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Technology-Enabled Best Practices and Services in Autonomous Engineering College Libraries in Karnataka: A Study

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Abstract

Technology has affected the core of the library system. It has become very much evident that conventional library procedures and services are slowly taking backstage, with technology-enabled practices and services attaining prominence. The study analyzed the adoption of technology in bringing out best practices and services in autonomous engineering colleges in Karnataka. It is found that the libraries are good at adopting technical best practices and services. The study recommended libraries to be proactive and continuously update the technologies; grab the opportunities brought by emerging technologies; integrate the technology with best practices; and innovative services to make them more successful.

Keywords: Technology, Best Practices, Services, Autonomous Engineering Colleges, Libraries

Introduction

Change is imperative in a society since older ages; however, with the globalization and rapid developments in technologies, the society has become volatile. All facets of the society are prone to the effects of technology and globalization. Education sector, more prominently the higher education sector, is highly influenced by global reforms, which in fact commanded deep changes in the academic library and information system. Effects of technology and globalization on libraries brought many challenges and opportunities to libraries.

Libraries should act dynamically and plan strategically to use advantages of technology to overcome challenges and develop various innovative services and best practices by using technology. Library leaders have to leverage technologies with their professional competencies and discern innovative practices and services through technology. Libraries can re-evolve as the centers of excellence in e-learning, e-resource services, and innovative spaces.

Definition of Best Practices

ODLIS (Online Dictionary of Library and Information Science) describes best practices as:

In the application of theory to real-life situations, procedures that, when properly applied; consistently yield superior results; and are therefore used as reference points in the evaluation of the effectiveness of alternative methods of accomplishing the same task. Best practices are identified by examining empirical evidence of success.

"Best practices encompass the implementation of the quality framework and the use of benchmarking and performance measurement as tools for the continuous improvement of products, processes, and services" Jotwani (2008).

Best Practices Under the Study

The list of technology-enabled best practices, defined under the study, is derived from the extensive literature survey and discussion with experts in the library field.

- Bridging internet resources and users – subject gate-ways, catalogs, etc.

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- Use of social media – library blog, library wiki, WhatsApp, Facebook, twitter, Instagram, Pinterest, etc.
- Mobile technology applications – mobile app, mobile website, Wi-Fi, etc.
- Innovative spaces in libraries - makers space, idea corner.
- Interaction with users using technology.
- Promotion of library resources and services using technology.

Innovative Services Under the Study

- Online reference services.
- Technology-enabled information dissemination services.
- Remote access services.
- User alerting services using technology – SMS, e-mail, and WhatsApp.

Review of Literature

In order to identify best practices applicable for libraries and technology applications in best practices and services, researchers reviewed various best practices defined by statutory bodies such as NAAC, American Library Association (ALA), and reviewed research papers on best practices and services.

Technology-enabled Best Practices

Every year, the ALA (2014) calls for best practices and technologies developed by libraries to honor best libraries. During the year 2014, the ALA reported about best practices using cutting-edge technologies adopted at four libraries in the USA and Canada. NAAC (2006) published a document on "best practices in library and information services", which is a helpful guide for libraries in adopting best practices. Case studies presented under "Use of Technology" section of NAAC guidelines help library professionals in gaining innovative ideas to carve best practices and services using technology. "Rigorous, strategic and non-business approach to marketing is required for libraries to promote their services and resources" Adeyoyin (2005). Jotwani (2008) studied the best practices of IIT Bombay library, which effectively presented the practices of the library and definitions of best practices. Some suggestions for NAAC's set of best practices to improve the quality of academic libraries have been suggested by Vyas (2009). "The innovative university library needs the support of the more active innovation and reform concepts, supporting environment, and various resources. "User's acceptance, recognition, and active participation are crucial factors which depend largely on publicity and the popularization by the library" stated by Jing and Jin (2009). Dysart and Jones (2011) reported on innovation in corporate and government libraries. The report presents valuable innovative practices and services, which libraries can adopt. Best practices should be adopted to overcome the problems facing by libraries suggested by Umesh Kumar (2012). Best practices for the customer-focused library are a project taken up by "Metropolitan Library System" in Chicago area, the USA to study how libraries serve users with the customer-focused goal, suggest innovative technology-enabled library services and practices. *Journal of the Medical Library Association* presented about seven virtual projects of health sciences libraries in its virtual projects column in October 2015 issue; the projects are examples of how librarians can make use of technologies to innovate new practices and services that can best serve their users. Sahu (2016) studied some best practices followed using social media and social networks by some engineering college libraries in Odisha. The study found that most of the libraries using social media to connect with their users, for information services and knowledge organization. Johnson (2016) explained concepts, needs and uses of creative spaces in the library. He suggests that the entire library can be made into creative space with the creativity of library professionals.

