

## Reshaping the effectiveness of the use of technology in teaching and learning in the context of higher education

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### Abstract

The role of technology in teaching and learning activities is indispensable now-a-day. Both the students and teachers are using the technology driven tools at every stage of learning and teaching, though there are few challenges both in the first place of access and secondly the use of technology, both the students and the teachers must use it to ensure they are becoming a progressive part of community both for themselves and society. The application of technology is benefitted by individual streams of education like Arts, Healthcare, and Mathematics. The education industry has already embraced the change, and more than half of the user population is already using the laptops. Internet is the basic requirement for the use of technology and many educators and students are eagerly trying to learn and adapt to the changes. The present study is empirical in nature. The data were collected from 170 respondents and mean and t-test were applied to do the analysis of the data. It was found that technology has a great role in making the teaching learning process effective.

**Keywords:** Effectiveness; Higher Education; Learning; Teaching; Technology

### 1. Introduction

Technology cannot ever replace the teachers, but if teachers are not using technology, then teachers can get replaced "advantages of using technology in education are: independent learning, easier access to information, treating world as a classroom, time and energy management. Some of the technology pedagogy tools used is: Google drive and drop box for study purpose, presentation such as power point, flash media for high and efficient learning, tablets and smart phones for the presentation purpose, course management tools such as black board and canvas for grading purpose, lecture capture tools such as panopto for capturing the class room learning's. In the current times, using technology in Indonesia's education system is a fast-growing field. High-speed internet and low cost computers/mobile devices are all accessible now, we have seen a marked growth in the technology as a tool for learning and teaching. Indonesia is one of the top countries for the e-based tools learning market (Pannen, 2007).

The social media or technology has played a important role in the teaching and learning practices, A certain research study which was done to know few things like what are the goals with respect to social media for teachers in the school, how do the teachers use social media, evidence of the successful outcome of use of social media, what is the relation between factors and results of use of social media. The conclusion at the end of research showed that at school: apply social media to larger audience, clarity of communication, promote social media as the learning tool, while using social media; consider the diversity of teacher's skill, experience etc. As a teacher: develop the habit of using social media skills by pupils, develop one's own skill about use of social media understand the barriers and implement it, social media tools

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can be effectively used for learning, collaborative learning, social media can be used to strengthen the teacher student bond due to continuous presence. As a student the social media is useful as: examine the status quo of students as all are not equally versed with social media, use it for effective communication, social media can result in indirect learning abilities, metacognitive skills are must for focussed use of social media use (Van den Beemt et.al, 2020).

Utilization of technology in teaching and learning is not a new aspect for higher education places, like universities. It is Since 1900s, administrators have successfully used the technology innovations like video and audio for the recording purpose, email, and telecon's to enhance or in place of older methods of giving instructions. There is a constant war between the faculty beliefs and the use of technology in pedagogy for ex, the university may use technology as a tool for the students, whereas the faculty may struggle to understand its role in pedagogy. From the technologies which were reviewed in this research were, digital

games, web-conferencing tools, and Face book are the most farfetched used tools for various types and also indicators for engaging students, the conclusion from this is the whenever there is a student engaging activity needed, we may consider these tools. Then in 1985, Steve Jobs had already said that the computer would revolutionize the way we learn. After and over 30 years what he said has completely turned true. In the student engagement review it can be concluded there is a lot of potential still left (Schindler et.al, 2017).

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## 2. Review literature

The current developments in technologies related to technology have shown promising results in our teaching and learning sector. Until today, no aspect of higher education remains untouched by the use of technology. The initiation of technology and the Internet in teaching learning process is radically changing the way faculty and students' access, produce, and share knowledge

It supports both the teaching and learning processes in multitude of ways. The traditional methods of teaching lacked emphasis on focus during learning, critical thinking abilities or interaction, while technology has helped in solving all these issues successfully. Technology enables the active learning for the learner for ex, studying geography using the Google maps, by using simulation tools they can actually see and learn which is more effective, like how a volcano erupts etc. the biggest reason for including technology in classroom is global communication, the language building especially English is another reason why technology should be adopted, as technology learning and English learning go hand in hand. Visualization is a pre requisite for the reader, technology nails it like a professional, and Technology help in building online communities that connect people in real time from anywhere in the world especially the learners and teachers (Roy, 2019).

