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Technological Competencies of Teachers in Teaching Learning Process and the Librarians' Role to Enhance the Technological Skills: A Study

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Abstract

The process of teaching and learning as well as the creation of knowledge has been carried on since the advent of civilization. Now technologies have significantly impacted our societal as well as the educational system in the last few decades. With the advancement in Information and Communication Technologies (ICT), the entire learning community is moving towards digital learning or e-Learning. Use of technology in education has highly increased due to COVID-19 pandemic situation. E-learning process has focused on virtual classrooms and various online tools. The teaching fraternity with the assistance of various digital tools are helping the students to provide them with their essentials. For the purpose various technological competencies are required for the teachers as well as the students. The present study pictures the various competencies level of teachers and students in the use of technologies in teaching learning process. It also depicts both favourable as well as adverse impact. In all aspects the perception of the teaching professionals from both science and humanities has been undertaken. This study highlighted how to increase the competencies level of the teachers as well as students. The study also focused on the role of library professionals regarding the use of technologies in teaching learning process.

Keywords: E-learning, Digital learning, Technological Competencies, Librarians' role

1 Introduction

Information and Communication Technologies (ICT) has become a part and parcel of our lives for the last few decades. Each and every aspects of life are related to science and technology. Education system is not out of this. Use of technology in education has increased due to COVID-19 pandemic situation. It helps to improve the quality of education by bringing progressive change in the entire teaching and learning system. Educational system has faced new dimension dominated by e-learning. The various kinds of ICT products available having relevance to education and serving different purposes, include teleconferencing, email, audio conferencing, television lessons, radio broadcasts, interactive radio counselling, interactive voice response system, group text messaging, group audio messaging, file transferring, learning apps etc. E-learning process has focussed on virtual classrooms and various online tools. This resulted in the adoption of various digital tools for

the successful running of the newly evolved system. Dutta and Bhattacharya (2021) stated that the teaching fraternity with the assistance of several communication applications such as Google meet, Google class room, Zoom, Easy Class, Go To Meeting, Remind, Slack and many others learning apps have been able to reach the students as far as possible. Students had to make much bigger adjustments because learning has always been in classrooms as well many of them even may not be well equipped with the newly emerged technological tools since presently they are unable to reach their respective classrooms physically due to the prevalent pandemic situation. Academic libraries have been considered as the major nerve centres of academic institutions as they support teaching, research, and other academic programmes in several ways. These libraries have become a part and parcel of the digital classroom. The teachers along with the librarians are able to bring the ocean of knowledge before the students through this online mode. It has facilitated in a break in the physical barriers to training and encouraged in interacting in a completely new and different way.

2 Objectives

The major objectives behind the study are:

a. To explore the impact of technologies in teaching learning process
b. To examine the competency level of teaching professionals regarding technologies
c. To identify the various problems faced by the teachers in the use of technologies
d. To suggest measures in order to overcome such problems
e. To examine the role of the librarians in supporting technologies.

3 Literature review

Fuchs and Woessman (2004) in their work stated that the positive impact of the use of digital technologies in higher education. Yusuf (2005) stated ICT has largely influenced the field of education which have undoubtedly affected the teaching-learning process. Cox and Marshall (2007) in their work explained that implementation of new classroom technology from traditional to modern is very much essential because it can help the students to get acquainted with the use the digital platform, a major requisite in the digital era. Angeli and Valanides (2009) stated that teacher candidates are ill-prepared to teach with technology when they enter classrooms. Iqbal and Ahmed (2010) stated that, in order to be successful, a country should improve its educational system by implementing effective ICT policies. Raob, Al-Oshaibat and Ong (2012) stated that effective technology integration begins with teacher preparation that provides the benefits, modes, and strategies for instruction that promotes learning in this digital culture. Foulger and others (2017) stated that all teacher candidates should have equitable, high-quality technology experiences throughout their teacher

preparation programs. Molla and Islam (2019), has put forward several platforms for the continuation of the process.Various literature reviews showed that application of educational technologies in teaching learning process is an essential part. But there are so many constraints in the use of technologies. One of the main constraints is technological competencies of teachers in the use of educational technologies.

