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Use of ICT in Teaching-Learning Process in Higher Education: A Study in a University of Assam, India

Amar Upadhyaya[1] and Rimzim Boruah[2]

[1,2]Department of Education, Dibrugarh University, Assam, India
E-mail: [1]amareducation@dibru.ac.in

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ABSTRACT This study examines the use of ICT tools and the associated challenges in higher education institutions in Assam from students' and teachers' perspectives. The study further explores the impact of using ICT tools on the teaching-learning process. The study uses a survey approach. The sample comprises two groups, namely students and teachers. Descriptive statistics were used to analyse the data. The study's findings highlight the most and least used ICT tools in higher educational institutions and help understand the challenges faced by both sample groups. The findings will help higher education institutions formulate policies regarding incorporating ICT tools and handling training and development programs for students and teachers.

INTRODUCTION

Information and communication technology (ICT) is a familiar term to all stakeholders in today's education system. Technology refers to the knowledge of modern techniques. When we talk about technology and education, it simply means information and communication technology in education. Technology can be a powerful tool for transforming learning. It can help affirm and advance relationships between educators and students, reinvent our approaches to learning and collaboration, shrink long-standing equity and accessibility gaps, and adapt learning experiences to meet the needs of all learners (Bhaumik 2012). ICT can play a significant role in the educational process for students starting their academic careers (Yushau and Nannim 2020). According to UNESCO (2020), ICT refers to a diverse set of technological tools and resources to create, store, transmit, share, or exchange information. These technological tools and resources include computers, the Internet, live broadcasting technologies, recorded broadcasting technologies, and telephony. Technology allows personalised instruction to fulfil each student's specific learning needs within the larger classroom environment (Best and Kahn 2016). The role of technology in the field of education is fourfold: it is included as a part of the curriculum, as an instructional delivery system, as a means of aiding instructions, and also as a tool to enhance the entire learning process (Yushau and Nannim 2020). It has been proven that integrating ICT into the classroom increases student motivation, enthusiasm, and engagement in their learning subjects. Therefore, the study aims to determine and evaluate the effectiveness of ICT utilisation in the teaching and learning process towards ICT integration. The emergence of ICT is one of the beautiful gifts of modern science and technology, which has brought tremendous changes in library and information science. The application of information and communication technology (ICT) to libraries and information work has revolutionized the traditional concept of libraries from a "storehouse of books to an intellectual information centre" (Bhaumik 2012), connoting the idea of an electronic library.

So, ICT in education means using information and communication to improve the delivery of education in every way (Lomos et al. 2023). ICT has several constraints, including ensuring access to every kid's electronic device (Siddiquah and Salim 2017). ICT can align the existing educational system with a knowledge-based, information-rich society by providing sophisticated tools, techniques, and methods (Chatterjee 2021). It will help transition from a broadcast model of learning to interactive learning. Thus, it makes the students active and participate in the teaching and learning process (Bhaumik 2012). Despite this, it opens up new issues related to the 'digital divide' and provides access to ICT tools and re-

sources for those who are less fortunate (Virmani 2022). Educational policymakers have strived to provide technology-based teaching with a broader mass base and richer instructional material. With the same view, educational technology was introduced in our country in the early seventies of the last century (Deivam 2016), and the new millennium brought new technology, that is, information technology, or information and communication technology (ICT), to more precise (Bhaumik 2012). The government of India, along with active cooperation from the states, is framing new policies, launching new schemes and missions, and introducing new devices at concessional rates for students (Deivam 2016). All these government activities revolve around ICT. Therefore, it becomes imperative to discuss all those efforts by the government with ICT at the centre, aimed at providing the latest gadgets, network environment, content presentation, instructional material, etc. ICT can be considered a subfield of educational technology when such technologies are used to support and improve students' learning and to develop learning environments (Siddiquah and Salim 2017). The present study will explore the actual use of ICT in classroom transactions in higher education. It is the need of the hour to look into the application of ICT in the modern education system to make it vibrant and compelling.

Objectives of the Study

The study is confined to two objectives-

a. To study the use of ICT in the learning process and the challenges faced by students.
b. To study the use of ICT in the teaching-learning process and the challenges faced by teachers.

RESEARCH METHODOLOGY

A descriptive survey method was used to study the problem. The study has been conducted to understand the use of ICT facilities by faculties and students in their teaching and learning processes. Since the study has been conducted at Dibrugarh University, Assam, India, the population covers all the teachers and students of departments and centres at Dibrugarh University. The study employed a purposive sampling technique. 200 students in PG courses and 50 teachers teaching at PG level were selected as a sample for the study for the year 2023-24. Two separate questionnaires were prepared for each faculty member and student. Each questionnaire has been divided into two sections covering usages and challenges. The questionnaire prepared for teachers had 38 items under *Usages* and 12 items under *Challenges*. The questionnaires prepared for students had 30 items under *Usages* and 12 under *Challenges*. The researchers used personal investigation techniques to collect the necessary data, and descriptive statistics were used to analyze the data.

