State and use of Educational Technology: A Study of Colleges in Tamil Nadu, India

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Abstract

Objective: The purpose of this research is to find the current state of using educational technology by teachers in higher education institutions. It also lists various reasons to which the teachers are not able to use educational technology in classrooms pertaining to infrastructural challenges. **Methods/Analysis:** The research used an online and paper based survey, where the college/university teachers responded to their use of educational technology in classrooms and their awareness about different tools. Data was collected from 19 engineering, 7 management and 8 arts and science colleges. A total of 328 teachers responded to the survey. **Findings:** The study shows the state of use of educational technology in colleges in Tamil Nadu. It draws upon the various infrastructural challenges that the teachers face on using technology in classrooms. Advanced trainings and follow ups are necessary to improve the present conditions. The teachers are provided only with minimum facilities on use of internet and computers. **Application/Improvement:** This paper makes a significant contribution to the lack of research pertaining to unknown problems of using educational technology in colleges and universities in India. It gives a clear picture why teachers do not use technologies in classrooms and also suggests solutions to infrastructural challenges.

Keywords: Educational Technology, Higher Education, Teachers, Technology use

1. Introduction

Technology has become an integral part of everyday life. Their application is evident in all aspects such as business, education, entertainment etc. Individuals prefer technology and e-resources because they are easy to access anytime and anywhere. Schools and colleges are investing high amount of money to create a world class system to meet the needs of millennial students and teachers. The use of technologies in classrooms has the potential to explain new concepts clearly which results in better understanding of new concepts taught. There is a tremendous growth in the technologies used in classrooms which has positioned many challenges in accepting the technology. Higher education institutions (HEIs) expect the teachers to achieve technological proficiency and work for the betterment of students learning. Countries have created multi disciplinary universities which focus on personnel training to go with the current trend in

education[1]. A few colleges adopt external and internal evaluating methods to analyse results of student testing. For the external evaluation they consider models practiced in countries like Norway, Germany, Russia and Denmark[2]. The teachers have the capability of making the students change from a traditional learner to a digital learner. In short, we discuss any technology which is used to replace the traditional form of teaching and learning in HEIs. With the help of the governments, the countries are able to reform the educational practices and impose technology usage in institutions. The ultimate aim of these reforms is to provide quality education and benchmark themselves with the top institutions.

1.1 Current Scenario of Higher Education in India

Post independence of India the higher education system has grown to become one of the largest in the world. It

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is been used as a powerful tool to build a responsible and knowledge based society of the 21st century. Higher education in India can be classified into five categories - central, state, deemed universities, institutions of national importance and private universities. Indian education system has expanded in a fast pace by an increase in number of universities 34 times from 1950 to 2014 (Centre for public policy research, 2015). But India's Education System is also wired with problems and challenges. The number of higher education institutions and student enrolments were so high that it could not cope up with the information and communication infrastructure facilities like developing course contents for students, improving students' participation, expanding the scope of library and information services, social media engagement for learning and understanding the student centric teaching methods. Times of India mentioned another challenge - the employability of the graduates[3].

"*According to Industry reports supported by NASSCOM, only 25% of technical graduates and about 15% of other graduates are considered employable by IT/ITES industry. Another survey conducted on 800 MBA students across different cities in India revealed that only 23% of them were considered employable.*"

The 12th Five Year Plan gives a distinct focus on quality and excellence in higher education courses in response to changing economic and industry needs. It includes investment in technology in terms of infrastructure and content development, strengthening the capacity of existing institutions and international collaborations. All institutions thus will modernize and internationalize the out dated curricula and improve teaching and learning[4]. With a view to that University Grants Commission (UGC), India and All India Council for Technical Education (AICTE) brought in policies that support use of ICT tools and other educational technology in colleges and universities. Instructors or teachers could combine two or three methods of teaching which they called it blended learning. They also supported open source softwares, virtual laboratories, online certifications and effective training for teachers for use of these new methods. National Programme of Technology Enhanced Learning (NPTEL) prepared video lectures otherwise known as MOOCs (Massive Open Online Courses) on wide areas of engineering education.

Samsung Newsroom, US in 2015 brought out a finding which says 91 per cent of teachers believe that up-to-date training on using technology in the classroom is important and 37 per cent of teachers said that they would like

to learn to use technology in classrooms but they do not know how to use[5]. These results can be reflected in the Indian scenario too. Hence, this research would be an exploratory study which discovers the frequency of use of various educational technologies and the hindrances for the teachers not to use technologies in classrooms. The study also focuses on the level of training received by teachers for using technology in classrooms.