4 Methodology

The methods of the entire field work are divided into three phases.

●**Pre-field Methods:** Selection of the respondents, Literature study, Preparation of questionnaires.

●**Field Methods:** Data collection through structured questionnaire.

● **Post-field Methods:** Proper arrangement of collected data, Analysis and processing of data, Data analysis and interpretation, Report writing.

5 Data source

The method of field scanning has been used in this study. The present study has been undertaken among the teachers working in the colleges imparting education in under graduate as well as post graduate levels in the undivided Midnapore district i.e. Purba Medinipur, Paschim Medinipur, and Jhargram district of West Bengal, India in the Academic year of 2020-2021. It has been considered from both science and humanities background teachers. So the population of the study are the teachers working in the UG and PG colleges in the undivided Midnapore district of West Bengal, India in the Academic year of 2020-2021.

Due to constraint of time and manpower the sample of the study is limited to 60 college teachers working in undivided Midnapore district. Stratified random sampling method has been applied to choose the teachers. It has been considered district, then faculties, then gender. 20 teachers have been selected from each district, then 10 teachers from both science and humanities background and then selected 5 male and female teachers in each background. For the sample of the study, college teachers have been chosen randomly out of the districts under study. The science faculties include from Physics, Chemistry, Mathematics, Botany, Zoology, Physiology, Microbiology, Nutrition and the humanities faculties include from Bengali, English, History, Philosophy, Political Science, Sanskrit, Hindi, and Sociology.

6 Data Collection Tools

A structured questionnaire has been prepared for the study based on the objectives of the study, i.e. “Technological Competencies of Teachers in Teaching Learning Process and

the Librarians' Role". For the purpose the scale consisted of the dimensions of "Basic computer operation skills", "Setup, maintenance, and troubleshooting skills", "Word processing, Spreadsheets and Presentation skills", "Web Resources Use and Management skills", "Communication Media related Skills" and "Content Development and Management Skills". There are 40 questions in the questionnaire. Participants indicated their choices on the scale over four grades as "Not competent", "Less competent", "Competent", "Highly competent". Few questionnaires have been distributed and collected through email and few questionnaires have been distributed and collected personally.

7 Data analysis and interpretation

Information and communication technologies have large scale impact on the teaching learning process which totally depends on the technological competencies of the teachers. The collected data has been analysed and discussed in the following sections. The tables have been sum up all respondents of the teaching professionals from science and humanities background as well as male or female college teachers.

Table 1: Basic computer operation skills

Skills	Not competent		Less competent		Competent		Highly competent	
	No.	%	No.	%	No.	%	No.	%
Knowledge of computer hardware	9	15	23	38.33	26	**43.33**	2	3.33
Knowledge of operating system	6	10	19	31.67	33	**55**	2	3.33
Knowledge of application software	2	3.33	20	33.33	35	**48.33**	3	5
Knowledge of computer devices and peripherals	2	3.33	18	30	30	**50**	10	16.67
Knowledge of computer networking system/network connectivity	27	**45**	11	18.33	19	31.67	3	3

Table 1 clearly pictures the various competencies level of basic computer operation skills of the college teachers. The table shows that maximum numbers of college teachers are 'competent' in knowledge of computer hardware (43.33%), knowledge of operating system (55%), knowledge of application software (48.33%), and knowledge of computer devices and peripherals (50%). But maximum number of college teachers are 'not competent' in the knowledge of computer networking system (45%). From the above table it also seen that maximum number of college teacher are 'competent' in basic computer operation skills and then 'less competent' in basic computer operation skills. Very few teachers are 'highly competent' and few teachers are 'not competent' with basic computer operation skills.

