

## IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) TOOLS ADOPTED BY HIGHER EDUCATION INSTITUTES ON THE DEVELOPMENT OF STUDENTS

Dr. Sanjay Dharmadhikari  
Director

Institute of Business Management and Research Development  
Ahmednagar  
dharmadhikari02@gmail.com

### ABSTRACT

The study aimed to investigate the challenges associated with the use of ICT tools in learning environments. It achieves this by collecting survey data from participants regarding their experiences with using ICT tools and analysing the data using one-sample t-tests to determine the extent to which participants agreed with statements about different challenges associated with using ICT tools. The study considers a sample of 128 students who study in higher educations and are undergoing graduate programs in Pune city. The analysis of survey data and one-sample t-tests conducted in this study aimed to explore the challenges associated with the use of ICT tools in learning environments. The results indicated that technical glitches, limited access to ICT tools, lack of technical support and guidance, complexity of some ICT tools, cost of acquiring and maintaining ICT tools, and frequent updates and changes to ICT tools can hinder students' ability to effectively use these tools in their learning. Furthermore, the use of ICT tools can create a digital divide among students with varying levels of access and technological skills. However, participants were somewhat divided on whether the lack of standardized policies and guidelines for the use of ICT tools can make it difficult to effectively integrate them into learning activities, and whether the challenges associated with the use of ICT tools have negatively affected their motivation to use them in their learning. These findings suggest that addressing these challenges is important to ensure that students can effectively utilize ICT tools to enhance their learning experiences.

**Keywords:** ICT tools, learning, education, survey, one-sample t-tests, technical glitches, limited access, technical support, complexity, cost, updates, distractions, digital divide, standardized policies, guidelines, motivation.

### Introduction

Information and communication technology (ICT) has played an increasingly important role in education over the past few years, especially in higher education institutions. Computers, tablets, smartphones, software programmes, and internet-based services are just a few examples of the ICT tools that have completely changed how students engage with and learn from educational resources. These tools have also given teachers fresh approaches to improve the educational process and advance students' abilities. The growth of students has been significantly impacted by the incorporation of ICT tools in higher education institutions. It has increased access to educational resources and made them more readily available, but it has also given students the chance to learn skills that are crucial in the rapidly changing digital world of today. ICT tools have made it possible for students to interact with teachers and their peers, access and share knowledge, work together on projects, and improve their ability to think critically and solve problems. In-depth research has been done in the literature on the effects of ICT tools on the growth of students in higher education. The advantages of ICT technologies for student development are highlighted by a number of significant conclusions from a study of the research. The increased accessibility and availability of instructional resources is one of the main advantages of ICT tools in higher education. Students can use their computers or mobile devices to access a variety of digital resources at any time and from any location, including textbooks, online journals, videos, and podcasts. Due to the opportunity for students to interact with a range of materials and have a deeper understanding of the subject matter, it has been discovered that having access to information improves student learning results.

Additionally, ICT tools have made it easier for students to communicate with one another and with teachers. With the use of online discussion boards, email, and video conferencing facilities, students may now communicate with one another and their teachers, exchange ideas, and get feedback on their work. As students gain the ability to communicate their thoughts and respond to others' views, it has been discovered that this contact improves students' critical thinking and problem-solving abilities. The growth of students' digital literacy abilities is another important effect of ICT tools in higher education. In the modern digital age, having the skills to operate software programmes, traverse the internet, and evaluate online resources is crucial. It has been discovered that the usage of ICT tools in higher education improves these skills in students, better preparing them for the workforce.

Despite the advantages of ICT, there are a number of obstacles to their adoption and utilisation in higher education. The expense of ICT infrastructure, the requirement for training and assistance for both students and teachers, and worries about the calibre and dependability of online resources are a few of these problems. This essay seeks to investigate how ICT technologies used by higher education institutions affect students' growth. The study will look at the many ICT tools used in higher education and how they affect the growth and learning of students. The study will also look into the potential and problems associated with using ICT tools in higher education and offer suggestions for teachers and policymakers on how to maximise the advantages of these tools in fostering student growth.

### Review of Literature

It has been extensively studied how Information and Communication Technology (ICT) tools affect students' progress in higher education. Teo (2010) asserts that the use of ICT tools has improved the availability and accessibility of educational resources, enabling students to interact with a range of materials and gain a deeper comprehension of the subject. In a similar vein, Dabbagh and Kitsantas (2012) discovered that the use of ICT tools has encouraged communication and collaboration among students as well as between students and instructors, leading to improved critical thinking and problem-solving abilities. Additionally, students' digital literacy abilities have grown as a result of the usage of ICT tools in higher education (Coiro et al., 2008). Digital literacy abilities are crucial in today's digital environment, as observed by Warschauer and Matuchniak (2010), and the usage of ICT tools in higher education has helped students learn these skills, better preparing them for the workforce.