1.2 Educational Technology

The evolution of technology from computer based instructions to the most advanced versions tantalized the educators and policy makers. Educational technology means a systematic application of knowledge to practical tasks based on concepts derived from psychology, sociology, philosophy computer science, communication and education for the aim of improving education. It includes applications of tools (including software, hardware and processes) of communication, media and information systems making it interactive between students and teachers. The use of Educational technology in classroom has the potential to help teachers explain new concepts clearly resulting in better understanding. Because of the complexity in different ideas and techniques, it is hard to define educational technology. A systems view defines Educational Technology as learning development and management process used for designing and evaluating instruction[6].

There are enormous studies which measure the attitude and motivational factors of teachers on technology usage in classrooms and many theories developed on it[7]. Personal factors, subject matter, gender differences, teacher experiences are also studied with the technology acceptance in other countries like Ghana, USA, Malaysia etc.[8] Based on the previous studies and with the evidence from intense literature review the authors concluded that there exists gap in the literature on determining that in this optional environment of using technology for teaching, to what extent does the teachers in colleges and universities use different tools for teaching in class and the reasons that they do not use technology.

2. Methods

2.1 Participants

Tamil Nadu is the 7th most populated state in India and it brands as a state frontier of quality education. The state

government university called the Anna University affiliates the engineering colleges in the state. The arts and science colleges take for the study fall under Madras University which is one of the oldest universities in India. The Management Schools are affiliated either under Anna University or Madras University. Hence, the participants for the study are teachers who work under Anna University or Madras University. Participation in this survey was voluntary and willingness to participate. The total sample of the study was 328 which included teachers from 19Engineering colleges, 7 Management Schools and 8 Arts and Science colleges.

2.2 Instrumentation

In order to investigate the usage of various educational technologies used by teachers in colleges and universities, an online and paper based survey was used. The questions and scales were adopted from the PhD thesis of Kadzera[9]. The authors also added other questions to capture the state and use technology in colleges by teachers. The survey consisted of different sections like demographics, frequency of use of educational technologies, reasons for not using them, open ended questions on teaching using technology and closed ended questions on various software tools available.

2.3 Demographic Data

Names, email address and other identifiable questions were removed from the survey for its anonymous nature. Age, gender and highest qualification received they work has been considered. Table 1, gives the detailed demographic details of the study.

3. Results and Discussions

3.1 Computer Facilities in the Campus

Adoption of technology in education is largely dependent on availability of computers in the college. All the colleges had a significant number of computers available. They were also well equipped with computer labs which can be used both by students and teachers. There was at least one desktop computer in each department of the college along with a printer and LCD projector. The researchers observed during the data colleges that only the newly established colleges had new computers and projectors

that were in good working condition, others had old, and some were found to be broken. 49% of the faculties carried their own laptops for teaching in class and they did not depend on the computers provided by the institution.

Table 1. Demographic details of the sample

		No. of Respondents	Percentage
Age	20 - 30 years	231	70.4
	31 - 40 years	89	27.1
	41 - 50 years	8	2.4
Gender	Male	171	52.1
	Female	157	47.9
Highest Qualification Received	Post Graduation	254	77.4
	M.Phil	51	15.5
	Ph.D	20	6.1
	Post Doctoral	3	.9
School of Study	Arts and Science	126	38.4
	Engineering	114	34.8
	Management Studies	88	26.8
	Total	328	100.0

3.2 Status of Network Infrastructure

To use internet at college or universities a good network infrastructure is required. Only 47% of the colleges had campus full coverage of WiFi connections. In others, they had LAN covered in computer labs and in administrative offices. The observation of the authors was that overall the network coverage was poor. This would impact the teachers' use of technology, internet and self learning. When the internet facilities were poor they were dependent on mobile networks or they had to take the work back home. In a few colleges the internet was not reliable due to low bandwidth and frequent disconnections.

3.3 Frequency of Using Various Educational Technologies

The survey primarily concentrated on the frequency of use of various tools that teachers use in class and to note the frequency of use. The teachers in these institu-

tions predominantly used text books, reference books and chalkboard/whiteboards to explain the concept. From the results the authors understand that a traditional method of teaching dominated in the colleges and it was only at times that they used easily accessible projectors and computers in classroom teaching. This was majorly in engineering colleges were computer labs were available. Management schools and arts and science colleges had only one or two subjects which fully involved use of computers, for example subjects like statistical packages, basic computer programming etc. Flipcharts were used only for certain subjects or topics which had to be diagrammatically represented. Use of it was common among engineering and arts science college teachers. Local resources included materials like newspapers, journals, magazines etc. For making students industry ready candidates, updating and upgrading through local resources play a very important role. The results show that local resources are rarely used in teaching the students. It is possible for teachers to make their own video lectures and post it in online forums so that the students watch them at their convenience. Here in the institutions the importance given to video lectures are minimal and hence the usage of video lectures is rare. In Figure 1, the researchers have brought in the statistics of frequency of use of various educational technologies used by the faculties in colleges for teaching and learning.
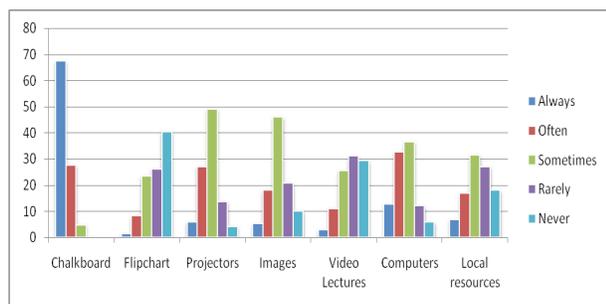
Figure 1. Frequency of use of various educational technologies.