Table 2: Setup, maintenance and troubleshooting skills

Skills	Not competent		Less competent		Competent		Highly competent	
	No.	%	No.	%	No.	%	No.	%
Knowledge of hardware installation	46	**76.67**	7	11.67	5		2	3.33
Knowledge of operating system installation	46	**76.67**	6	10	6	10	2	3.33
Knowledge of application software installation	11	18.33	18	30	25	**41.67**	6	10
Knowledge of network configuration	32	**53.33**	11	18.33	15	25	2	3.33
Printer setup/selection	4	6.67	6	10	45	**75**	5	8.33
Computer File management skill	1	1.67	8	13.33	40	**66.67**	11	18.33
Knowledge of computer security	51	85	4	6.67	3	5	2	3.33
Computer related storage devices, like CDs, DVDs, USB drives, etc.	8	13.33	10	16.67	32	**53.33**	10	16.67
Digital cameras	7	11.67	9	15	33	**55**	11	18.33
Knowledge of scanner	7	11.67	10	16.67	32	**53.33**	11	18.33

Table 2 shows that the competency level of setup, maintenance and troubleshooting skills of the teachers. It is seen that teachers are ‘competent’ about knowledge of application software (41.67%), File management skill (66.67%), Computer related storage devices, like CDs, DVDs, USB drives, etc. (55.33%), Digital cameras (55%) and Knowledge of scanner (55.33%). Whereas respondents are ‘not competent’ in the Knowledge of hardware installation (76.67%), Knowledge of operating system installation (76.67%) and Knowledge of network configuration (53.33%). Few teachers are ‘highly competent’ in setup, maintenance and troubleshooting skills.

Table 3: Word processing, Spreadsheets and Presentation Skills

Skills	Not competent		Less competent		Competent		Highly competent	
	No.	%	No.	%	No.	%	No.	%
Knowledge of word processing software	0	0	0	0	24	40	36	**60**
Knowledge of Spread sheet application	0	0	13	21.67	39	**65**	8	13.33
Knowledge of presentation package	0	0	9	15	37	**61.67**	14	23.33

Table 3 shows the competency level of teachers in the knowledge of word processing, spreadsheets and presentation skills. Respondents are ‘highly competent’ in the Knowledge of word processing software (60%) and ‘competent’ in the Knowledge of Spread sheet application (65%) and Knowledge of presentation package (61.67%). In this category maximum numbers of respondents are competent in word processing software, spread sheet application and presentation skills.