However, there are a number of difficulties associated with the acceptance and use of ICT technologies in higher education. The cost of ICT infrastructure, the requirement for training and assistance for both students and teachers, and worries about the calibre and dependability of online resources are some of these difficulties (Selwyn, 2011). Ertmer et al. (2012) assert that overcoming these difficulties is crucial to maximising the advantages of ICT tools for fostering student growth in higher education. According to the literature, ICT tools are used to enhance student growth in higher education. These tools have improved student access to educational resources, enabled communication and teamwork, and promoted digital literacy. To fully realise their advantages, it is essential to solve the issues related to their acceptance and utilisation. ICT tool use in higher education has positively improved student learning results, according to research. The usage of ICT resources, such as multimedia, online discussion forums, and blogs, improved student involvement, motivation, and performance, according to a study by Kebritchi, Hirumi, and Bai (2010). Similar to this, Tamim et al. (2011)'s meta-analysis revealed that the usage of ICT technologies in higher education significantly increased student achievement. The usage of ICT tools in higher education has been found to increase the development of 21st-century skills among students in addition to boosting student learning outcomes. The use of ICT technologies has facilitated the growth of skills including teamwork, communication, creativity, and critical thinking, according to Voogt et al. (2016). These abilities are crucial in today's digital environment. Additionally, the use of ICT tools has helped students develop self-directed learning skills, allowing them to take charge of their education and follow their interests (Chen & Lin, 2013).

ICT technologies have many advantages, but despite this, there has been significant resistance to their adoption and use in higher education. According to a study by Hammond and Crossouard (2013), the adoption and usage of ICT tools in the classroom was influenced by the attitudes of the instructors. Similar to this, Hew and Cheung's (2013) research revealed that students' perspectives on using ICT tools had an impact on both their engagement and performance. The development of 21st-century skills and student learning outcomes have been found to be positively impacted by the usage of ICT technologies in higher education. To fully realise their advantages, it is essential to address the issues that are related to their acceptance and use, such as attitudes towards their use. The introduction of ICT technologies in higher education, according to the literature, has a favourable effect on students' growth. These tools have enabled communication and cooperation, increased digital literacy abilities, and improved accessibility to educational resources. To increase the advantages of ICT tools in supporting student development, however, issues with their adoption and use must be resolved. Students' learning experiences have been found to be improved by the usage of ICT technologies in higher education. According to a study by Wang and Newlin from 2002, using online discussion forums improved student interest and participation in the conversations, which in turn resulted in a deeper grasp of the subject matter. Similar to this, Cho and Berge's (2002) study discovered that the usage of online collaborative tools promoted a more collaborative learning environment where students could benefit from one another's knowledge and aid in one another's education.

Additionally, the usage of ICT tools has given pupils access to a greater variety of learning resources. The use of ICT tools, such as online libraries, video lectures, and digital textbooks, has improved the accessibility and

availability of educational resources, according to Hrastinski (2008). This has allowed students to engage with a variety of materials and gain a deeper understanding of the subject matter. However, there are a number of difficulties associated with the acceptance and use of ICT technologies in higher education. Some of these issues were outlined in a study by Selwyn (2011), including the need for the right technical infrastructure, the requirement for instruction and assistance for both students and instructors, and worries about the calibre and dependability of online resources. In a similar vein, a study conducted in 2012 by Ertmer et al. discovered that overcoming these difficulties is crucial to maximising the advantages of ICT tools in fostering student development in higher education. The effect of ICT tools on student participation in higher education has also been researched. According to a study by Wang, Chen, and Liang (2011), using ICT resources like online tests and discussion boards improved student involvement as indicated by their level of participation in discussions and assignment completion. The usage of ICT tools, such as video lectures and podcasts, improved student involvement and course satisfaction, according to research by Shroff, Deneen, and Ngampornchai (2011).

Additionally, it has been discovered that using ICT tools helps pupils have more individualised learning experiences. According to a 2015 study by Hwang and Choi, using ICT tools like personalised learning systems improved student motivation and academic achievement. The use of ICT tools like e-portfolios allowed students to design their own learning paths, which allowed them to explore their interests and connect more thoroughly with the subject matter, according to a study by Dalsgaard and Godsk (2011). The employment of ICT tools in higher education, however, also prompts questions about the likelihood that human connection and support will be replaced by technology. According to a 2005 study by Vonderwell and Zachariah, while the use of ICT tools increased student engagement, it also decreased the amount of face-to-face interaction between students and teachers. Similar to this, a study by Kirschner and Karpinski (2010) discovered that if students rely too heavily on technology for information and answers, using ICT tools may result in a loss in critical thinking skills.