Innovative Technical Services

Li (2006) suggests, "It is very imperative for libraries and librarians to design, develop, enhance, implement, and deliver high-quality user-centered information services, resources, and instruction at the fingertips of library users". ICT-based resources and services are significant for their academic and research work found by Haneefa (2007) in his study on special libraries in Kerala. Sun and Lau (2007) describe two different customer experience management for better understanding about user's experiences and satisfaction with regard to e-services.

"Libraries are mixing up local and external searching facilities which enabled them to develop intelligent information filtering techniques effective in meeting the changing needs of users in the light of internet and web technologies" by Lossau (2008). Sangeeta and Sarika (2008) analyzed the status of ICT-based services, library automation and problems in the application of ICT in library services, and found that most of the libraries are not providing ICT-based services as well as they do not have e-resources collection. Huang and Strawderman (2009) concluded that both traditional and technical work systems are essential for libraries after a comparative analysis of traditional and online library services. Ji (2009) argued that user experiences and user suggestions for designing library services will enhance the quality of services. Use of library 2.0 technologies in library services will enhance the reputation of the libraries, insists Arora (2009). Lippincott (2010) has foreseen lots of potential in mobile technologies in libraries, and suggested librarians to make use of students and faculty skills and collaborate with them to develop mobile portals and apps for their libraries. Satisfied customers will also become advocates of the services and indirectly help to emphasize the value of the services, concluded Kaur and Singh (2011) after evaluating the nature and quality of customer services in some prominent universities in Malasia. "There is an urgent need to develop dynamic library websites and incorporate relevant Web 2.0 based services including web forms in each web-based library service; apply semantic technologies and ontologies; adopt next-generation internet (IPv6); provide multi-language support content," suggested Madhusudhan and Nagabhushanam (2012). "Mobile web library services transcend time restrictions, and free patrons from restrictions related to the opening and closing hours of the library, now; they can enjoy services provided by the library 24 hours a day using their mobile phones" say Wang and Ke (2012). Librarians can help researchers in various ways by playing various roles such as a consultant, research partner, data analyst, trainer for data management and better research methods, suggested Wang (2013). Evaluating e-services through user communication, participation and feedback is a better approach (Einasto, 2014). There is an emerging need to expand the library's sphere of influence, search for new forms and methods of service, and introduce new kinds of information and library services (Berezkina, 2014). Owing to faster technological up-gradation and technology obsolescence, it is imperative for libraries to change and upgrade themselves (Jange, 2015). Oda (2015) carried out a survey on trends and features of reference services in libraries of Japan and concluded that ICT-based reference services are gaining momentum in this digital age; hence, it is important to adopt such services in libraries. "Technologies may be boon or bane to libraries" Sandhu (2015) alerts librarians to make use of emerging technologies as opportunities to bring out innovative services and practices**.** "It is exciting to witness how academic libraries evolve in the midst of this vigorously changing digital age and how leaders at all levels in academic libraries are transforming their libraries to better support research and teaching and to become a crucial strategic partner on campus" concludes Davis (2015) in his study on technical services of research university libraries on technical services transformation. "If the Library is to remain relevant to the university community it needs to be continually innovating and evolving" Hockey (2016). Harris (2016) reviewed literature related to innovative services which enhance the significance of libraries in the USA and also evaluates the provision of identified services in the literature review by University of West Indies (UWI) Mona Library.