Figure 1: Word processing, Spreadsheets and Presentation Skills

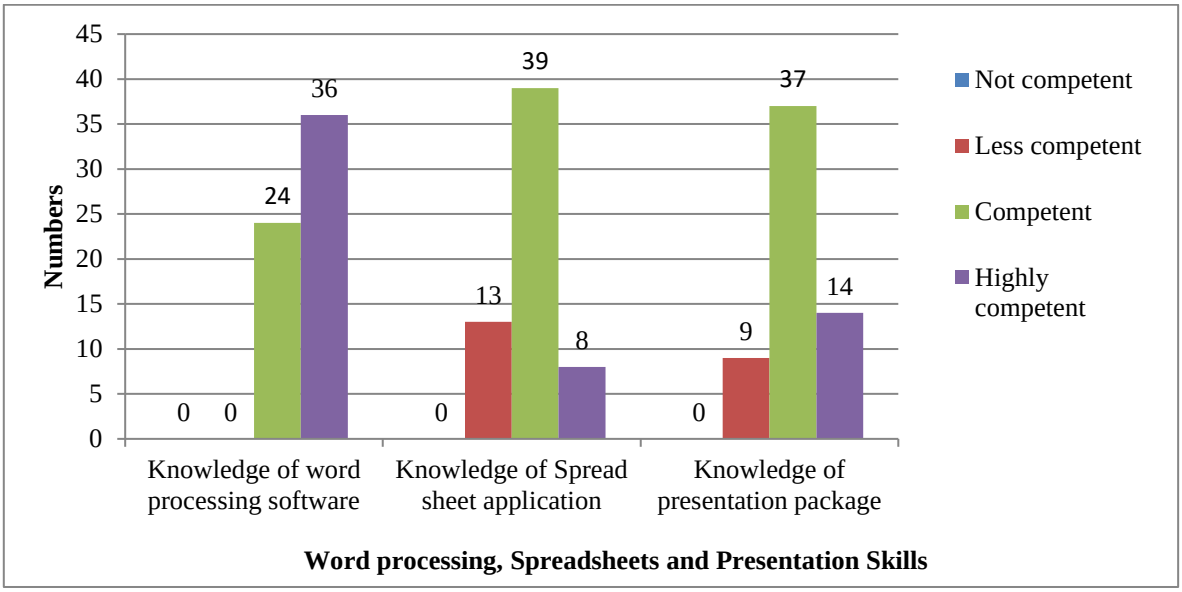

Figure 3 shows that the knowledge of word processing, spread sheet and presentation skills of the college teachers. According to the graph most teachers are 'competent' and few teachers are 'highly competent'.

Table 4: Web Resources Use and Management skills

Skills	Not competent		Less competent		Competent		Highly competent	
	No.	%	No.	%	No.	%	No.	%
Knowledge of web browsers and search engines	1	1.67	21	35	28	**46.67**	10	16.67
Browse / Search the web	0	0	22	36.67	23	**38.33**	15	25
Use of Web resources and e-documents	1	1.67	14	23.33	29	**48.33**	16	26.67
Knowledge about Open Access e-Resources	1	1.67	12	20	33	**55**	14	23.33
Downloading software from the web	1	1.67	21	35	36	**60**	2	3.33
Website designing and maintenance skill	44	**73.33**	10	16.67	5	8.33	1	1.67
Web server setup and maintenance	54	**90**	3	5	2	3.33	1	1.67
Use of cloud based services except email service	53	**88.33**	4	6.67	2	3.33	1	1.67
Technical skill in cloud based computing	55	**91.67**	3	5	2	3.33	0	0

Table 4 shows the competency level of teachers in web resources usage and management skills. Maximum teachers are 'competent' in the Downloading software from the web (60%), Use of Open Access e-Resources (55%), Use of web resources and e-documents (48.33%), Knowledge of web browser and search engine (46.67%) and Browse / Search the web (38.33%). But in case of Technical skill in cloud based computing (91.67%), Web server setup and maintenance (90%), Use of cloud based services (88.33) and Website

design skill (73.33%) teachers are 'not competent'. There are few teachers are highly competent in the use and management of web resources. In maximum cases they are computer science subject teachers.