### Objectives

- To identify and examine the different types of ICT tools used in higher education institutes.
- To analyze the impact of ICT tools on student learning and development in higher education.
- To explore the challenges and opportunities associated with the use of ICT tools in higher education.

### Hypotheses

H1: The adoption of ICT tools in higher education institutes positively affects student learning and development.

H2: The challenges associated with the use of ICT tools in higher education, such as technological glitches and lack of technical support, can negatively impact student learning and development.

### Research methodology

1. Quantitative research methodology will be employed, which entails gathering and examining numerical data in order to test an idea or respond to a research question.
2. Sampling: Undergraduate students registered in higher education institutions in Pune City will be the study's target group. A sample of 128 students from prestigious higher education institutions in Pune City that regularly incorporate ICT-enabled services into the classroom will be chosen using a random sampling technique.
3. Data Collection: Information on student demographics, academic performance, and use of ICT tools will be gathered through a survey questionnaire. In the middle of the academic year, the students will be given the questionnaire.
4. Data Analysis: To explain the distribution of the data, descriptive statistics like means and standard deviations will be used to analyse the acquired data. To test the hypothesis and evaluate whether there is a significant effect on performance among the students who utilise a wide variety of ICT tools, inferential statistics like t-tests will be used.
5. Ethical Considerations: The applicable ethics committee will give the study its seal of approval. Prior to collecting any data, participants will be made aware of the study's objectives and their informed consent will be sought.
6. Limitations: The study may have restrictions due to the use of self-reported data, the potential impact of confounding variables, and the applicability of the findings in different circumstances.

### Data Analysis

		Freq.	%	Valid %	Cumulative %
Valid	Male	64	50.0	50.0	50.0
	Female	64	50.0	50.0	100.0
	Total	128	100.0	100.0	

**Table 1: Gender of the respondents**

The frequency and ages of the two categories "Male" and "Female" are displayed in this table. 128 people in all were included in the analysis. Male and female participants made up 50% of the group. Since there were only two categories in this table, the valid% column displays the percentage of participants in each group (male and female), which is the same as the overall percentage. The cumulative% column displays the participants' cumulative% age up to that moment. For instance, 50% of the participants were included after the first group (Male). After accounting for all 128 participants, the cumulative percentage reached 100% after the second group (Female). Overall, the gender distribution of the participants is clearly summarised in this table.

		Freq.	%	Valid %	Cumulative %
Valid	First Year	25	19.5	19.5	19.5
	Second Year	38	29.7	29.7	49.2
	Third Year	49	38.3	38.3	87.5
	Last Year	16	12.5	12.5	100.0
	Total	128	100.0	100.0	

**Table 2. Level of education of the respondents**

The frequency and ages of students in the "First Year," "Second Year," "Third Year," and "Last Year" academic levels are displayed in this table. 128 pupils in all were included in the analysis. 25 (19.5%) of them were in their first year, 38 (29.7%) in their second, 49 (38.3%) in their third, and 16 (12.5%) in their final year. The percentage of participants at each academic level is displayed in the valid% column. The cumulative% column displays the students' cumulative % up to that point. For instance, 19.5% of the students were counted after the first academic level (First Year). The cumulative percentage improved to 49.2% after passing the second academic level (Second Year). The cumulative% grew to 87.5% after the third level (Third Year). The final academic level (Last Year) saw the inclusion of all 128 pupils, yielding a cumulative% of 100%. Overall, the distribution of pupils among the various academic levels is clearly summarised in this table. It reveals that 38.3% of students were in their third year, followed by 29.7% of students in their second year, 19.5% of students in their first year, and 12.5% of students in their last year.

		Freq.	%	Valid %	Cumulative %
Valid	Strongly Disagree	15	11.7	11.7	11.7
	Disagree	10	7.8	7.8	19.5
	Neutral	3	2.3	2.3	21.9
	Agree	45	35.2	35.2	57.0
	Strongly Agree	55	43.0	43.0	100.0
	Total	128	100.0	100.0	

**Table 3. The use of ICT tools has improved my learning experience in higher education.**

The frequency and percentages of responses to a statement about ICT (Information and Communication Technology) tool use and its effect on the learning process in higher education are shown in the table below. According to the table, 15 respondents (11.7%) strongly disagreed with the statement, 10 disagreed (7.5%), 3 were neutral, 45 agreed (35.2%), and 55 strongly agreed with the statement. The percentage of responders falling into each category is displayed in the valid% column. The cumulative% column displays the overall response rate up to that moment. For instance, just 11.7% of respondents still disagreed with the statement after the first category (Strongly Disagree). The cumulative% grew to 19.5% after the second category (Disagree). The cumulative% grew to 21.9% after the third category (Neutral). Following the fourth category (Agree), the overall percentage rose to 57.0%. After accounting for all 128 responders in the last category (Strongly Agree), the cumulative percentage reached 100%. Overall, the distribution of replies to the statement is clearly summarised in this table. It demonstrates that the majority of respondents (78.2%) agreed or strongly agreed that using ICT tools had improved their educational experience.