RESULTS

Use of ICT by Students in their Learning Process

The researchers interpreted the data and information collected from students to analyse the first objective of the study.

Regarding the use of computers and the Internet Table 1 depicts that 72 percent reported using computers and the Internet for e-book reading, followed by 17 percent for accessing research materials. Only 6 percent of the students use computers and the internet for blog reading and accessing the Swayam platform. 97 percent of the students reported that using a computer helps their learning process. An interesting aspect is teachers' use of computer devices in the classroom. 60 percent of students reported that only 50 percent of the teachers use computers in the day-to-day teaching and learning process. Regarding the reasons for teachers not using computers, 56 percent of students feel it is because the classrooms are not computer-friendly. Meanwhile, 17 percent feel teachers do not use com-

\Table 1: Purposes of use of computer and Internet by students in learning

Purposes of use of computer and internet	*Percentage of students*
For e-book reading	72
Accessing research materials	17
Blog reading and accessing the Swayam platform	6

Source: Author

puters because it makes the class less effective. However, 11 percent of students said teachers lack computer skills and thus do not utilise computer devices.

Regarding the use of a projector Table 2 shows that 61 percent of the students suggest using a projector makes the classroom interesting, followed by 14 percent of the students suggesting it enhances explanation and helps better understand the topic. Whereas 11 percent of the students believe it helps maintain focus in the class. Similarly, 78 percent of the students reported having experienced the use of projectors by teachers while teaching, whereas 22 percent of the respondents reported that their teachers do not use projectors. Regarding using TV for learning purposes, only 31 percent of the students reported a positive effect, whereas 69 percent believe TV does not help learning. 25 percent of students suggest that using TV makes the classroom interesting, and only 6 percent suggest that TV enhances the explanation. Regarding the use of TV by teachers, only 8 percent of students have reported having experienced it, and 92 percent reported that their teachers do not use it for teaching.

Table 2: Students opinion on use of projector by teachers in teaching learning

Students' opinion on use of projector	*Percentage of students*
To make the classroom interesting	61
To enhances explanation and helps better understand	14
To maintain focus in the class	11

Source: Author

Regarding the use of speakers, 44 percent of the students believe it helps in learning, whereas a majority of the 56 percent suggest it does not help in learning. Out of all the students who suggested that speakers help in learning, 17 percent said that using speakers helps better understand the topic in the class. Whereas a small fraction of 3 percent of students believe it increases interest in the class, enhances explanation, and maintains focus. Regarding the use of speakers in class for teaching, only 8 percent have reported that their teachers use them, whereas a huge majority of 92 percent of the students reported that teachers do not.

Regarding familiarity with SWAYAM platform, Table 3 clearly depicted that 72 percent of the students reported familiarity with the platform, whereas 28 percent were unaware of the platform. Only 36 percent of the students have reported using SWAYAM for learning purposes, whereas a majority of 64 percent of the students have not used SWAYAM for any learning purposes. Contrary to this, 67 percent of the students perceived it to be beneficial for learning, and 33 percent did not feel it helped in learning. About the reasons for using SWAYAM, 31 percent of the students reported that it helps with self-learning, followed by 8 percent of the students who suggest that it helps in finding course materials, and 6 percent suggest it helps them in finding courses of their interest.

About using another learning site, that is, e-PG Pathshala, Table 3 depicts that 69 percent of the students reported familiarity with the platform, whereas 31 percent were unaware. Only 42 percent of the students have reported using e-PG Pathshala for learning purposes, whereas a majority of 58 percent of the students have not used e-PG Pathshala for any learning purposes. Contrary to this, 56 percent of the students perceived it to be beneficial for learning, and 44 percent did not feel it helped in learning. Regarding the reasons for using e-PG Pathshala, 28 percent of the students reported that it helps in self-learning, 8 percent suggested that it helps find course materials, and 20 percent suggested that it helps them understand the topic. Table 3 also shows that 100 percent of the students reported familiarity with the Google Classroom platform. Only 94 percent of the students reported using Google Classroom for learning purposes. In contrast, a minority of 6 percent of the students did not use Google Classroom for any learning purposes, and 92 percent of the students perceived it to be beneficial for learning. 83 percent of students reported that it helps in submitting assignments, and they mostly used it for that purpose. Regarding the use of Moodle, 44 percent of the students reported familiarity with the platform, whereas a majority of 56 percent were unaware of it. Only 17 percent of the students have reported using Moodle for learning purposes.