Figure 2: Web Resources Use and Management skills

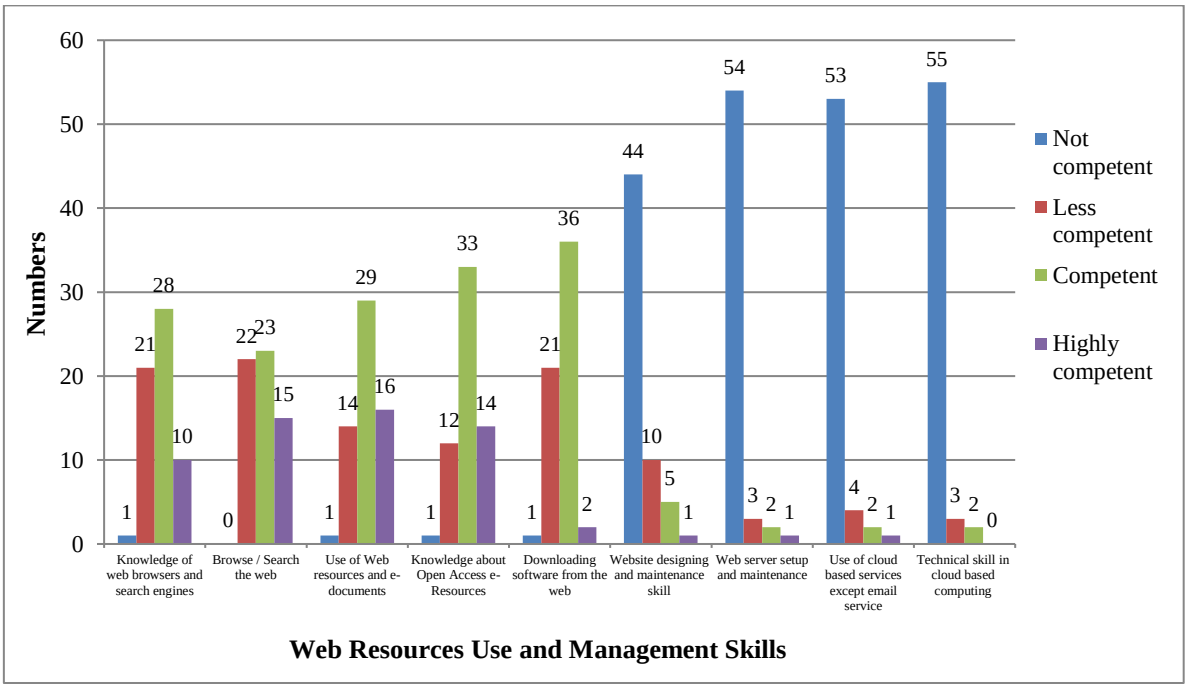

Figure 2 show that the knowledge of web resources uses and management skills of the college teachers. According to the graph most teachers are 'not competent' in website designing and maintenance, web server setup and maintenance, cloud based services and cloud based computing. Some teachers are 'competent' in web browsers and search engines, browse / search the web, use of web resources and e-documents, Open Access e-Resources and downloading software from the web.

Table 5: Communication Media related Skills

Skills	Not competent		Less competent		Competent		Highly competent	
	No.	%	No.	%	No.	%	No.	%
Use of smart classroom	26	**43.33**	11	18.33	18		5	8.33
Use of Learning Management System (LMS)	33	**55**	5	8.33	20	33.33	2	3.33
Use of email service	2	3.33	5	8.33	15	25	38	**63.33**
Instant messaging skill, like WhatsApp, Telegram etc.	0	0	4	6.67	51	**85**	5	8.33
Use of Social Networking sites	0	0	3	5	44	**73.33**	13	21.67
Use of meeting platforms (Zoom, Cisco WebEx. Google meet)	1	1.67	4	6.67	41	**68.33**	14	23.33
Video conferencing skills	1	1.67	5	8.33	43	**71.67**	11	18.33

Table 5 shows the competency level of teachers in the communication media skills. Teachers are more 'competent' in instant messaging skill, like WhatsApp, Telegram etc. (85%), use of social networking (73.33%), video conferencing skills (71.67%) and use of meeting platforms like Zoom, Google meet etc. (68.33%). Maximum number of teachers are 'highly competent' in case of use of email (63.33%). On the other hand, maximum teachers are 'not competent' in Learning Management System (LMS) (55%) and smart classroom (43.33%).