Study Was done with 231 students who were studying physiology in second year in the, five health colleges, an online survey was conducted for the use of technology and devices, descriptive statistics and pearson correlation coefficient were used for the study analysis, where the correlation studies was technology and learning achievement in the study. The results showed that there is significant relation between them, devices which were most used are laptops accounting for 50%, phones were at 42% use, tablets were used by nearly 7%, and only 0.5% used the desktop computer. The most important element which is used in the technology of education system is internet. Technology helps an individual to become a good researcher, other skills developing during use of technology are, problem solving skills, analytical reasoning, information evaluation, creative thinking etc. (Al-Hariri, &Al-Hattami,2017).

Role of technology in education during learning and teaching is having both negative and positive effects, positive effects are: enhanced teaching and learning, globalization and limitless geographical advantage. While the negative effects include: declined skills in writing, increase risk of cheating, lack of focus. Advantages include: students' excitement to learn, flexibility to work, lifelong skill for technology, aids in green revolution. Disadvantages are: imagination and creative thinking is reduced, expensive expenditure, time consuming for teachers, and risk toward health if continuously exposed to technology. Teachers and students have to take the good from the technology development and eliminate the bad, this will alone help to build a strong and progressive future for the generations to come (Nagasubramani, 2018).

In a particular study it was seen, "primary school teachers use computers only for administration and preparation of classes and not for the medium for instructions to students. "Another study says the maximum number of staff from faculties do not use technology for the teaching purpose, but use traditional methods like textbooks, boards etc. Recent surveys technology being integrated in the teaching and learning methods is very limited. A very popular study in U.S nation's report card says "58% of higher secondary students from history class have never used computer in public or even the private schools."(Thieman, 2018).

Educational technology use is broadly classified as: technology's use as a tutor, technology's use as a learning tool, Technology's use as a tool for teaching. With the aid of technology, we are preparing students for the future by exposing them to the kind of work they will do as in office culture. We are adapting to a ever changing world, it's a way to lifelong learning, through this type of education they can build better life for themselves also for the society where they live in. information and communication technology is a boon for the students where they can connect with the world and expand their knowledge and also share theirs at the same time. For today's students to become tomorrow's leader it is essential to use the technology driven tools it is applicable to all the areas of education like science, law, arts etc (Budhwar, 2017)

The quality of active and effective interaction is a key point for the degree of success in successful deep and effective learning, Technology which is needful for the sake of any kind of knowledge is only effective technology-based learning. The advent of new technologies the enhanced use of the online tools and platforms and other technological ways which are being used in the classroom for students learning are the new normal in teaching and learning process. As per an experimental study on technology use revealed that, incorporating the technology successfully at classroom level is important and the key to a satisfying learning for students in the classroom (Greve, 2021).

Digital technology has a major share of role in the progress of our society. This kind of practical shift in education is mainly enabled by teachers who should work as digital networkers and use the smart tools of technology at school level and bring about the change. The current use of smart classrooms and classroom boards which are magnetic induction based can lead to knowledge engagement, which will ensure long lasting impression in students mind, and retain knowledge for longer time also helps in increasing the society's progress. The presence of technology in this generation will ensure seamless knowledge sharing way. The teachers have to ensure that the education is always sustainable, safe and environment friendly (Srivastava, 2018).

Researchers have started to focus on the fact the role of teachers in getting adapted to technology, by developing a theoretical framework and help in research design. "Any technique, to become a mechanically useful thing then, it for sure requires some theoretical background. Hence, digital technological tools need to have its own mathematical tool as understanding (Clark-Wilson et.al, 2020).

A study on research done on the adoption of ICT by the university and the impact on the students' academic performance. The study also looks at the' effect of sex, GPA, and student subject majors on the link between the ICT and student progress. By adopting a quantitative approach and a sample size of thousand students, data was collected from Saudi students from various universities. Analysis of Moment Structures (AMOS), was used for path analysis and structural modelling, is the research tool used, findings show a strong relation exist between the above said components. An additional finding was female students were more benefitted than the male students. Any student's IT performance was not affected, it remained same (Basri et.al, 2018).