Need and Purpose of the Study

Technology intervention with conventional library practices, and carving innovative practices and services using technology are the key success factors for libraries in the current scenario. Karnataka, being a fast developing state in India and hub of information technology, is a home for many prominent engineering and technical institutions. The state is having 21 autonomous engineering colleges, which are globally benchmarked, academically advanced, and infra-structurally well versed. These institutions are imparting world-class education supplying competent workforce to the world. Analyzing the adoption of technology to escalate the importance of library and information system in these premier institutions will give the bird's eye view of the state of the library system in technical education.

Objectives of the Study

- To find the availability of electronic information resources in libraries.

- To identify technology-enabled best practices applicable for engineering libraries at present scenario.
- To study technology-enabled best practices adopted by libraries.
- To identify useful innovative library and information services for engineering education at present scenario.
- To analyze technology-enabled innovative services provided by libraries.
- To draw suggestions to make use of technology for engineering libraries.

Research Methodology

A meticulous study of the implementation of technology in library's best practices and services has been carried out through personal observations of researchers and through the data gathered using questionnaire and discussion with librarians and library staff. All 21 autonomous engineering colleges in Karnataka are covered under the scope of the study. Since population size is smaller, the census method is used to collect data. Percentage analysis and mean analysis are used to analyze data. Considering the mean value of 1 as the highest value, the status of individual parameters with the mean of 0.5 (50% of the highest value of mean) or higher is considered as good, whereas the status of parameters with the mean value below 0.5 is considered as lower.

Data Analysis and Discussions

Analysis of Colleges Details

Distribution of colleges based on year of establishment and type of the college has been analyzed to understand the nature of colleges. E-resources collection details, technology-enabled best practices, and innovative technical services are analyzed.

Table 1: Distribution of Colleges as Per Year of Establishment

year of establishment	*Number of Colleges (N)*	*Percentage % (M)*	*Cumulative percentage*
1945 -1950	3	14.29%	14.29%
1950 - 1960	3	14.29%	28.58%
1961 - 1970	6	28.58%	57.16%
1971 - 1980	4	19.06%	76.21%
1981 - 1990	2	9.52%	85.72%
1991- 2000	1	4.76%	90.48%
2001	2	9.52%	100%
Total	21	100%	

N=21, M=100%

Present autonomous colleges in Karnataka were established in the period from 1945 to 2001. The highest number of colleges were established in the period from 1961 to 1970 (six colleges), followed by 1971 to 1980 (four colleges), three colleges were established before 1950, that is the initial period of independence. More than $3/4^{th}$ (76.21%) of the colleges were established before 1980. Only five colleges were established between 1981 and 2001.

Table 2: Distribution of Colleges as Per the Type of the College

College Type	*Number of Colleges (N)*	*Percentage % (M)*
Aided	9	42.86%
Private	12	57.14%
Government	0	0
Total	21	100%

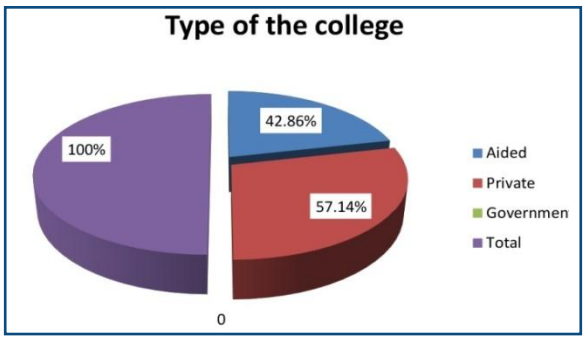

Fig. 1: Distribution of Colleges as per the Type of the College

Majority of the autonomous colleges in Karnataka are private colleges (57.14%) and the remaining are aided colleges (42.86%). There are no government autonomous colleges. Hence, there are only two types of autonomous colleges in Karnataka – private and aided.

E-Resources Collection

E-Books Collection

E-books are user-friendly, can be saved into users' personal devices, have no restriction of one book one user at a time, and any number of users can access simultaneously. Only useful parts of an e-book can be downloaded and saved for further use. Owing to the user-friendly nature of e-books, the collection of e-books in the library will be helpful for real-time user services.