Figure 3: Communication Media related Skills

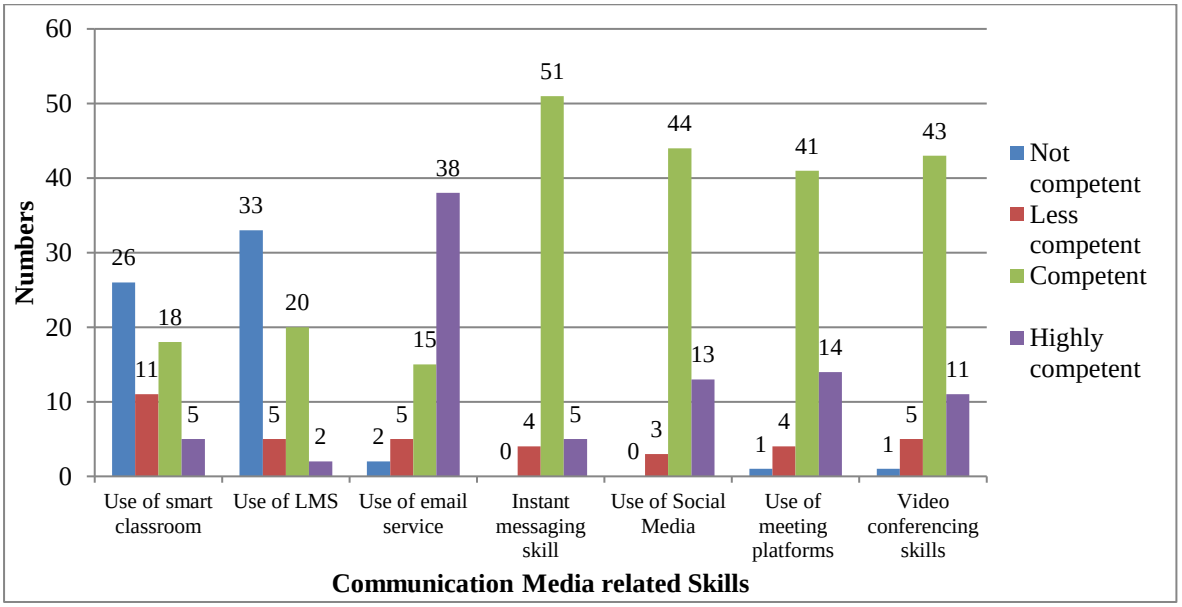

Figure 2 show that the Communication Media related Skills of the teachers. In most cases teachers are 'competent' in different medium of communication. But teachers under study are 'not competent' in case of use of smart class room and learning management software (LMS).

Table 6: Content Development and Management Skills

Skills	Not competent		Less competent		Competent		Highly competent	
	No.	%	No.	%	No.	%	No.	%
Preparing digital learning materials for students	41	**68.33**	12	20	5	8.33	2	3.33
Technological competencies in Multimedia development (Photo editing, Video editing, etc.)	45	**75**	7	11.67	6	10	2	3.33
Preparing multimedia presentation	44	**73.33**	7	11.67	7	11.67	2	3.33
Prepare exercises and tasks for students	3	5	16	26.67	37	**61.67**	4	6.67
Use of ICT to get feedback / assess students learning	3	5	16	26.67	37	**61.67**	4	6.67

The above table shows the content development and management skills of the teachers. Teachers are ‘competent’ to prepare exercises and tasks for students (61.67%) as well as getting feedback from the students (61.67%). In each cases teachers uses Goole Form to take online examination and feedback. On the other hand teachers are ‘not competent’ in multimedia development like photo editing, video editing etc. (75%) preparing multimedia presentation (73.33%) and create own digital learning materials for students (68.33%). Some teachers are ‘highly competent’ and ‘less competent’ in content development and management skills.