The emergence of digital technology has exclusively grabbed the attention of researchers to study the effectiveness of technology with respect to learning and teaching processes. The innovative ICT is a double edge sword for giving both the challenges as well as opportunities, Cognitive engagement is intrinsically linked to innate motivation, learning objective, and self-regulation, Emotional engagement otherwise known as affective engagement, relates to positive response to the learning, peers and teachers, as also about owning, interest and belonging (Teng &Wang, 2021)

### *Objectives of the Study*

- To find the reasons for using technology in teaching and learning
- To a certain the significance of the reasons for using technology in teaching and learning

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### **3. Research Methodology**

The present study is descriptive in nature in which the reasons for using technology in teaching and learning have been studied. The sample size of the study is 170 respondents from several higher education institution in Indonesia. The data were collected with the help of a structured questionnaire on a five-point scale and analysed with the help of the mean values and t test.

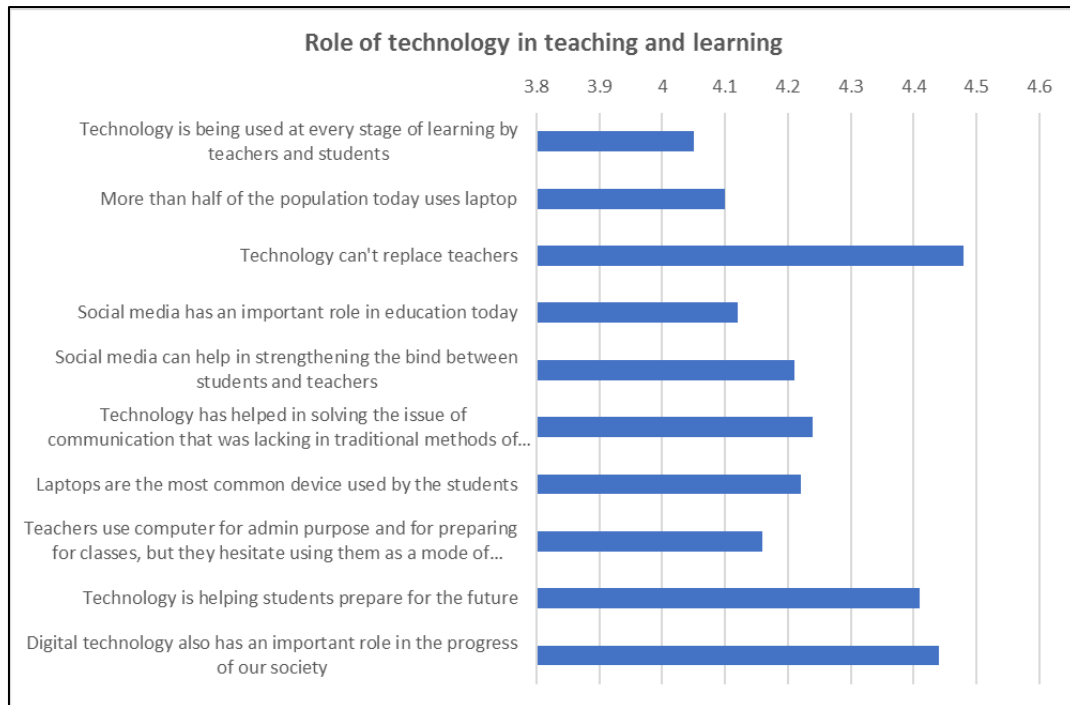
**Table 1** The Sample of the study

Variables	Number of respondents	% age
Gender		
Male	96	56%
Female	74	44%
Total	170	100%
Level of education		
Secondary	36	21%
Higher secondary	42	25%
Under graduate	57	34%
Post graduate	23	13%
Ph.D.	12	7%
Total	170	100%
Device used		
Laptop	58	34%
Desktop	34	20%
Tablet	25	15%
Smartphone	53	31%
Total	170	100%

Table 1 presents demographic profile of the students. There are 56% males and 44% females in the study. Among the respondents 21% are studying secondary, 25% are studying higher secondary, 34% are undergraduate, 13% are postgraduate and 7% are doing Ph. D. The percentage of respondents using laptop is 34%, desktop is 20%, tablet is 15% and smart phone is 31%.

