	11	34	134	202	4.33	3	3.97
3	CD-ROM Databases/ Online Databases	18	26	17	21	120	202	3.99	5	3.73
4	Web Pages	8	10	9	39	136	202	4.41	2	4.02
5	Search Engines	6	5	8	41	142	202	4.52	1	4.10
6	Online Library Catalogues (OPAC)	13	18	11	34	126	202	4.20	4	3.87

Note: 1- Strongly disagree, 2- Disagree, 3- Neutral, 4 – Agree & 5- Strongly agree

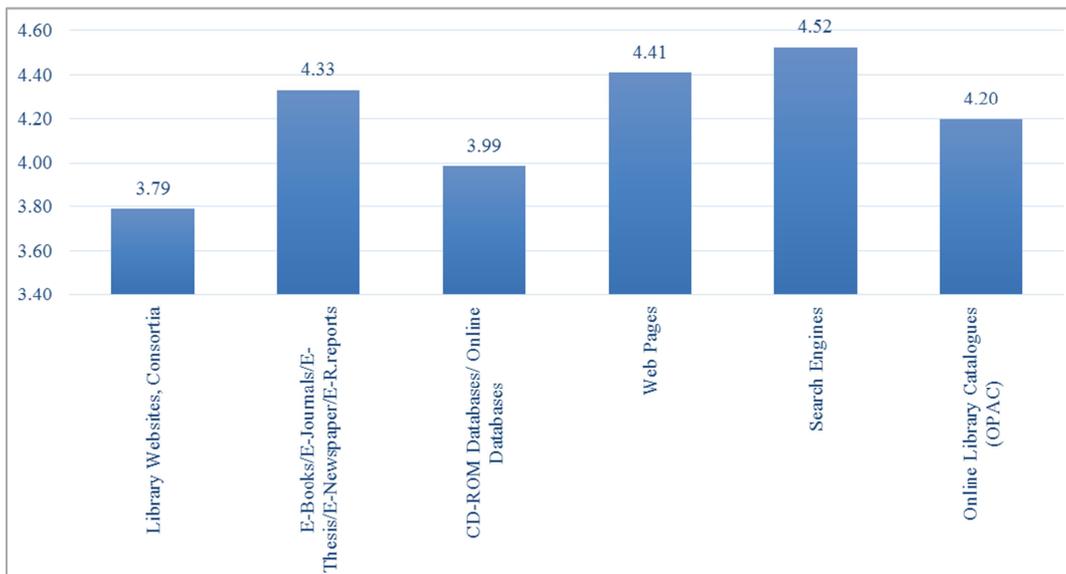


Figure 2. Skills on ICT.

Interpretation: Table 2 and Figure 2 shows the Skills on ICT by the librarians of the college libraries in Maharashtra. The ICT skills have been group into E-Books/E-Journals/E-Thesis/E-Newspaper/E-reports, CD-ROM Databases/ Online Databases, Library Websites, Consortia, Search Engines etc.

The highest mean value (4.52) has arrived at the respondent's level at Search Engines, followed by Web pages (4.41), E-Books/E-Journals/E- Thesis/E-Newspaper/E-reports (4.33), Online Library Catalogues (OPAC) (4.20), CD-ROM Databases/ Online Databases (3.99), Library Websites,

Consortia (3.79).

Table 3. Collaborative Technologies Skills.

Sr. No	Description	1	2	3	4	5	Total	Mean	Rank	Std. Dv.
1	Blogs / Discussion Forums / Google Groups (e.g. ILOSC, LIS Forum)	27	24	20	24	107	202	3.79	7	3.58
2	Instant Messaging / Virtual Meetings / Video Conferencing	4	8	5	4	161	202	4.63	1	4.19
3	Social Networking Site (SNS) (e.g. Twitter, Facebook, Instagram, LinkedIn)	10	11	14	26	142	202	4.40	3	4.02
4	Audio Sharing / Pod Cast /Video Streaming / Vodcast	8	12	13	48	121	202	4.30	5	3.92
5	Social Bookmarking / Tagging/Photo Sharing	7	8	21	41	125	202	4.33	4	3.94
6	Google Work Place / Google Drive	8	6	5	28	155	202	4.56	2	4.15
7	File Organizing, Storage and Transfer tools	16	18	14	31	123	202	4.12	6	3.82