		Freq.	%	Valid %	Cumulative %
Valid	Strongly Disagree	10	7.8	7.8	7.8
	Disagree	10	7.8	7.8	15.6
	Neutral	5	3.9	3.9	19.5
	Agree	32	25.0	25.0	44.5
	Strongly Agree	71	55.5	55.5	100.0
	Total	128	100.0	100.0	

**Table 4. ICT tools have helped me to understand the course material better.**

According to the table, 10 respondents (7.8%) strongly disagreed with the statement, 10 respondents (7.8%) disagreed, 5 respondents (3.9%) were neutral, 32 respondents (25.0%) agreed, and 71 respondents (55.5%) highly agreed. The percentage of responders falling into each category is displayed in the valid% column. The cumulative% column displays the overall response rate up to that moment. For instance, just 7.8% of respondents strongly disagreed with the statement after the first group (Strongly Disagree). The cumulative% grew to 15.6% after the second category (Disagree). When the third category (Neutral) was added in, the total percentage rose to 19.5%. The cumulative% reached 44.5% after the fourth category (Agree). After accounting for all 128 responders in the last category (Strongly Agree), the cumulative percentage reached 100%. Overall, the distribution of replies to the statement is clearly summarised in this table. ICT technologies have aided the majority of respondents (81.5%) in better understanding the course material, according to the data.

		Freq.	%	Valid %	Cumulative %
Valid	Strongly Disagree	9	7.0	7.0	7.0
	Disagree	12	9.4	9.4	16.4
	Neutral	6	4.7	4.7	21.1
	Agree	44	34.4	34.4	55.5
	Strongly Agree	57	44.5	44.5	100.0
	Total	128	100.0	100.0	

**Table 5. The use of ICT tools has enhanced my problem-solving skills.**

The frequency and percentages of replies to a statement on how ICT tools affect problem-solving abilities are displayed in the table below. According to the table, 9 respondents (7.0%) strongly disagreed with the statement, 12 respondents (9.4%) disagreed, 6 respondents (4.7% were neutral), 44 respondents (34.4%) agreed, and 57 respondents (44.5%) strongly agreed. The percentage of responders falling into each category is displayed in the valid% column. The cumulative% column displays the overall response rate up to that moment. For instance, just 7.0% of respondents strongly disagreed with the statement after the first group (Strongly Disagree). The cumulative% grew to 16.4% after the second category (Disagree). The cumulative% grew to 21.1% after the third category (Neutral). When the fourth category (Agree) was included in, the overall percentage rose to 55.5%. After accounting for all 128 responders in the last category (Strongly Agree), the cumulative percentage reached 100%. According to this table's overall results, 78.9% of respondents agreed or strongly agreed that using ICT tools had improved their problem-solving abilities. The majority of responders (44.5%) strongly agreed with the statement, showing that ICT tools have benefited students' ability to solve problems.

		Freq.	%	Valid %	Cumulative %
Valid	Strongly Disagree	9	7.0	7.0	7.0
	Disagree	10	7.8	7.8	14.8
	Neutral	6	4.7	4.7	19.5
	Agree	44	34.4	34.4	53.9
	Strongly Agree	59	46.1	46.1	100.0
	Total	128	100.0	100.0	

**Table 6. The availability of a wide range of ICT tools has helped me to perform better**

A survey question about the availability of a variety of ICT tools and how it affected their performance received responses from 128 participants in total. The replies were divided into five categories: "Strongly Disagree", "Disagree", "Neutral", "Agree", and "Strongly Agree". The data indicates that 46.1% highly agreed, 7.0% agreed, 7.8% disagreed, 4.7% were indifferent, 34.4% agreed, and 7.0% strongly agreed that having access to a variety of ICT tools had improved their performance. ICT tools have improved respondents' performance, according to 80.5% of respondents who agreed or strongly agreed with this statement. The majority of respondents (46.1%) agreed with the statement in strong agreement. In conclusion, the majority of respondents felt that having access to a variety of ICT tools had a beneficial impact on their academic achievement.