Table 3: E-Books Collection

Si. No.	*Name of e-books Publisher*	*No. of Colleges having*	*Percentage*	*Rank*
1.	Taylor & Francis	21	100%	1
2.	Springer	20	95.23%	2
3.	Elsevier	14	66.66%	3
4.	IEEE	8	38.09%	4
5.	McGraw-Hill	7	33.33%	5
6.	Pearson/PHI	6	28.57%	6
7.	Wiley	4	19.04%	7
8.	Thomson Reuters	4	19.04%	8
9.	Cambridge University Press	2	9.52%	8
10.	Sage Publications	1	4.76%	9
11.	Oxford University Press	1	4.76%	9
Number of colleges (N1) = 21, Mean = 0.38				

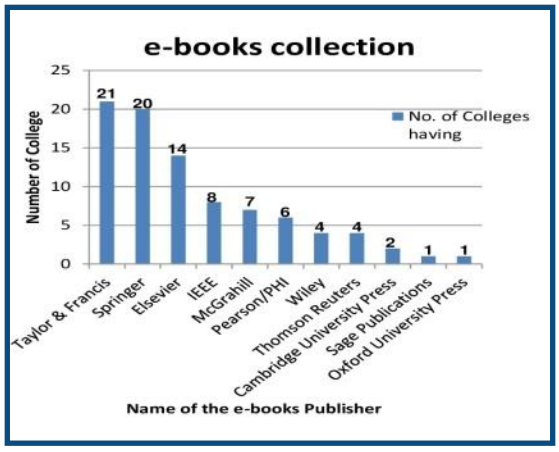

Fig. 2: E-Books Collection

All 21 colleges are having 'Taylor & Francis' e-books, followed by 'Springer' e-books in 20 colleges, 14 colleges are having 'Elsevier' e-books, eight colleges are having 'IEEE' e-books, seven colleges are having 'McGrahill' e-books, six colleges are having 'Pearson/PHI' e-books. 'Wiley', and 'Thomson Reuters' e-books are in four colleges, only two colleges are having 'Cambridge University Press' e-books, both 'Sage Publications', and 'Oxford University Press' e-books are available in only one college. The overall status of e-books collection is lower with the mean value of 0.38.

E-Journals Collection

E-journals are helpful in improving co-curricular and research activities of users. Collection of standard e-journals in the library has become mandatory in order to enhance user satisfaction and user productivity.

Table 4: E-Journals Collection

Si. No.	*Name of e-journals Publisher*	*No. of Colleges having*	*Percentage*	*Rank*
1.	Taylor & Francis	21	100%	1
2.	IEEE	21	100%	1
3.	Proquest	21	100%	1
4.	ASCE	21	100%	1
5.	Springer	20	95.23%	2
6.	Elsevier	20	95.23%	2
7.	ASME	18	85.75%	3
8.	Emerald	13	61.9%	5
9.	Ebsco	2	9.52%	5
Number of colleges (N) = 21, Mean = 0.84				

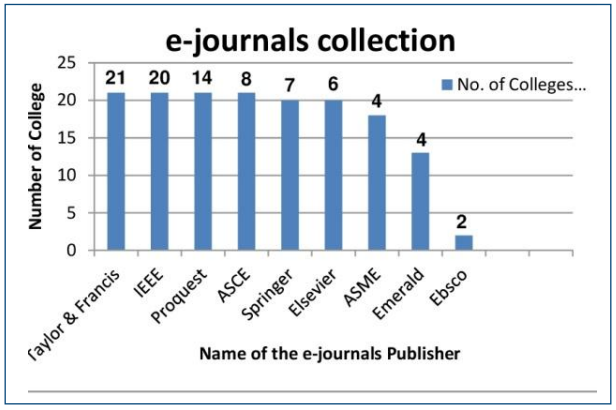

Fig. 3: E-Journals Collection

All 21 colleges are having e-journals published by 'Taylor & Francis', 'IEEE', 'Proquest', and 'ASCE'; 20 colleges are having e-journals published by 'Springer' and 'Elsevier'; 18 colleges are having 'ASME' e-journals, 13 colleges are having 'Emerald' e-journals, only two colleges are having 'Ebsco' e-journals. The overall status of e-journals collection is good with the mean value of 0.84.

E-Databases Collection

E-databases are a set of useful and related data. They are helpful in retrieving specialized information. Two broader categories of databases are analyzed, 'standards and handbooks' listed from Si. No. 1 to 3 in Table 4; also, Si. No. 4 to 11 are indexing databases.