Note: 1- Strongly disagree, 2- Disagree, 3- Neutral, 4 – Agree & 5- Strongly agree

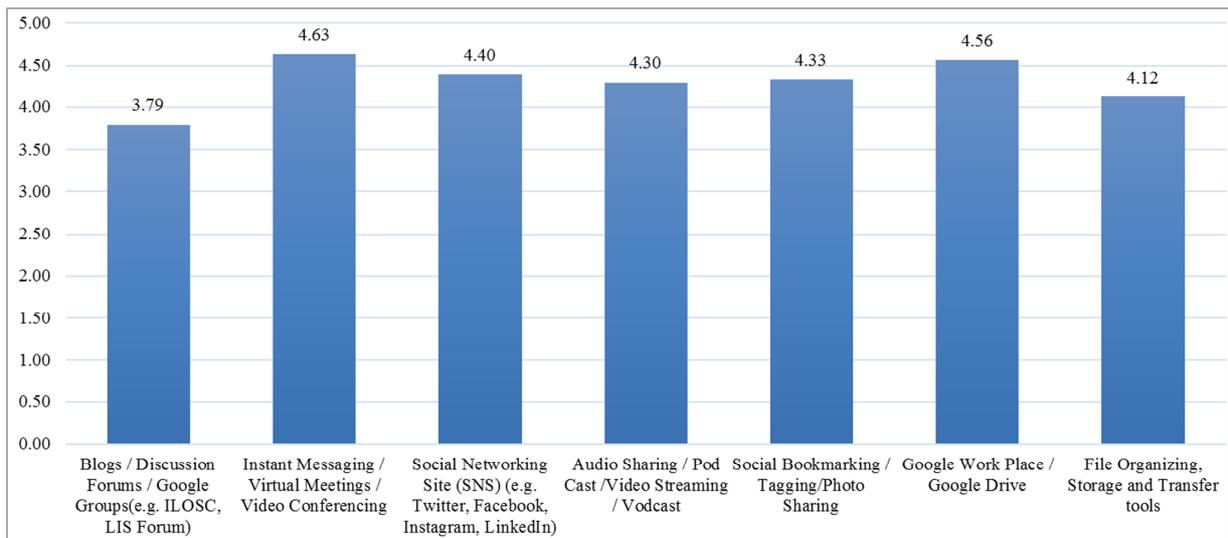


Figure 3. Collaborative Technologies Skills.

Interpretation: Table 3 and Figure 3 shows the Collaborative Technologies skills by the librarians of the college libraries in Maharashtra. According to the responses received the highest mean value (4.63) has arrived at Instant Messaging / Virtual Meetings / Video Conferencing the, followed by Google Work Place / Google Drive (4.15),

Social Networking Site (SNS) (e.g. Twitter, Facebook, Instagram, LinkedIn) (4.02), Social Bookmarking / Tagging/Photo Sharing (OPAC) (3.94), Audio Sharing / Pod Cast /Video Streaming / Vodcast (3.92) & File Organizing, Storage and Transfer tools (3.82).