		Freq.	%	Valid %	Cumulative %
Valid	Strongly Disagree	8	6.3	6.3	6.3
	Disagree	10	7.8	7.8	14.1
	Neutral	6	4.7	4.7	18.8
	Agree	45	35.2	35.2	53.9
	Strongly Agree	59	46.1	46.1	100.0
	Total	128	100.0	100.0	

**Table 7. The use of ICT tools has increased my motivation to learn.**

A survey question about the effect of ICT tools on respondents' motivation to learn received responses from 128 participants in total. The replies were divided into five categories: "Strongly Disagree", "Disagree", "Neutral", "Agree", and "Strongly Agree". The table shows that 35.2% of respondents agreed and 46.1% strongly agreed that using ICT tools has enhanced their motivation to learn, while 6.3%, 7.8%, 4.7%, and 6.3% of respondents strongly disagreed. ICT tools have positively impacted respondents' drive to learn, according to 81.3% of respondents who agreed or strongly agreed with this statement. The majority of respondents (46.1%) agreed with the statement in strong agreement. In conclusion, the majority of survey respondents claimed that using ICT tools had boosted their desire to learn.

		Freq.	%	Valid %	Cumulative %
Valid	Strongly Disagree	8	6.3	6.3	6.3
	Disagree	12	9.4	9.4	15.6
	Neutral	4	3.1	3.1	18.8
	Agree	47	36.7	36.7	55.5
	Strongly Agree	57	44.5	44.5	100.0
	Total	128	100.0	100.0	

**Table 8. ICT tools have helped me to collaborate with other students and educators more effectively.**

128 respondents were surveyed, and they were asked to rate how much they agreed or disagreed with the statement, "ICT tools have helped me to collaborate with other students and educators more effectively." According to the results, 44.5% highly agreed, 36.7% agreed, 9.4% disagreed, 3.1% disagreed, and 6.3% strongly disagreed. Most respondents (81.2%) either agreed or strongly agreed that ICT technologies have improved their ability to collaborate.

		Freq.	%	Valid %	Cumulative %
Valid	Strongly Disagree	6	4.7	4.7	4.7
	Disagree	10	7.8	7.8	12.5
	Neutral	5	3.9	3.9	16.4
	Agree	47	36.7	36.7	53.1
	Strongly Agree	60	46.9	46.9	100.0
	Total	128	100.0	100.0	

**Table 9. I have received adequate training and technical support to use ICT tools effectively in my learning.**

The frequency and percentage distribution of participant responses to the statement "I have received adequate training and technical support to use ICT tools effectively in my learning" are shown in the table. In response to the statement, 128 participants gave their opinions, with 46.9% strongly agreeing and 36.7% agreeing that they had gotten sufficient technical support and training. Only 4.7% of participants strongly disagreed with the statement that they had gotten sufficient technical support and training.

		Freq.	%	Valid %	Cumulative %
Valid	Strongly Disagree	4	3.1	3.1	3.1
	Disagree	9	7.0	7.0	10.2
	Neutral	7	5.5	5.5	15.6
	Agree	48	37.5	37.5	53.1
	Strongly Agree	60	46.9	46.9	100.0
	Total	128	100.0	100.0	

**Table 10. The use of ICT tools in higher education has prepared me for the demands of the modern workplace.**

In the study, 128 higher education students were polled to determine how well ICT tools had prepared them for the workplace of today. The findings indicated that 37.5% and 46.9% of respondents agreed—strongly—that using ICT tools had better equipped them for the demands of the contemporary job. Only 3.1% strongly disagreed and 7.0% disagreed with this assertion, in contrast. This shows that the majority of students (84.4%) thought that their preparation for the modern workplace was facilitated by the usage of ICT technologies in higher education.

		Freq.	%	Valid %	Cumulative %
Valid	Strongly Disagree	3	2.3	2.3	2.3
	Disagree	11	8.6	8.6	10.9
	Neutral	9	7.0	7.0	18.0
	Agree	50	39.1	39.1	57.0
	Strongly Agree	55	43.0	43.0	100.0
	Total	128	100.0	100.0	

**Table 11. I would recommend the use of ICT tools to other students to enhance their learning experience.**

The table displays 128 students' replies to the statement, "I would recommend the use of ICT tools to other students to enhance their learning experience." The replies were scored using a Likert scale with five possible options, ranging from "Strongly Disagree" to "Strongly Agree." The majority of pupils (82.1%) said they would strongly or definitely advise other students to use ICT tools. More specifically, 43.0% of students strongly agreed, whereas 39.1% agreed. 18.0% of students were ambivalent or unsure about promoting the use of ICT technologies, on the other hand. Only 11.0% of students strongly disagreed or disagreed that they would advise others to use ICT tools. The table's overall findings indicate that a sizable majority of students felt ICT tools to be beneficial to their learning process and would propose them to others.