**Table 2** Mean Value of the role of technology in teaching and learning

Sr. No.	Role of technology in teaching and learning	Mean Score
1.	Technology is being used at every stage of learning by teachers and students	4.05
2.	More than half of the population today uses laptop	4.10
3.	Technology can't replace teachers	4.48
4.	Social media has an important role in education today	4.12
5.	Social media can help in strengthening the bind between students and teachers	4.21
6.	Technology has helped in solving the issue of communication that was lacking in traditional methods of teaching	4.24
7.	Laptops are the most common device used by the students	4.22
8.	Teachers use computer for admin purpose and for preparing for classes, but they hesitate using them as a mode of instructions	4.16
9.	Technology is helping students prepare for the future	4.41
10.	Digital technology also has an important role in the progress of our society	4.44



**Figure 1** Role of technology in teaching and learning

Table 2 and Figure 1 show the opinion of respondents on role of technology in teaching and learning. It is observed that Technology cannot replace teachers is the most important role of technology in teaching and learning with the mean value of 4.48. It is followed by Digital technology also has an important role in the progress of our society (4.44) and Technology is helping students prepare for the future (4.41). Further, Technology has helped in solving the issue of communication that was lacking in traditional methods of teaching (4.24), Laptops are the most common device used by the students (4.22), and social media can help in strengthening the bind between students and teachers (4.21) were also considered important. Further, Teachers use computer for admin purpose and for preparing for classes, but they hesitate using them as a mode of instructions (4.16), social media has an important role in education today (4.12), More than half of the population today uses laptop (4.1) and Technology is being used at every stage of learning by teachers and students (4.05) also seems important as per the opinion of the respondents.

**Table 3** Role of technology in teaching and learning

Sr. No.	Role of technology in teaching and learning	Mean Score	t- Value	Sig
1.	Technology is being used at every stage of learning by teachers and students	4.05	6.809	0.000
2.	More than half of the population today uses laptop	4.10	6.986	0.000
3.	Technology can't replace teachers	4.48	11.127	0.000
4.	Social media has an important role in education today	4.12	6.013	0.000
5.	Social media can help in strengthening the bind between students and teachers	4.21	7.226	0.000
6.	Technology has helped in solving the issue of communication that was lacking in traditional methods of teaching	4.24	8.494	0.000
7.	Laptops are the most common device used by the students	4.22	8.586	0.000
8.	Teachers use computer for admin purpose and for preparing for classes, but they hesitate using them as a mode of instructions	4.16	8.705	0.000
9.	Technology is helping students prepare for the future	4.41	10.908	0.000
10.	Digital technology also has an important role in the progress of our society	4.4	11.341	0.000

Table 3 shows the results of t-test. It is found from the table that the significance value for all the statements are below 0.05, hence all the statements regarding the role of technology in teaching and learning are significant.

## 4. Results and Discussion

### 4.1. Key Findings from the Analysis

In this research, data obtained was utilized to empirically analyze the findings from 170 higher education institutions throughout Indonesia. The descriptive statistics (mean scores), t-test results indicate the degree of importance and effectiveness of technology as perceived by respondents within higher education institutions in Indonesia. The results obtained from this analysis support our second and third objectives which were to identify potential reasons why respondents use technology and determine the extent to which each of those reasons was perceived to be important by respondents. The analyses of the results obtained through this study indicate both the significant transformational aspects of technology as well as the ongoing challenges associated with it.

The average score in Table 2 demonstrates that all types of technology play an important role in educational opportunities. For instance, the response to Technology cannot replace teachers [question] received an average score of 4.48. This represents that the respondents see technology as a supplement to the teacher rather than a replacement for the teacher, giving the impression that technology is an assistance to enhance teaching methods. Also, the responses for Digital Technology have an important role in the development of our society (4.44) and Technology is preparing students for the future (4.41) indicate that many of the respondent's regard technology to be a means of developing our society and preparing students for their future careers. Finally, another average score of note technology aided in developing an alternative solution to overcome the lack of communication associated with traditional teaching practices (4.24), the use of Laptops is the most common technology students utilize (4.22), and the influence of social media on enhancing Graduate Placement (4.21).