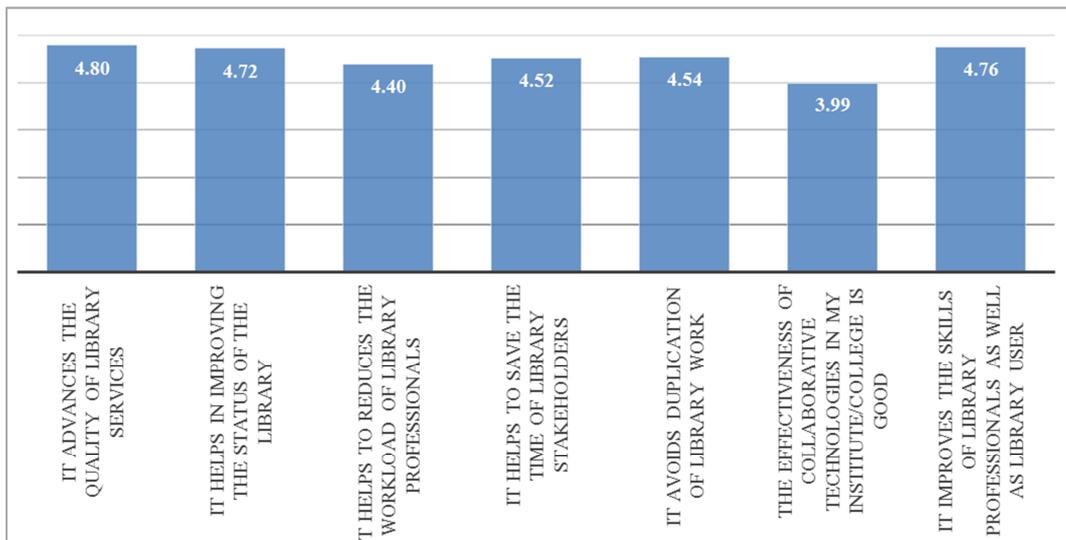


Figure 4. Perception of library professionals towards Collaborative Technologies (CT).

Table 4. Perception of the Librarians towards the application of Collaborative Technologies (CT).

Sr. No	Description	1	2	3	4	5	Total	Mean	Rank	Std. Dv
1	It advances the quality of library services	2	2	0	27	171	202	4.80	1	4.31
2	It helps in improving the status of the library	3	4	3	31	162	203	4.72	3	4.24
3	It helps to reduce the workload of library professionals	11	14	5	26	146	202	4.40	6	4.04
4	It helps to save the time of library stakeholders	6	9	12	21	154	202	4.52	5	4.12
5	It avoids duplication of library work	7	8	9	22	156	202	4.54	4	4.14
6	The effectiveness of Collaborative technologies in my institute/college is good	26	21	8	21	126	202	3.99	7	3.76
7	It improves the skills of library professionals as well as library user	1	2	5	29	165	202	4.76	2	4.27

Note: 1- Strongly disagree, 2- Disagree, 3- Neutral, 4 – Agree & 5- Strongly agree

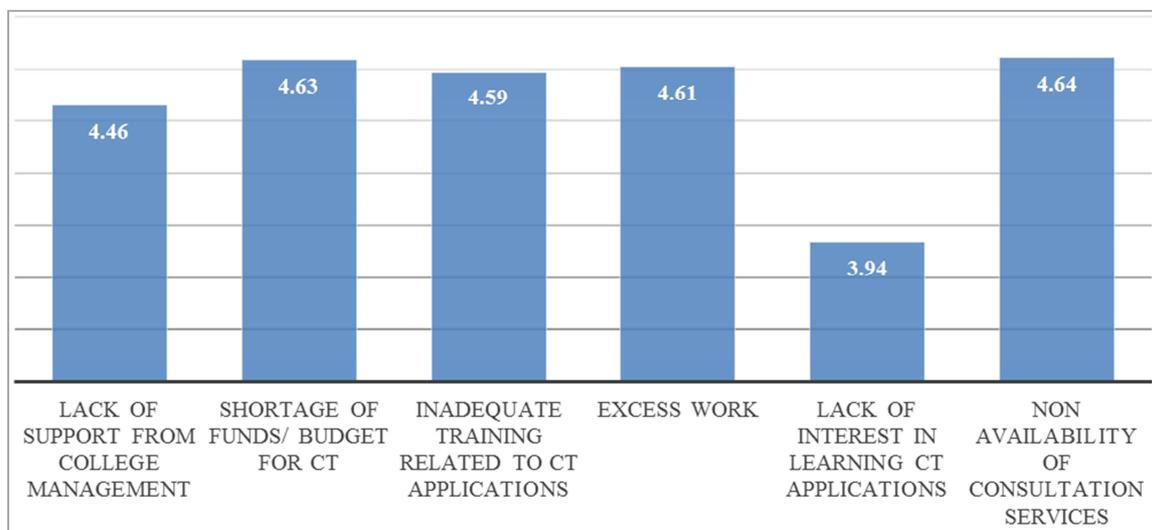
Interpretation: To understand the perception of the librarians towards the application of CT, 5 point Likert's scale- Strongly agree, Agree, Neutral, Disagree & 1-Strongly disagree have been used. Table & Figure 4 shows attitude of the Librarians towards the application of CT in the college libraries of Maharashtra state. The attitudes have been categorized into 7 parameters. The highest mean value