3.4 Reasons for not using various Educational Technologies

The authors classified the reasons for not using educational tools into five categories - a) not applicable, b) not available, c) not accessible, d) lack of training and e) lack of infrastructure. Not applicable of the particular tools implies that the teachers could not teach the subject using those tools. For example: statistics subject cannot be taught with flipcharts. Mostly, those kinds of subjects are taught on chalkboards/whiteboards. Not available refers to those where the tools are not provided by the institution. Not accessible implies that the tools are available in the college but it may not always available for the teachers to use them in the classroom for teaching. This could be because of less number of instruments/tools, internet and electricity problems, damaged tools and hence cannot be used etc. Below, are the reasons for not using various educational technology tools:

3.4.1 Chalk Board/Whiteboards

Across the country chalkboards/whiteboards are considered as teachers' primary tool for teaching students. The results from the survey show that there is not even a teacher who does not use chalkboards or white boards. It is always better to look at technology form the past, so that it can be compared with the changing technology. Teachers might not have enough time to prepare on the computers and thus they end up teaching the traditional way. Teachers need to put information from text books into innovative technology. Chalkboards/white boards can be replaced with interactive boards or Smart boards. There are several studies that show usage of smart boards to enhance students learning in western countries[10].

3.4.2 Flipchart

Flipcharts are economical, available at ease and an alternative to whiteboards. Usually flipcharts are used to capture feedbacks and comments of participants or students while discussions or group work. Almost 40% of the teachers expressed that flipcharts are not available in their college. Use of flipcharts in classrooms can facilitate active participation and teachers should use these for students to improve their presentation skills. Teachers can make use of these flipcharts as reference and also for evaluation of group analysis. Table 2, gives an overall picture of the reasons that teachers do not use flipcharts in their teaching process.

Table 2. Reasons for not using flipcharts

Options	No. of Respondents	Percentage (%)
Not Applicable	90	27.4
Lack of Training	62	18.9
Lack of Infrastructure	23	7.0

Not Available	130	39.6
Not Accessible	23	7.0
Total	328	100.0

3.4.3 Projectors

44.5% of teachers responded that subject that they teach does not apply the use of projectors. 32% of the teachers also said that because of lack of infrastructure. Overhead or movable projectors are useful for students in note taking and quick recording of ideas. It will also be in response to their visual learning cues. Teachers often use PowerPoint presentations to display in class using the projectors. But, most of the teachers read out the slides rather than explaining the bullet points. Teachers should be given special training and practice in order to bring effectiveness in teaching using presentations. They should also understand the quick and easy techniques while using presentations, for example, instead of directly switching off the projectors to blank presentation, they can use the 'B' letter on the keyboard to blank the presentation in Microsoft PowerPoint. Practicing these short techniques is essential because, projectors can be costly and handing them should be with utmost care. The reasons for not using projectors in classrooms are given in Table 3.

Table 3. Reasons for not using projectors

Options	No. of Respondents	Percentage (%)
Not Applicable	146	44.5
Lack of Training	39	11.9
Lack of Infrastructure	106	32.3
Not Available	15	4.6
Not Accessible	22	6.7
Total	328	100.0

3.4.4 Images

Benefits of using images in teaching and learning process are enormous. Dale in 1969 stated that when students are exposed to pictures it triggers their visual cortex by the reality itself[11]. They can make the students under-stand using graphs, posters, maps, charts and text with lot of pictures. Graphical techniques like mind mapping capture thoughts of students and bring them in a visual form. In Table 4, we can find that, 43% of the teachers responded it he survey that the images are not applicable in their teaching subjects and 18% of the teachers said they are not available with them to teach.

Table 4. Reasons for not using images

Options	No. of Respondents	Percentage (%)
Not Applicable	143	43.6
Lack of Training	36	11.0
Lack of Infrastructure	53	16.2
Not Available	58	17.7
Not Accessible	38	11.6
Total	328	100.0

3.4.5 Video Lectures

The use video lectures to teach subjects have become the trend in higher education these days. The NPTEL video lectures, a project of Ministry of Human Resource Development (MHRD) is one such platform that has given the teachers to use them for teaching in class as well as self- learning. But the usage of these in classrooms is still uncertain. We infer from Table 5 that, when teachers are asked on the reasons for not using 36 percent answered that they did not have the right training to make video lectures or how to use them in classroom teaching. Around 27% said they did not use them because the colleges lacked enough infrastructures to use them.