Figure 4 : Content Development and Management Skills

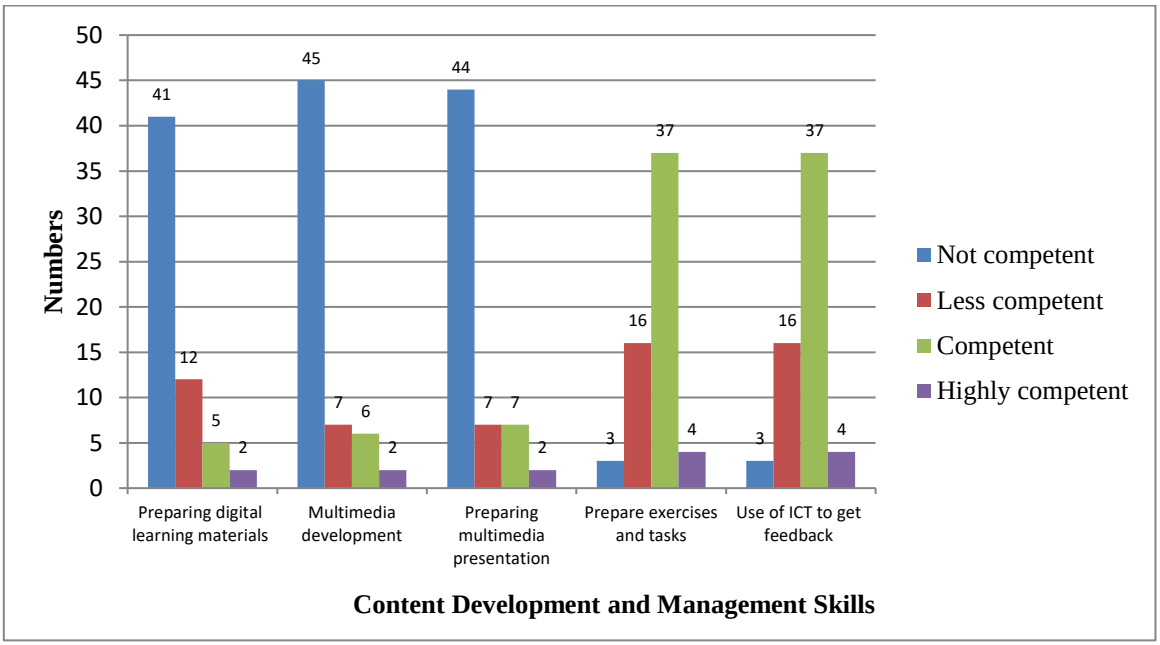

Figure 4 shows the content development and management skills of the teachers. The above figure shows that the teachers are not competent in case of preparing digital learning materials, multimedia development and multimedia presentation. But they are more competent in case of preparing exercise, tasks and feedback.

Teachers who are ‘highly competent’ or ‘competent’ were further called to know if there is any role of libraries in helping them to achieve their competence level. Only 6 (10%) teachers said that they have got help from library regarding web/e-resources and open access resources. Only 1 (1.67%) teacher gets help from library in preparing digital learning material. Other teachers do not know that library can help them in enhancing their technological skills in teaching learning.

8 Findings

It has been observed from the study that:

i. The maximum numbers of teachers are ‘highly competent’ in the Knowledge of word processing software and in the use of email. Very few teachers are ‘highly competent’ in the other areas.

ii. The maximum numbers of teachers are ‘competent’ in the knowledge of computer hardware, operating system, application software, computer devices and peripherals, file management skill, computer related storage devices, like CDs, DVDs, USB drives, etc., use of digital cameras, scanner, video conferencing skills, downloading software from the web, knowledge about open access e-resources, e-documents, web browser, search engine, instant messaging skills, Social networking sites, meeting platforms, preparation of exercises and tasks for students and the use of ICT to provide feedback / assess students learning.

iii. The maximum number of teachers are ‘not competent’ in the knowledge of computer networking system, hardware installation, operating system installation, network configuration, cloud based computing service and technical skills, website design, multimedia development (photo editing, video editing, etc.), Preparing digital learning materials for students, Preparing Multimedia presentation, Learning Management System (LMS) and smart classroom.

iv. The basic technology competency level is not dependent on gender and discipline in most of the cases, but it depends on their age. Aged teachers are not very comfortable with technology. Their competence level either ‘less competent’ or ‘not competent’.

v. The other factor that affects the technical competency of teachers is the level of facility provided by the college/institute. Colleges near the city provide more facility to the teachers which increase their competency level.

vi. Most of the teachers do not have idea that libraries can help them in developing their technological skills towards teaching learning.