(4.80) has arrived in the form of 'It advances the quality of library services' followed by 'It improves the skills of library professionals as well as library user' (4.76), 'It helps in improving the status of the library' (4.72), 'It avoids duplication of library work' (4.54) and lastly 'The effectiveness of Collaborative technologies in my institute/college is good' (3.99).

Table 5. Challenges/barriers associated with the implementation of Collaborative Technologies (CT).

Sr. No	Description	1	2	3	4	5	Total	Mean	Rank	Std. Dv
1	Lack of support from college management	9	11	7	26	149	202	4.46	5	4.08
2	Shortage of funds/ budget for CT	1	9	6	31	155	202	4.63	2	4.18
3	Inadequate training related to CT applications	4	7	14	18	159	202	4.59	4	4.16
4	Excess work	5	6	11	19	161	202	4.61	3	4.18
5	Lack of interest in learning CT applications	29	21	0	36	116	202	3.94	6	3.72
6	Non availability of consultation services	5	7	5	21	164	202	4.64	1	4.21

Note: 1- Strongly disagree, 2- Disagree, 3- Neutral, 4 – Agree & 5- Strongly agree

**Figure 5.** Challenges faced by librarians.

Interpretation: The above table 5 & Figure 5, shows that out of 202 surveyed libraries, the highest challenge faced by them while implementing CT with highest mean value of 4.64 is 'Non availability of consultation services' followed by 'Shortage of funds/ budget for CT' (4.63), 'Excess work' (4.61), 'Inadequate training related to CT applications' (4.59) and so on. The lowest challenge found is 'Lack of interest in learning CT applications' (3.94).

8. Hypothesis Testing

HYPOTHESIS NO. 1

H₀1: Academic libraries in Maharashtra have not adopted right collaborative technology skills.

H₁1: Academic libraries in Maharashtra have adopted right collaborative technology skills.

For testing hypothesis No 01, researcher has collected data from Librarians/Library Staff, and used One-way ANOVA test.

Table 6. The ANOVA results are as below.

Sr. No	Description	1	2	3	4	5	Total	Mean	Rank	Std. Dv
1	Blogs / Discussion Forums / Google Groups (e.g. ILOSC, LIS Forum)	27	24	20	24	107	202	3.79	7	3.58
2	Instant Messaging / Virtual Meetings / Video Conferencing	4	8	5	4	161	202	4.63	1	4.19
3	Social Networking Site (SNS) (e.g. Twitter, Facebook, Instagram, LinkedIn)	10	11	14	26	142	203	4.40	3	4.02
4	Audio Sharing / Pod Cast /Video Streaming / Vodcast	8	12	13	48	121	202	4.30	5	3.92
5	Social Bookmarking / Tagging/Photo Sharing	7	8	21	41	125	202	4.33	4	3.94
6	Google Work Place / Google Drive	8	6	5	28	155	202	4.56	2	4.15
7	File Organizing, Storage and Transfer tools	16	18	14	31	123	202	4.12	6	3.82

ANOVA: Single Factor SUMMARY						
Groups	Count	Sum	Average	Variance		
CT 1	202.00	766.00	3.79	2.27		
CT 2	202.00	935.00	4.63	0.79		
CT 3	202.00	887.00	4.39	1.24		
CT 4	202.00	868.00	4.30	1.18		
CT 5	202.00	875.00	4.33	1.09		
CT 6	202.00	922.00	4.56	0.95		
CT 7	202.00	828.00	4.10	1.85		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	98.10	6.00	16.35	12.20	0.00	2.11
Within Groups	1885.16	1407.00	1.34			
Total	1983.26	1413.00				