Challenges Faced by Students in Using ICT in Their Teaching and Learning Process

The researchers found mixed responses regarding the challenges faced by the students in

Table 3: Students' awareness and use of online learning platform

Awareness and use of online learning platform	*Percentage of students*
SWAYAM Platform	
Aware about the SWAYAM Platform	72
Unaware about the SWAYAM Platform	28
Use of SWAYAM for learning purposes	36
Not use of SWAYAM for learning purposes	64
e-PG Pathshala Platform	
Aware about the e-PG Pathshala platform	69
Unaware about the e-PG Pathshala platform	31
Use of e-PG Pathshala platform for learning purposes	42
Not use of e-PG Pathshala platform for learning purposes	58
Google Classroom Platform	
Aware about the Google classroom platform	100
Unaware about the Google classroom platform	0
Use of Google classroom platform for learning purposes	94
Not use of Google classroom platform for learning purposes	6

Source: Author

using ICT in their learning process. 44 percent of the respondents reported that the non-availability of ICT devices is a challenge in using ICT in their teaching and learning process, whereas 56 percent do not consider non-availability a major challenge. Similarly, most students do not consider accessibility a major challenge. 69 percent of the students do not consider it a major challenge. Similarly, usability is also considered a major challenge by a smaller fraction, with just 33 percent reporting it as a major challenge and 67 percent not considering it a major challenge. The biggest challenge to using ICT tools, as reported by the students, is a lack of training. 75 percent of the students reported that a lack of training is a major challenge in adopting ICT tools.

Regarding training on ICT tools, a majority of 75 percent of the students reported that they have not received any training, whereas 25 percent of the students have reported receiving some training for using ICT tools. A huge majority (94%) of students believe proper training in ICT tools can improve adaptation and help better utilise the tools. Regarding the challenges students face while using SWAYAM, 39 percent of the students reported the non-availability of internet and connectivity as a major challenge. 36 percent of the students suggested understanding the materials and availability of courses as the second major challenge to using SWAYAM. Lack of proper training has been considered a major challenge by 22 percent of the students. While using e-PG Pathsala, 52 percent of the students reported finding the correct material as the major challenge to using the platform. 41 percent of the students consider the non-availability of internet and connectivity to be the major challenge of using Moodle. 36 percent of the students consider the processing of the tool to be the second major challenge.

Use of ICT in the Teaching and Learning Process by University Teachers

The present study attempts to determine the use of ICT by university teachers. The researchers found a very interesting fact about using computers and the Internet in the teaching and learning process. Table 4 shows that 90 percent of the teachers reported using computers in their day-to-day classroom teaching. 40 percent of the teachers reported using computers and the internet to search for information and content for teaching. The use of computers for classroom presentations has also been reported by 40 percent of the teachers. Half of the sampled teachers reported classroom infrastructure as a major challenge.

Table 4: Use of ICT devices and learning platform by the teachers

Use of ICT devices by the teachers in teaching	*Percentage of teachers*	
	Yes	*No*
Use of Computer and Internet in day-to-day teaching	90	10
Use of Smart Board in day-to-day teaching	70	30
Use of projectors	80	10
Use of You tube channel for e-content delivery to students	40	60
Use of e-Pg Pathshala Platform	20	80
Use of Moodle in Teaching	30	70
Use of National Digital Library	30	70
Use of Shoodganga for research related activities	60	40

Source: Author

Regarding using smart boards in day-to-day teaching Table 4 clearly indicates that 70 percent of the teachers reported positively, and 80 percent believed that using smart boards makes teaching effective. 50 percent of the sampled teachers felt that smart boards helped better explain the topics, followed by 20 percent who reported that using smart boards helped with visualisation and 10 percent reported that smart boards made the class interesting. On the query regarding the use of projectors in the teaching and learning process, again Table 4 depicts 80 percent of the teachers reported positively. 40 percent of the teachers reported that the projector makes the class interesting and enhances explanation. Regarding the use of YouTube channels in teaching and learning, most (60%) of the sampled teachers reported that they had never used YouTube in teaching and learning. However, 60 percent of teachers believe YouTube makes teaching more effective.