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Technical glitches (e.g., slow internet, software crashes) can negatively affect my learning experience when using ICT tools.	23	18.0%	15	11.7%	6	4.7%	29	22.7%	55	43.0%
Limited access to ICT tools can hinder my ability to complete course assignments and projects.	25	19.5%	17	13.3%	4	3.1%	30	23.4%	52	40.6%
Lack of technical support and guidance can make it difficult to effectively use ICT tools in my learning.	26	20.3%	18	14.1%	5	3.9%	31	24.2%	48	37.5%
The complexity of some ICT tools can make it difficult for me to understand and use them effectively.	26	20.3%	20	15.6%	6	4.7%	30	23.4%	46	35.9%
The cost of acquiring and maintaining ICT tools can be a barrier to my access and use of these tools in my learning.	28	21.9%	19	14.8%	5	3.9%	31	24.2%	45	35.2%
The frequent updates and changes to ICT tools can make it challenging to keep up and adapt to these changes in my learning.	28	21.9%	19	14.8%	4	3.1%	33	25.8%	44	34.4%
The use of ICT tools can make it difficult to maintain focus and avoid distractions during learning activities.	30	23.4%	21	16.4%	5	3.9%	35	27.3%	37	28.9%
The use of ICT tools can create a digital divide among students with varying levels of access and technological skills.	28	21.9%	19	14.8%	4	3.1%	34	26.6%	43	33.6%

The lack of standardized policies and guidelines for the use of ICT tools can make it difficult to effectively integrate them into learning activities.	30	23.4%	21	16.4%	3	2.3%	32	25.0%	42	32.8%
The challenges associated with the use of ICT tools have negatively affected my motivation to use them in my learning.	30	23.4%	22	17.2%	2	1.6%	31	24.2%	43	33.6%

**Table 12. Challenges**

The survey results on the difficulties in using ICT tools for learning are shown in the table. Ten assertions about various facets of employing ICT tools in education are included in the table. The table displays the number and percentage of respondents who strongly disagree with each statement, disagree with it, are indifferent about it, agree with it, or strongly agree with it. Overall, the table indicates that a large number of respondents are aware of the difficulties involved in using ICT tools for learning. For instance, a sizable proportion of respondents strongly agree or agree that technical issues, access restrictions, a lack of technical support and guidance, complexity, cost, frequent updates, distractions, the digital divide, a lack of standardised policies and guidelines, and detrimental effects on motivation are some of the difficulties associated with using ICT tools in learning. Additionally, the table reveals that the most typical response to each statement is "agree" or "strongly agree," showing that many respondents encounter difficulties when utilising ICT resources in their learning activities. The replies to the various claims do vary slightly, though, with some statements receiving a higher proportion of agreeing or strongly agreeing responders than others.

**Testing of Hypotheses**

	N	Mean	Std. Deviation	Std. Error Mean
The use of ICT tools has improved my learning experience in higher education.	128	3.8984	1.35065	.11938
ICT tools have helped me to understand the course material better.	128	4.1250	1.26740	.11202
The use of ICT tools has enhanced my problem-solving skills.	128	4.0000	1.22956	.10868
The availability of a wide range of ICT tools has helped me to perform better	128	4.0469	1.20928	.10689
The use of ICT tools has increased my motivation to learn.	128	4.0703	1.17844	.10416
ICT tools have helped me to collaborate with other students and educators more effectively.	128	4.0391	1.19317	.10546
I have received adequate training and technical support to use ICT tools effectively in my learning.	128	4.1328	1.11094	.09819
The use of ICT tools in higher education has prepared me for the demands of the modern workplace.	128	4.1797	1.03051	.09108
I would recommend the use of ICT tools to other students to enhance their learning experience.	128	4.1172	1.02428	.09053

**Table 13. One-Sample Statistics**

The table gives descriptive data for responses to questions about the usage of ICT tools in higher education from a sample of 128 students. The table lists the number of replies (N), mean rating, standard deviation (Std. Deviation), and standard error of the mean (Std. Error Mean) for each of the statements. The mean rating is the average degree of agreement with the statement on a scale from 1 to 5, where 1 denotes "Strongly Disagree" and 5 denotes "Strongly Agree." A measure of how much agreement or disagreement there is among the respondents, the standard deviation represents the dispersion of the scores around the mean. Indicating how much the mean rating might change if the survey were repeated with a different sample of students, the standard error of the mean provides an approximation of the sampling error in the mean rating. Overall, the table indicates that the majority of respondents concur that using ICT tools has benefited their college education, aided in their better understanding of the topic, and increased their problem-solving abilities. The respondents claim that they have received appropriate technical support and training to utilise ICT tools efficiently, and they think that using ICT tools in higher education has better prepared them for the needs of the modern workplace.