Interpretation: It is observed that computed p-value is less than 0.05 & ANOVA f-test (Observed Value) 12.20 > f-test (Critical Value) (2.11) i.e. ANOVA f-test observed value is greater than ANOVA f-test critical value. Thus, Null hypothesis is rejected. & Alternative hypothesis is accepted.
HYPOTHESIS NO. 2

H₀2: Librarians do not show any positive attitude towards adoption of Collaborative Technologies.
 H₁2: Librarians show positive attitude towards adoption of Collaborative Technologies.
 For testing hypothesis No 02, researcher has collected data from library professionals, and used One-way ANOVA test.

Table 7. The ANOVA results are as below.

Sr. No	Description	1	2	3	4	5	Total	Mean	Rank	Std. Dv
1	It advances the quality of library services	2	2	0	27	171	202	4.80	1	4.31
2	It helps in improving the status of the library	3	4	3	31	162	203	4.72	3	4.24
3	It helps to reduces the workload of library professionals	11	14	5	26	146	202	4.40	6	4.04
4	It helps to save the time of library stakeholders	6	9	12	21	154	202	4.52	5	4.12
5	It avoids duplication of library work	7	8	9	22	156	202	4.54	4	4.14
6	The effectiveness of collaborative technologies in my institute/college is good	26	21	8	21	126	202	3.99	7	3.76
7	It improves the skills of library professionals as well as library users	1	2	5	29	165	202	4.76	2	4.27

ANOVA: Single Factor SUMMARY						
Groups	Count	Sum	Average	Variance		
Perception 1	202.00	969.00	4.80	0.34		
Perception 2	202.00	953.00	4.72	0.47		
Perception 3	202.00	879.00	4.35	1.53		
Perception 4	202.00	914.00	4.52	1.00		
Perception 5	202.00	918.00	4.54	1.00		
Perception 6	202.00	806.00	3.99	2.25		
Perception 7	202.00	961.00	4.76	0.35		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	97.32	6.00	16.22	16.36	0.00	2.11
Within Groups	1395.21	1407.00	0.99			
Total	1492.53	1413.00				

Interpretation: It is observed that computed p-value is less than 0.05 & ANOVA f-test (Observed Value) 16.22 > f-test (Critical Value) (2.11) i.e. ANOVA f-test observed value is

greater than ANOVA f-test critical value. Thus, Null hypothesis is rejected. & Alternative hypothesis is accepted.

9. Recommendations

- 1) The LIS educational programs should incorporate capacity building for the use of emerging Collaborative Technologies (CT). The learning exercises should incorporate teaching and practical exercises.
- 2) The management, educators, IT Team, and students should all be included in the formulation of the plan to adopt collaborative tools, and librarians should talk with them about the advantages that the entire academic community would receive from incorporating these online tools into the library services.
- 3) The administration of the library should make sure that sufficient funds are set aside during budget allocations to purchase ICT equipment that will be adequate to accommodate more library customers and also be able to prolong their life span because technology quickly gets outdated.
- 4) The requirement to regularly upgrade the library's IT infrastructure and expand library services must be incorporated into strategic plans and development by librarians. In order to build and improve technical competency, library professionals should be encouraged to consistently use these internet channels for collaboration with one another.
- 5) To avoid having to wait for extended periods when using ICT equipment, additional internet bandwidth should be taken into consideration. This will enable more library patrons to utilize ICT facilities.
- 6) To improve knowledge, abilities, and awareness of the many online technologies, particularly those they are unfamiliar with or that have been identified as valuable in libraries, library professionals should participate in training, such as a short-term program on collaborative tools and thus they must experiment with a variety of tools for getting fit in their respective environments.
- 7) Further library staff ought to be permitted, empowered, and upheld to go to different conferences as well as workshops led inside and outside the country to furnish them with more abilities and furthermore to collaborate with the specialists.