Regarding using SWAYAM, 100 percent of the respondents reported familiarity with the platform. However, only 20 percent of the teachers have used materials from SWAYAM for teaching purposes, and a majority of 80 percent do not use it for teaching purposes. The response regarding course preparation for SWAYAM was an absolute negative, with 100 percent of teachers reporting having not prepared any course for SWAYAM. Only 10 percent of the teachers reported guiding students for a SWAYAM course. According to 70 percent of the teachers' materials available in SWAYAM, they do not help in teaching, while 30 percent reported that they help in their teaching. According to 20 percent of the teachers, using Swayam for teaching provides broader knowledge of the subject matter, whereas 10 percent reported that SWAYAM enhances students' understanding of the topic.

Table 4 also indicates that regarding the use of e-PG Pathshala, only 20 percent of the teachers have reported using it for teaching, while 80 percent have not used it for any teaching purposes. However, 30 percent of the teachers have reported using the materials available in e-PG Pathshala for teaching purposes, while 70 percent have not used the materials for any teaching purposes. Regarding the use of Moodle, only 20 percent of the teachers have reported using it for teaching, while 80 percent have not used it for any teaching purposes. However, according to 30 percent of the teachers, Moodle helps in their teaching, and 70 percent believe it does not provide any help. According to 10 percent of the teachers, Moodle helps in the giving and collecting of class assignments and also helps in tracking classroom activity. Regarding the use of Inflibnet and the National Digital Library content in teaching, only 30 percent of the teachers have reported using them for teaching. In comparison, 70 percent have not used them for any teaching purposes. According to 60 percent of the teachers, the National Digital Library helps access a wide range of resources for teaching, and 10 percent reported that it helps prepare course content. Regarding the use of research contents from Shodhganga, only 60 percent of the teachers have reported using them for teaching and research, while 40 percent have not.

Challenges Faced by the Teachers in Using ICT in Their Teaching-Learning Process

Regarding the challenges faced by the teachers of Dibrugarh University in using ICT in their

teaching process, the researchers found mixed responses. Regarding the challenges of availability and accessibility, there was a split response of 50 percent. 50 percent of the teachers consider availability a major challenge, whereas the other half doesn't; similarly, for accessibility, 50 percent consider it a major challenge, whereas the other half does not. Usability has been considered a major challenge by 60 percent of the teachers, whereas 40 percent do not consider it a challenge. However, the highest number of teachers have reported lack of training as the major challenge, as 90 percent reported lack of training as the major challenge, whereas 10 percent do not consider it a challenge. Regarding training on ICT tools, a majority of 90 percent of the teachers reported that they have not received any training, whereas 10 percent of the teachers have reported receiving some kind of training for using ICT tools. Regarding the challenges teachers face in using ICT-related devices, repositories, and platforms, 70 percent of the teachers reported internet availability and connectivity as a major challenge. 10 percent of the teachers suggested understanding the materials, and 20 percent reported the non-availability of courses as a major challenge.

DISCUSSION

Integrating Information and Communication Technology (ICT) in higher education has been a focal point for enhancing teaching and learning processes. Several studies have explored this integration in India, highlighting both advancements and challenges. Baruah and Mohalik (2022) examined the extent of ICT adoption in Teacher Education Institutions (TEIs) affiliated with Gauhati University. The study identified a lack of technical skills among educators and trainees as a primary obstacle to effective ICT integration. Similar findings have also been attained by the present study, where a lack of skills in handling ICT devices is a major problem among faculty members. Rizvi (2020) conducted a study on "ICT and Higher Education in Assam: Importance of MOOCs and SWAYAM," and analysed the potential of online platforms like MOOCs and SWAYAM in enhancing higher education accessibility in Assam. The findings indicated that despite governmental efforts, student adoption of these platforms remained limited due to Insufficient digital infrastructure and Lack of awareness and training. The study emphasised the necessity of creating a supportive digital environment to maximise the benefits of such platforms. The present study also identified the limitation of ICT resources as one of the problems in higher education institutions. Sadavar and Shaikh (2024) conducted a qualitative study that provides an analysis of India's Ed-Tech sector, assessing its current state, identifying significant trends, and exploring factors driving its expansion and challenges. It examines instructional technologies like online platforms, mobile applications, virtual classrooms, and adaptive learning systems, evaluating their efficacy and impact on educational outcomes. This study supports the idea that more similar studies are needed to explore the true picture of ICT in education in India.