The t-test results in Table 3 further confirm the other information already provided, as evidenced by every significance (Sig) value being less than 0.05 (Sig values varied between 0.000 and 0.000); therefore, the means difference found to be statistically significant. Examples include the t-value of 11.127 for the statement "The technology can't replace the teachers" and t-value of 11.341 for "Digital technologies have a very important role in the development of our society." Both of these t-values provide strong support for both of the statements; in effect, they reject the null hypothesis that says there is not a statistically significant difference in opinion between the two groups. In a similar fashion, the t-value of 8.705 for the statement "Teachers use computer for administrative purposes and to prepare for classes, but are reluctant to use them as a way to teach" indicates a clear divide in the integration of instructional technology; although administrative uses of technologies are common, teachers are much less likely to adopt them as a pedagogical tool. Thus, the test findings demonstrate that, within this context, technology represents not only an important tool but that it is also a central component in the evolution of teaching and learning practices. Ultimately, the successful utilisation of technology as a pedagogical tool is clearly dependent upon many factors such as access to devices (for example using laptops 34% of the time) and varying degrees of availability for the internet.

Table 1 shows how male (56%) and female (44%) respondents, who mostly attended undergraduate (34%) or postgraduate (13%), represent younger, technologically savvy people in postsecondary education. Based on how often they use different types of devices to access the Internet (e.g., laptops—34%, smartphones—31%, desktops—20%, tablets—15%), it would appear that the majority of all respondents are also like this. As indicated in global research, mobile and portable devices are preferred for their portability and lower cost; these findings also support earlier studies (i.e. Al-Hariri and Al-Hattami, 2017) indicating positive results between device usage and student achievement, which substantiated the study's assertion that the internet is an essential resource for student success.

### 4.2. Key Findings from the Analysis

The findings confirm that technology is integral to post-secondary education, consistent with literature review themes of increased interaction, worldwide communication, and skill development. The communication improvement score's high mean (4.24) supports the claim made by Roy (2019) that with technology, traditional barriers are removed, and active learning can result from using systems such as Google Maps and simulations. While the score for instructional use (4.16) indicates some reluctance of faculty to use technology, this indicates a pedagogical gap that aligns with Schindler et al. (2017), which reported that many faculty members resist using technology even though they have access

to it. Hence, in addition to administrative support, faculty will require targeted professional development to make the transition from administrative use of technology to instructional application.

The role of social media (t-value of 4.12 and 4.21) can be seen as a double-edged sword because it promotes cooperative learning between learners and teachers and helps to build rapport between them while posing risks such as distraction unless students develop metacognitive skills, as stated by Beemt et al. (2020). Furthermore, the significant t-values for future preparation (4.41) and societal development (4.44) support the findings of Basri et al. (2018) that integrating ICT will raise the level of students' academic performance for all students, especially female students, indicating that there is gender-specific advantages to utilizing technology. On the other hand, there are still challenges to overcome, including deteriorating writing skills and health issues (Nagasubramani and Raja, 2018), in order to ensure that technology is not over-utilized.

The data on technology use in this study fit within the scope of the literature advocating for the use of technology as a tutor, tool, and aid to teaching that facilitates lifelong learning and innovation throughout higher education (Budhwar, 2017). Statistically (e.g., by the significant t-tests), the study demonstrates that the reasons to use technology are both widely accepted and statistically supported ( $p < .05$ ) — e.g., due to improved accessibility and increased engagement. Yet, technological use in the U.S. shows a significant divide in the level of access (Thieman, 2018), supporting the need for equitable distribution of technology resources in places like Indonesia where technology infrastructure varies from urban to rural areas.

Ultimately, while the results of this study demonstrate the potential of technology as a fundamental element of educational transformation, the ability to fully realise its potential is dependent on creating the necessary supports to overcome the barriers associated with implementing technology into the educational experience. Future research should continue to examine both longitudinal outcomes and gender-specific interventions to continue evolving the information in this study.

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## 5. Conclusion

The use of technology in the current generation is a two-sided sword, using it for the benefit for growth and development is our onus. Technology offers the kind of solutions which were not possible in earlier times, so it would be a wise decision to accept the best and innovative solutions and grow for the good. Education industry would be blind, lame without use of technology in these days as the technology is a worldwide phenomenon and that means we have only the choice to incorporate technology in the learning and teaching methods. It has made the world a global village, which is a sign of sure shot development.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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