10. Conclusion

The world of information and communication is constantly changing, and the World Wide Web is widely regarded as one of the most significant advancements in the history of communication technology. The widespread use of digital technologies in the communication arena is fast transforming the higher education sector, and libraries cannot avoid such new advances. Academic libraries must expand outside their physical borders and diversify their offerings in order to gain recognition and reputation for their resources. Academic libraries in the twenty-first century will need to adopt a service-based approach that allows them to meet their clients wherever they are and in whatever mode they desire [25].

It is commonly acknowledged that interactive

collaborative technologies have a significant influence on learners' performance, on decreasing feelings of isolation, on improving self-learning abilities, and on developing a new study environment. The involvement of competent library information professionals is critical in offering interactive library services. Legitimate training and supplemental classes are expected for library staff to fulfill the requests of net-savvy library patrons. The libraries of internationally renowned universities provide a plethora of interactive information offerings via their websites. In India, the majority of the greater learning organizations have great libraries and a large portion of them are offering online services. To summarize, this study aims to present a clear picture of the current state of the application of collaborative technologies in academic libraries of Maharashtra. The information presented in this study will be useful to many libraries that utilize collaborative tools or plan to include them in their services. The study revealed that librarians had a more favorable perception of implementing collaborative technologies in academic libraries, particularly for online support and library services. As a result of the data and analysis, one can anticipate that, if the trend continues, the adoption of collaborative technologies will increase among academic institutions in Maharashtra which are essential for user's learning needs and expectations.

References

- [1] Lee, Y. S., & Schottenfeld, M. A. (2014). Collaborative knowledge creation in the higher education academic library. *Journal of Learning Spaces*, 3 (1). <http://files.eric.ed.gov/fulltext/EJ1152684.pdf>
- [2] Garoufali, A., & Garoufallou, E. (2022). Transforming libraries into learning collaborative hubs: the current state of physical spaces and the perceptions of Greek librarians concerning implementation of the "Learning Commons" model. *Global Knowledge, Memory and Communication*. <https://doi.org/10.1108/gkmc-04-2022-0086>
- [3] Çakır, H., & Ünal, E. (2020). Use of Collaborative Technologies in Engineering Education. In *Engineering Education Trends in the Digital Era* (pp. 125–149). essay, IGI Global. Retrieved from <https://doi.org/10.4018/978-1-7998-2562-3.ch006>.
- [4] N. A. Dahri, M. S. Vighio and M. H. Dahri, "A survey on technology supported collaborative learning tools and techniques in teacher education," 2019 International Conference on Information Science and Communication Technology (ICISCT), Karachi, Pakistan, 2019, pp. 1-9, doi: 10.1109/ICISCT.2019.8777421.
- [5] Ince, S., Hoadley, C., & Kirschner, P. (2022). Collaborative technology practices in social science early career scholarly research workflows. *Journal of Librarianship and Information Science*, 09610006221140124. <https://doi.org/10.1177/09610006221140124>
- [6] Zhao, J., & Richards, J. (2021). E-Collaboration Technologies and Strategies for Competitive Advantage Amid Challenging Times. IGI Global.