Magallanes et al. (2024) evaluate the proficiency levels of Physical Education teachers using various ICT applications and examine the relationship between ICT proficiency's perceived importance for teaching, learning, career advancement, and actual proficiency among Senior High School PE teachers in Mexico, Pampanga. Virtual classrooms and other forms of technology can help teachers to create students who are actively interested in their lessons (Bhaumik 2012). Similar findings were achieved in the study. Students found more interest in technology-based learning. A study done by Kilag et al. (2022) found that the use of technology opens up opportunities for personalized instruction to fulfil each student's specific learning needs within the context of the larger classroom environment. The present study also reveals teachers' belief in using personalised instruction to make the classroom effective. Panda et al. (2025) investigated the factors of ICT in higher education, indicating that the content efficacy of a teacher is pivotal to providing effective teaching-learning using digital tools and techniques. The developed model measures the cause-effect relationship based on the role of ICT efficacy of teachers in delivering teaching, enabling academic organizations to frame policies and strategies focusing on enhancing teachers' competencies. The present study supports the constraints identified by Siddiquah and Salim (2017), that is, ensuring access to electronic devices for every kid. The course structure, tools,

materials and subjects have a significant impact on students learning through ICT (Leslie 2019). Technology and the ability to operate the tools significantly affect the teaching process (Thaheem et al. 2021). The present study also supports both. The study reveals that the sampled Higher education institution had sufficient ICT resources. However, the usability of these resources is not up to its potential. As one of the oldest government-managed universities in the State, this result is not very encouraging. Regarding online education platforms like SWAYAM, the study found that although stakeholders know about it, the application is still very poor. The findings imply three patterns among students in using ICT resources. First, there is a high level of usefulness for particular ICT products such as computers, the Internet, and Google Classroom, with nearly 100 percent reporting the use of these items. The difference between students' perceptions and usage rates of the relevant items must be narrowed to maximise resource utilisation. Teachers' usage of technologies can be improved with training and assistance; hence, the study suggests that teacher training is the most essential link between the availability and usability of ICT resources. On the other hand, students reported availability as a greater issue than accessibility and usability. Although students pointed out training as a major barrier, they are more concerned about the availability of tools.

The study also revealed that the involvement of teachers in designing SWAYAM and other MOOC courses was found to be extremely low, implying that teachers must participate in these activities if the university is to intervene. However, the magnitude of involvement required by the university in this matter is beyond the scope of this study. The study concludes that though ICT has become popular in higher education institutions, it is still used in a limited way. Some recent studies conducted in the area of ICT in Education reflect more prominently on AI in education. Chathura et al. (2024) Investigating Sri Lankan ICT teachers' readiness to teach AI in schools, this study focuses on self-efficacy. A survey of over 1,300 teachers assessed their self-efficacy using a scale developed based on Bandura's theory. It revealed that teachers' self-efficacy was low, primarily influenced by emotional and physiological states and imaginary experiences related to AI instruction. In a similar way, Mounia et al. (2025) researched integrating ICT into education to promote sustainable development through enhanced communication among educational stakeholders. This shows that the scope of research in ICT in Education is very wide.

CONCLUSION

The topic of ICT is a critical concern for many stakeholders, including universities, policymakers, and end users, among others. Although there has been a recent push for the use of ICT, the exact needs of the pupils must be assessed at the ground level. Because Indian higher education institutions host students from various social spectrums, the generalist approach to expanded inclusion may be ineffective. A student from a high-income family, for example, may have access to technological conveniences from an early age, which aids in their adoption of any technology, whereas a student with no prior experience handling or operating high-end devices or platforms may struggle to operate a simple platform like SWAYAM seamlessly. Aside from that, the perceived advantage of using any platform from the students' perspective must be understood before pushing it for greater penetration, as a platform may be built for a specific purpose, but its benefits may be wasted elsewhere. SWAYAM, for example, is a platform for self-learning, however the University provides very little ICT equipment for this specific function. However, in this instance, when someone who can afford a single computer will turn to SWAYAM, widespread utilization may be restricted. One source of worry is the allocation of ICT equipment in departments and centers; despite the fact that the majority of the equipment is dedicated to instructional purposes; it is still limited to classroom operations. Self-learning, remote learning, and virtual learning through university have extremely low tabs. When institutions allocate adequate support to their students, the true advantage of platforms**.** So, this kind of study explores the ground reality of using ICT in Education.

RECOMMENDATIONS

The study's topic was significant to many higher education institutions as well as other ed-

ucational bodies. Many governing and policy-making agencies have recently concentrated on the penetration of ICT tools and facilities in the higher education sector. The findings clearly offer information on the state of available facilities and their purposes of usage across various departments, which will assist the administration in making future decisions regarding equipment allocation planning. In general, the findings indicate students' and teachers' preferences for using any ICT platform. The study also emphasized the need for increased knowledge and training for certain platforms, which can be useful not only for this university but also for others in structuring their training and workshop programs about the usage of ICT tools. The issues highlighted by this study can also be assessed in other institutions, which can help policymakers to organise coordinated training programs.

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