Table 5: E-Databases Collection

Si. No.	*Name of the database*	*No. of Colleges having*	*Percentage*	*Rank*
12.	IEEE Standards	21	100%	1
13.	ASTM standards	6	28.57%	2
14.	ASM Handbooks	5	23.8%	3
15.	J-gate	4	19.04%	4
16.	SCOPUS	4	19.04%	4
17.	Web of science	4	19.04%	4
18.	INSPEC	2	9.52%	5
19.	COMPENDEX	1	4.76%	6
20.	SCI	1	4.76%	7
21.	Engineering Village	0	0	8
22.	worldcat	0	0	8
Number of colleges (N) = 21, Mean = 0.2				

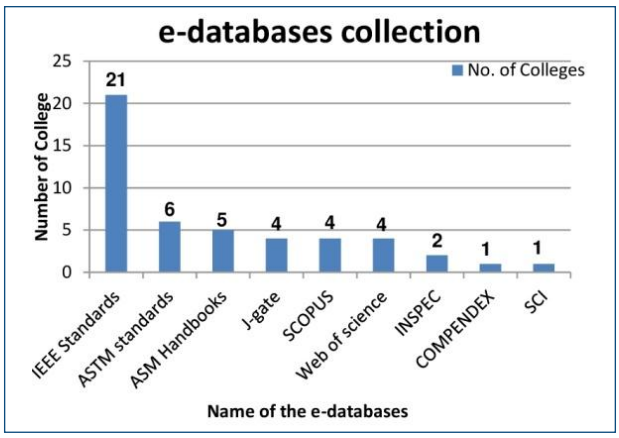

Fig. 4: E-Databases Collection

All 21 colleges are having IEEE Standards. Collection of other databases is relatively lower. No colleges are having 'Engineering Village' and 'WorldCat'. Among the two categories of databases, standards and handbooks collection is better compared to indexing databases. The overall status of the e-databases collection is very low with the mean value of 0.2.

Other E-Resources Collection

Table 6: Other E-Resources Collection

Si. No.	*Name of the database*	*No. of Colleges having*	*Percentage*	*Rank*
1.	Open Access resources	21	100%	1
2.	e-question papers	19	90.47%	2
3.	e-project reports	16	76.19%	3
4.	multimedia resources	13	61,9%	4
5.	e-thesis & dissertations	12	57.14%	5
6.	In-house databases	10	47.61%	6
Number of colleges (N) = 21, Mean = 0.72				

'Open access resources' are in top rank with all 21 colleges having access to them, 'e-question papers' are on the 2nd rank with 19 colleges, 'e-project reports' are on the 3rd rank with 16 colleges, 'multimedia resources' are on the 4th rank with 13 colleges, 'e-thesis & dissertations' are on the 5th rank with 12 colleges, and 'In-house databases' are in the least rank with 10 colleges. The overall status of e-journals collection is good with the mean value of 0.72.

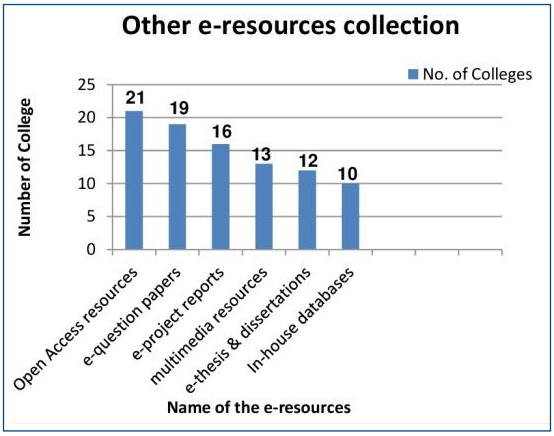

Fig. 5: Other E-Resources Collection

Comparative Analysis of Different E-resources Collection

Table 7: Comparative Analysis of Different E-Resources Collection

Si. No.	*Type of e-resources*	*Mean*	*Rank*
	e-Journals	0.84	1
	Other e-resources	0.72	2
	e-books	0.38	3
	e-databases	0.2	4