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
The use of ICT tools has improved my learning experience in higher education.	7.526	127	.000	.89844	.6622	1.1347
ICT tools have helped me to understand the course material better.	10.043	127	.000	1.12500	.9033	1.3467
The use of ICT tools has enhanced my problem-solving skills.	9.201	127	.000	1.00000	.7849	1.2151
The availability of a wide range of ICT tools has helped me to perform better	9.794	127	.000	1.04688	.8354	1.2584
The use of ICT tools has increased my motivation to learn.	10.276	127	.000	1.07031	.8642	1.2764
ICT tools have helped me to collaborate with other students and educators more effectively.	9.852	127	.000	1.03906	.8304	1.2478
I have received adequate training and technical support to use ICT tools effectively in my learning.	11.536	127	.000	1.13281	.9385	1.3271
The use of ICT tools in higher education has prepared me for the demands of the modern workplace.	12.952	127	.000	1.17969	.9994	1.3599
I would recommend the use of ICT tools to other students to enhance their learning experience.	12.340	127	.000	1.11719	.9380	1.2963

**Table 14. One-Sample Test**

The outcomes of nine assertions about the usage of ICT tools in higher education are shown in this table as the results of one-sample t-tests. As a comparison point, the hypothesised mean of three is shown in the "Test Value" column. The "t" column displays the calculated t-value, which represents the distance between the sample mean and the hypothesised mean in terms of standard errors. The "df" column, which is equal to the sample size minus 1, displays the degrees of freedom for each test. The "Sig. (2-tailed)" column displays the p-value, which, given that the null hypothesis (the mean equals the hypothesised value of 3) is correct, gives the probability of obtaining the observed results or more extreme outcomes by chance alone. All nine of the assertions' p-values are less than .001, suggesting strong evidence against the null hypothesis.

The difference between the sample mean and the hypothesised mean is displayed in the "Mean Difference" column. The range of values within which the true population mean is most likely to fall with 95% confidence is displayed in the "95% Confidence Interval of the Difference" column. The confidence interval does not cover the hypothesised mean of 3, and the mean difference for all nine claims is positive, indicating that participants in the sample on average rated the assertions higher than 3. Overall, the findings indicate that the sample's participants firmly believe that using ICT tools in higher education improves their learning process, content comprehension, problem-solving abilities, performance, motivation to learn, ability to work with others, and readiness for the modern workplace. Additionally, they show that sample members believe they have gotten sufficient technical help and instruction to use ICT tools effectively and would advise other students to do the same.

	N	Mean	Std. Deviation	Std. Error Mean
Technical glitches (e.g., slow internet, software crashes) can negatively affect my learning experience when using ICT tools.	128	3.6094	1.55849	.13775
Limited access to ICT tools can hinder my ability to complete course assignments and projects.	128	3.5234	1.58718	.14029
Lack of technical support and guidance can make it difficult to effectively use ICT tools in my learning.	128	3.4453	1.58640	.14022
The complexity of some ICT tools can make it difficult for me to understand and use them effectively.	128	3.3906	1.58355	.13997

The cost of acquiring and maintaining ICT tools can be a barrier to my access and use of these tools in my learning.	128	3.3594	1.60086	.14150
The frequent updates and changes to ICT tools can make it challenging to keep up and adapt to these changes in my learning.	128	3.3594	1.59593	.14106
The use of ICT tools can make it difficult to maintain focus and avoid distractions during learning activities.	128	3.2188	1.58207	.13984
The use of ICT tools can create a digital divide among students with varying levels of access and technological skills.	128	3.3516	1.59027	.14056
The lack of standardized policies and guidelines for the use of ICT tools can make it difficult to effectively integrate them into learning activities.	128	3.2734	1.61545	.14279
The challenges associated with the use of ICT tools have negatively affected my motivation to use them in my learning.	128	3.2734	1.62517	.14365

**Table 15. One sample statistics**

The table provides descriptive statistics for a number of claims about the difficulties in using ICT resources for learning. For each statement in the table, the following information is provided: the number of participants (N), mean, standard deviation (Std. Deviation), and standard error mean (Std. Error Mean). On a 5-point Likert scale, the mean score for each statement runs from 3.2188 to 3.6094, showing that participants generally do not strongly agree or disagree with the assertions. The standard deviations and standard errors, however, indicate that there is some variation in the participants' responses. As a result, it can be inferred that while some individuals may strongly agree or disagree with the assertions, others may be more ambivalent. The statements imply that there may be difficulties using ICT tools in learning due to technical issues, limited access to ICT tools, a lack of technical support and guidance, complexity of ICT tools, cost of acquiring and maintaining ICT tools, frequent updates and changes to ICT tools, difficulty focusing and avoiding distractions, the development of a digital divide, a lack of uniform policies and guidelines, and a detrimental effect on motivation.