9 Suggestions

Following are some of the suggestive measures that may be undertaken in order to overcome these problems.

i. Establishment of Virtual or Smart Class rooms in all Higher Educational Institutions.
ii. Allocation of funds by the Government or institute for developing infrastructure and incorporation of human resources in various fields of ICT.
iii. Suitable administrative support for use of technology.
iv. Allocate time for teachers to plan and learn how to integrate technology.
v. Providing technical and financial support for technology use.
vi. Refresher / Orientation courses must be regularly conducted for all teachers.

vii. Periodic general awareness and development programs are to be conducted for various levels.

10 Role of librarians in supporting teachers to enhance technological skills in teaching learning process

Librarians are much experienced in the use of technologies on information collection, processing, and dissemination. With the easy and cheap internet facility electronic resources and related technologies become major share holder in today's life. Now a days libraries main emphasis is on collection development of electronic resources like e-books, e-journals, databases, electronic archives, resource management tools like ILS, Web OPAC, Digital repositories, integration of discovery service. Librarians took active participation in incorporating and implementing technologies in library services in order to meet the changing demands of the users and thus librarians are more aware of technological changes and new technologies. Librarians can help teachers in adapting technologies in the following ways:

Access to good quality e-resources **-** Librarians can help teachers by providing e-resources that are available in the library on their respective field. Librarians can also help the teachers to access e-resources during online class by providing URL of the e-resources subscribed by the college.

Open access resources **-** Librarians are good at searching and organising knowledge. So, librarians can search open access resources more effectively and help the teachers to get quality e-resources in their subject areas.

List of URLs of e-resources **-** Librarians can prepare list of e-resources available in a specific subject area and provide the URLs to the teachers, which will help them in teaching and to prepare learning materials.

Academic/semantic search engines **-** Librarians can also provide list of academic/ semantic/scientific search engine which will help them in teaching learning.

How to use guide **-** Librarians can prepare a how to use guide on different topics be it use of hardware, be it software, be it access of e-resources or any other relevant topic and give it to the teachers and help them to use the service.

Quality learning space **-** Libraries can provide quality learning space for teacher. The space will have computer with internet facility and equipped with latest hardware, software and technologies. It will help them to upgrade their technology competence level. Librarians can also help them to use these technologies.

Academic social networking sites/blogs/wikis **-** Librarians can create college profile in academic social networking sites and help the teachers to create their profile. It will help them to peer with teachers /researchers of same filed and thus help in development.

Integrating library OPAC with LMS **-** Librarians can integrate the library OPAC with LMS so that teachers can directly use the e-resources in the class and also provide learning material to the students.

Informational / technological help in multimedia-based services / cloud-based services **-** Librarians can help the teachers by providing the required software and hardware for multimedia-based service like multimedia presentation, audio and video editing, Photo editing. Library can provide facilities to access cloud-based services.

Information regarding trainings / workshops on teaching learning related to technologies **-** Librarians can prepare a list of upcoming training programme on skill development and provide to the teachers.

Web 2.0 / Web 3.0 applications **-** In the web 2.0 / Web 3.0 environment library and information professionals can activate Blogs, RSS, etc., so that peers can keep up-to date with interactive communication.

Technological help for preparation of learning materials - Librarians can help to prepare the multimedia based course materials or learning materials for the students.

11 Conclusion

Teachers should acquire technological competence to teach in the college level in an effective way. They should also be updated regularly about new technologies applicable in their subject or teaching learning process. Most of college teachers have basic knowledge about the computer hardware, operating system, application software, computer devices and peripherals, file management skill, storage devices, digital cameras, scanners, video conferencing, e-resources, group messaging etc. But they are not well versed about the new technological skills like weblogs, website design, creation of digital learning materials for students, Learning Management System (LMS), smart classroom, smart board use, multimedia production, photo editing, video/audio editing, cloud based computing, courseware designing etc. Establishment of Virtual or Smart Class rooms in all Higher Educational Institutions will be helpful to the teachers. Libraries can play a vital role in providing facilities to teachers for enhancement of technological upgradation. Lastly refresher or orientation courses must be regularly conducted for all teachers to learn how to integrate new technologies in an effective way in the teaching learning process.

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