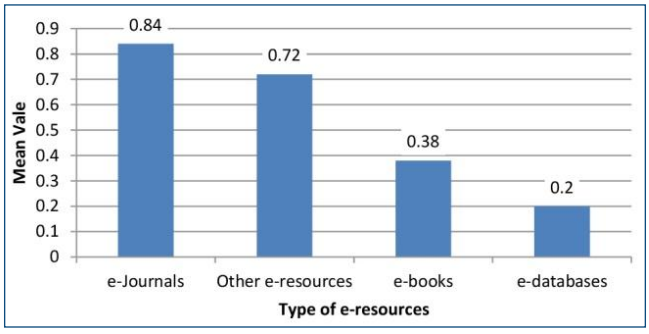

Fig. 6: Comparative Analysis of Different E-Resources Collection

Overall e-journals collection is highest with the mean value 0.84; collection of other e-resources is also good with the mean value of 0.72. E-books collection status is lower, and e-databases collection is lowest.

Technology-Enabled Best Practices

Technology is bringing numerous advantages to libraries. Libraries should catch hold of technology applications, brainstorm and walk an extra mile to appropriately apply the technologies to bring out various practices that add value to the library. 10 technology-enabled best practice are analyzed in the study.

Table 8: Technology-Enabled Best Practices

Si. No.	*Best Practice*	*No. of Colleges Adopting the practice*	*Percentage*	*Rank*
1.	Promoting library services, resources, and events using technology	18	85.71%	1
2.	Finding & sending alerts on important conferences /seminars /workshops to users in their respective fields	18	85.71%	1
3.	Online user feedback on library resources/services and facilities	17	80.95%	2
4.	Created group e-mail IDs for different groups of users (department wise, class wise, etc.) & regularly communicate through those groups	16	76.19%	3
5.	Helping your users in identifying and publishing their research papers in reputed journals	16	76.19%	3
6.	Creating awareness of new technologies and developments in the field of engineering and technology and providing information sources for related to them	16	76.19%	3
7.	Collaborating with faculty and students in implementing new technologies and services	15	71.42%	4
8.	Sending important messages through group SMS	15	71.42%	5
9.	Innovative spaces like discussion spaces/ maker spaces with necessary infrastructure in the library	13	61.9%	6
10.	Prepare subject gateways – grouping together URL of the important information resources or web pages related particular area	11	52.38%	6
Number of colleges (N) = 21, Mean = 0.73				

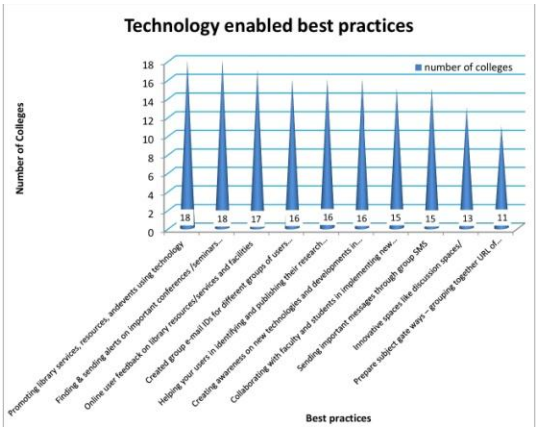

Fig. 7: Technology-enabled Best Practices

'Promoting library services, resources, and events using technology' and 'Finding & sending alerts on important conferences / seminars / workshops to users in their respective fields' are being practicing by most of the libraries, 18 colleges are using both of the best practices; 17 colleges are using 'Online user feedback on library resources/services and facilities', which is the second highest used best practice. Two best practices – 'Helping your users in identifying and publishing their research papers in reputed journals' and 'Creating awareness on new technologies and developments in the field of engineering and technology and providing information sources related to them' – are on the 3rd rank with 16 colleges practicing

them. Another two best practices 'Collaborating with faculty and students in implementing new technologies and services', and 'Sending important messages through group SMS' are on the 4th rank with 15 colleges practicing them. 13 colleges are having innovative spaces; however, only 11 colleges prepare subject gateways in 5th and 6th rank, respectively. The overall status of technology-enabled best practices adopted by the colleges is good with the mean of 0.73.