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Technical glitches (e.g., slow internet, software crashes) can negatively affect my learning experience when using ICT tools.	4.424	127	.000	.60938	.3368	.8820
Limited access to ICT tools can hinder my ability to complete course assignments and projects.	3.731	127	.000	.52344	.2458	.8010
Lack of technical support and guidance can make it difficult to effectively use ICT tools in my learning.	3.176	127	.002	.44531	.1678	.7228
The complexity of some ICT tools can make it difficult for me to understand and use them effectively.	2.791	127	.006	.39063	.1137	.6676
The cost of acquiring and maintaining ICT tools can be a barrier to my access and use of these tools in my learning.	2.540	127	.012	.35938	.0794	.6394
The frequent updates and changes to ICT tools can make it challenging to keep up and adapt to these changes in my learning.	2.548	127	.012	.35938	.0802	.6385
The use of ICT tools can make it difficult to maintain focus and avoid distractions during learning activities.	1.564	127	.120	.21875	-.0580	.4955
The use of ICT tools can create a digital divide among students with varying levels of access and technological skills.	2.501	127	.014	.35156	.0734	.6297
The lack of standardized policies and guidelines for the use of ICT tools can make it difficult to effectively integrate them into learning activities.	1.915	127	.058	.27344	-.0091	.5560

The challenges associated with the use of ICT tools have negatively affected my motivation to use them in my learning.	1.904	127	.059	.27344	-.0108	.5577
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**Table 16. One-Sample Test**

The table displays the findings of a one-sample t-test that was performed on a sample of 128 participants. Participants were asked to rate how much they agreed with various statements about the difficulties in using ICT resources for learning. The table lists the mean, standard deviation, and standard error of the mean for each assertion. The findings of the one-sample t-tests performed on each statement are presented in the second section of the table. The sample mean is checked against the fictitious mean value (i.e., 3), which is shown in the "Test Value" column. The test's t-statistic and degrees of freedom (df) are displayed in the "t" column. The p-value for the test is displayed in the "Sig. (2-tailed)" column and represents the likelihood that the observed result would have occurred by chance if the null hypothesis were true. The "95% Confidence Interval of the Difference" column displays the range of values within which we can be 95% confident that the actual population mean difference lies. The "Mean Difference" column displays the difference between the sample mean and the hypothetical mean.

The results indicate that participants generally agreed with all 10 of the claims because their average scores were much higher than the fictitious mean value of 3. The two statements with the highest mean scores and statistical significance at the 0.01 level were "Limited access to ICT tools can hinder my ability to complete course assignments and projects" and "Technical glitches (e.g., slow internet, software crashes) can negatively affect my learning experience when using ICT tools." The two statements with the lowest mean scores and those that did not reach statistical significance at the 0.05 level were "The use of ICT tools can make it difficult to maintain focus and avoid distractions during learning activities" and "The lack of standardised policies and guidelines for the use of ICT tools can make it difficult to effectively integrate them into learning activities."

**Findings**

Based on the analysis of the survey data and the one-sample t-tests, the following conclusions can be drawn:

1. Participants generally agreed that technical glitches, limited access to ICT tools, lack of technical support and guidance, complexity of some ICT tools, cost of acquiring and maintaining ICT tools, and frequent updates and changes to ICT tools can hinder their ability to effectively use ICT tools in their learning.
2. Participants were somewhat divided on whether the use of ICT tools can make it difficult to maintain focus and avoid distractions during learning activities.
3. Participants generally agreed that the use of ICT tools can create a digital divide among students with varying levels of access and technological skills.
4. Participants were somewhat divided on whether the lack of standardized policies and guidelines for the use of ICT tools can make it difficult to effectively integrate them into learning activities, and whether the challenges associated with the use of ICT tools have negatively affected their motivation to use them in their learning.

These findings suggest that there are significant challenges associated with the use of ICT tools in learning environments, and that addressing these challenges is important in order to ensure that students are able to effectively utilize these tools to enhance their learning experiences.

**Conclusions**

1. The study shows that technical glitches, limited access to ICT tools, lack of technical support and guidance, complexity of some ICT tools, cost of acquiring and maintaining ICT tools, and frequent updates and changes to ICT tools can hinder students' ability to effectively use ICT tools in their learning.
2. The results indicate that there is some disagreement among participants on whether the use of ICT tools can make it difficult to maintain focus and avoid distractions during learning activities.
3. The study highlights that the use of ICT tools can create a digital divide among students with varying levels of access and technological skills.
4. The findings suggest that there is some division among participants on whether the lack of standardized policies and guidelines for the use of ICT tools can make it difficult to effectively integrate them into learning activities, and whether the challenges associated with the use of ICT tools have negatively affected their motivation to use them in their learning.

Overall, the study demonstrates that addressing the challenges associated with the use of ICT tools in learning environments is crucial to ensure that students are able to effectively utilize these tools to enhance their learning experiences.

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