Table 5. Reasons for not using video lectures

Options	No. of Respondents	Percentage (%)
Not Applicable	48	14.6
Lack of Training	118	36.0
Lack of Infrastructure	88	26.8
Not Available	26	7.9
Not Accessible	48	14.6
Total	328	100.0

3.4.6 Computers

With the advancements of technology, the students in colleges and universities are more inclined to use computers for their regular academic works. For this purpose, teachers should also be proficient to tackle their thinking and practical skills. Teachers' use of computers helps in presenting the course material in a more comprehensible way. The results of the study in Table 6 shows that 52% of the teachers responded that computers are not applicable in their course work , 19% said that they did not have the infrastructure and 12% said they did not have enough training on usage of computers. The digital generation students are more inclined to learn with computers and technology. The use of computers can motivate the digital generation, capture their attention and help explain complex concepts.

Table 6. Reasons for not using computers

Options	No. of Respondents	Percentage (%)
Not Applicable	169	51.5
Lack of Training	39	11.9
Lack of Infrastructure	63	19.2
Not Available	23	7.0
Not Accessible	34	10.4
Total	328	100.0

3.4.7 Local Resources

Local resources are readily available materials that teachers can use for teaching learning purposes. Use of research papers, news paper articles or any other substitute for their text books helps understand the recent happenings around the world and keeps the students updated about different advancements of science and technology. By the use of local resources students find more relevance in the subject they are been taught. In Table 7 we find that, 52% of the teachers felt local resources are not applicable in their teaching process. This might arise from the feeling that teachers feel they are not relevant in everyday teaching in class or they are not aware of how to integrate them in classroom teaching. Another 17% of the teachers mentioned that the local resources are not accessible in their college and 12% of the teachers had no training on how to efficiently use them for classroom teaching.

Table 7. Reasons for not using local resources

Options	No. of Respondents	Percentage (%)
Not Applicable	168	51.2
Lack of Training	32	9.8
Lack of Infrastructure	32	9.8
Not Available	56	17.1
Not Accessible	40	12.2
Total	328	100.0

3.5 Training

Training for teachers inculcates new skills and abilities to perform tasks more efficiently and effectively. Teachers need to be exposed to different technologies that are operated and how they can be used in classrooms[7]. Colleges and universities in Tamil Nadu have compulsory Faculty Development Programmes (FDPs) which is done by both in-house trainers and experts from other organizations. Table 8 gives an overall idea on the trainings teachers have received pertaining to technology use in classrooms. The authors could infer that trainings for teachers were insufficient and a huge gap was found towards the implementation. Teachers require hands on experience offered at convenient times. The follow ups of the initial trainings are also essential so that they can master that particular area.

Table 8. Trainings received for teachers

Items	Yes	No
Basic Computer Skills	93.8%	6.2%
Use of Internet	77.6%	22.4%
Integrating Technology in Curriculum	38.4%	61.6%
Using different softwares/ technology	34.2%	65.8%
Follow up/ Advanced Training	19.8%	80.2%
MOOCs	23.2%	76.8%

4. Conclusion

Educational technology has been a main a focus for higher education institutions for improving quality. It opens door for students' higher order thinking skills and creativity in learning. But to engage students efficiently and effectively, teachers should be able to integrate technology

with the curriculum perfectly. They should have accessibility and knowledge about the changing technology. The right mix of traditional teaching and educational technology will help students to achieve high learning outcomes. From the results of the study we understand that teachers have the access to internet and computers in college but they do not get appropriate time to spend on learning new methods of teaching. Given that only basic technology tools are available in colleges and universities, there is much to be done to improve the instructional technologies at state level and within the institutions. Efforts are to be taken by the institutions to upgrade the existing technology capacity and to provide follow up/ advanced trainings for teachers. A teacher rated good only when they have the right knowledge about subject and when they are able to capture students' attention in classrooms. For this purpose, teachers of digital generation need to be tech savvy.

5. Further Research

The findings of the study suggest the possibilities of future research. The present study deals only with the infrastructural aspects that lead to usage of educational technology in classrooms. During the study, teachers from various colleges made no serious mention of usage of computers for classroom teaching. Further research can be conducted to find out the difference of using and not using computers in classrooms both in teachers and students. A successful implementation of technology in classrooms can be made a case study and set as an example for other colleges and universities. A complete technology usage in classroom depends on factors like institutional infrastructure, institutional support, technological complexity and personal factors such as intention to use, personality types and perception on technology tools. For further studies, researchers can measure the above and bring a complete picture on use of technology by teachers in higher education institutions. Studies can also concentrate on teachers' gender and generational differences in use of technology.

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