Innovative Technical Services

The bottom line of any library's purpose and the objective is service. They exist for serving users, all their subsystems and activities are inclined towards serving and satisfying users. Technology added many opportunities to libraries in providing user-friendly, user-centric, and real-time services. Ten innovative technical services, analyzed under the study, are critical to the success of the libraries.

Table 9: Innovative Technical Services

Si. No.	*Best Practice*	*No. of Colleges Adopting the practice*	*Percentage*	*Rank*
1.	Remote access service	20	95.23%	1
2.	web OPAC	18	85.71%	2
3.	online CAS/SDI services	16	76.19%	3
4.	Online Alerting services on new arrivals/ loan over dues	16	76.19%	3
5.	Electronic document delivery	14	66.66%	4
6.	Research support services	14	66.66%	4
7.	online reference services	12	57.14%	5
8.	Whatsapp group services	11	52.38%	6
9.	Facebook, Twitter pages etc	9	42.85%	7
10.	Online promotion and marketing services	8	38.09%	8
Number of colleges (N) = 21, Mean = 0.65				

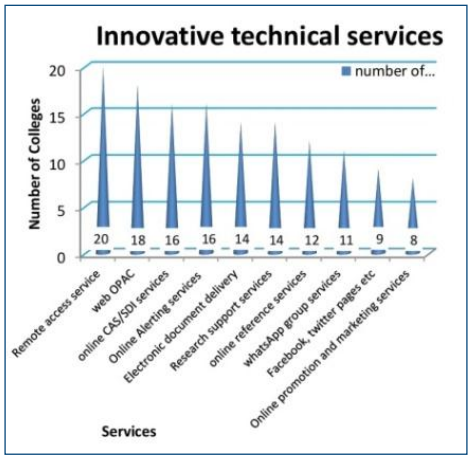

Fig. 8: Innovative Technical Services

'Remote access service' is the top-ranked service; 20 colleges are providing this service. 18 colleges are providing 'web OPAC' service, which is on the 2nd rank. Two services 'online CAS/SDI services' and 'Online Alerting services on new arrivals/loan over dues' are on the 3rd rank with 16 colleges providing the services. Another two services 'Electronic document delivery' and 'Research support services' are on the 4th rank with 14 colleges providing the services.12 colleges are providing 'online reference services', 11 colleges providing 'Whats-App group services,' nine colleges providing 'Facebook, Twitter and other social media pages', and eight colleges providing 'Online promotion and marketing services'. The overall status of the provision of innovative technical services by the colleges is good with the mean of 0.65.

Findings

- All 21 autonomous colleges in Karnataka were established in the period from 1945 to 2001. More than 3/4th (76.21%) of the colleges were established before 1980. Only five colleges were established between 1981 and 2001.
- Majority of the autonomous colleges in Karnataka are private colleges, and the remaining are aided colleges. There are no government autonomous colleges.

- Overall e-journals collection is highest compared to other types of e-resources, the collection of 'other e-resources' is also good. E-books collection status is lower, and e-databases collection is lowest.
- The overall status of technology-enabled best practices adopting by the colleges is good.
- The overall status of the provision of innovative technical services by the colleges is good.

Recommendations

- Since autonomous engineering college libraries are serving tech-savvy users and they need to provide information for academic research, improving the collection of e-books, standards and indexing databases will result in building world-class resource collection. Value-added resource collection built based on the user requirements is a valuable tool to enhance the user satisfaction.
- Best practices are always helpful in adding value to the library system, and escalate the reputation of any library. Any best practice should sync with local requirements. Hence, libraries need to study the changing needs of the users, and their parent organization. Best practices should be upgraded, or adopt new best practices as per the changing needs. Using technology in implementing best practices will be helpful in the success of the new practices.
- Engineering libraries should have the continuous watch on emerging technologies; enfold the opportunities of the new technologies in providing user-friendly services.

Conclusion

In the technology-engulfed environment, libraries are facing the question of their survival. In fact, libraries will exist forever but only their anatomy will transform according to the changes in society and user requirements. Libraries need to turn the challenges into opportunities to step up further using the advantages of technology. It is a time to integrate technology with all the activities of the library. Libraries are adopting best practices and services since older times, but integrating technology into the best practices and services will accelerate the reach of these services to users, which intern will improve the usage of the library and attract non-users towards the library.

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