- [7] Ajakaye, J. E., & Ogunniyi, S. O. (2021). 21st-Century Multidisciplinary Collaboration in Research in Library. *Library Philosophy and Practice (e-Journal)*. Retrieved from <https://digitalcommons.unl.edu/libphilprac/6228/>.
- [8] Gunderman, H. C., Scherer, D., & Behrman, K. (2021). Leveraging Library Technology Resources for internal projects, outreach, and Engagement: A case study of overleaf, latex, and the KILTHUB Institutional Repository Service at Carnegie Mellon University Libraries. *College & Undergraduate Libraries*, 27 (2-4), 164–175. <https://doi.org/10.1080/10691316.2021.1885549>
- [9] Sukula, S. K., Awasthi, S., & Dwivedi, A. K. (2021). Transcending learning and information access by academic libraries in the perspective of digital accessibility and policies in higher education during covid-19 in India. *International Journal of Research in Library Science*, 7 (1), 1–14. <https://doi.org/10.26761/ijrls.7.1.2021.1362>
- [10] Adeoye, A. A., Onuoha, C., & C. Obiano, D. (2021). *SOCIAL MEDIA AS A COLLABORATIVE TOOL FOR RESEARCH AMONG LIBRARY AND INFORMATION SCIENCE (LIS) PROFESSIONALS IN NIGERIA*. DigitalCommons@University of Nebraska - Lincoln. <https://digitalcommons.unl.edu/libphilprac/5137>
- [11] Blilat, A., & Ibriz, A. (2020). Design and Implementation of P2P Based Mobile App for Collaborative Learning in Higher Education. *International Journal of Interactive Mobile Technologies*, 14 (07), 115. <https://doi.org/10.3991/ijim.v14i07.13167>
- [12] Johnston, E., Burleigh, C., & Wilson, A. (2020). Interdisciplinary Collaborative Research for Professional Academic Development in Higher Education. *Higher Learning Research Communications*, 10 (1), 62–77. <https://doi.org/10.18870/hlrc.v10i1.1175>
- [13] Bernhardt, B. R., Dempsey, L., Price, J., & Wise, A. (2019). A Collaborative Imperative? Libraries and the Emerging Scholarly Communication Future. In *Proceedings of the Charleston Library Conference*. Retrieved from <http://dx.doi.org/10.5703/1288284317190>.
- [14] Bakhtiyar, A. (2019). The Transformation of The Role of Librarians in Modern Library Information Services in the Era of Industrial Revolution 4.0: A View in the Perspective of Sociology. *Conference: Seminar Nasional UPT Perpustakaan ISI Surakarta Tahun 2019*. pp. 36–43.
- [15] Ayanbode, O. F., & Nwagwu, W. E. (2019). Use of Collaborative Technologies for Knowledge Management in Psychiatric Hospitals in Southwest Nigeria. *Mousaion*, 37 (3). <https://doi.org/10.25159/2663-659x/6453>
- [16] Sharp, L. A. (2018). Collaborative Digital Literacy Practices among Adult Learners: Levels of Confidence and Perceptions of Importance. *International Journal of Instruction*, 11 (1), 153–166. <https://doi.org/10.12973/iji.2018.11111a>
- [17] Vaaler, A., & Brantley, S. (2016). Using a blog and social media promotion as a collaborative community building marketing tool for library resources. *Library Hi Tech News*. <https://doi.org/10.1108/lhtn-04-2016-0017>
- [18] Pham, H. T., & Tanner, K. (2015). Collaboration Between Academics and Library Staff: A Structurationist Perspective. *Australian Academic & Research Libraries*, 46 (1), 2–18. <https://doi.org/10.1080/00048623.2014.989661>
- [19] Stoytcheva, M. (2014). Collaborative Distance Learning: Developing an Online Learning Community. In *AIP Conference Proceedings 1910*. Retrieved from <https://doi.org/10.1063/1.5014003>.
- [20] Pymm, B., & Hay, L. (2014). Using Etherpads as Platforms for Collaborative Learning in a Distance Education LIS Course. *Journal of Education for Library and Information Science*, 55 (2), 133–149. <http://www.jstor.org/stable/43686976>
- [21] Rajkoomar, M. (2013). Blended learning in Library and information Science (LIS) education and training. In *Proceedings of the IATUL Conferences*. Retrieved from <https://docs.lib.purdue.edu/iatul/2013/papers/1>.
- [22] Marty, P. F. (1999). Museum informatics and collaborative technologies: The emerging socio-technological dimension of information science in museum environments. *Journal of the American Society for Information Science*, 50 (12), 1083–1091.
- [23] The survey questionnaire is available at <https://forms.gle/3g2b2S36kZrxxsY6A>
- [24] Kothari, C. R. (2004). *Research Methodology: Methods and Techniques*. New Delhi: New Age International (P) Limited, Publishers.
- [25] LeBlanc, L., & Kim, K. (2014). Web 2.0 and Social Media: Applications for Academic Libraries. *Information Security and Computer Fraud*, 2 (2), 28–32. <https://doi.org/10.12691/iscf-2-2-2>