



Teaching and Learning Enhancement in Tertiary Institutions in 21st Century via ICT

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Abstract

Information and communication technology (ICT) has become a force that changed many aspects of life. The integration of Information and Communication Technology (ICT) has transformed teaching and learning processes in tertiary education, leading to enhanced educational outcomes in the 21st century. This study, however explores the impact of ICT on student engagement, academic performance, and skills development within higher institutions by taking advantage of digital tools such as online learning platforms, multimedia resources, and interactive applications, educators can create more dynamic and personalized learning environments. A mixed-methods approach was employed, combining quantitative surveys and qualitative interviews to gather data from teachers and students across multiple institutions in Enugu State. The study also utilized a descriptive-relationship method and the descriptive-correlation method allowed for a comprehensive analysis of the data collected from the teachers' and students' responses. The findings indicate that ICT not only fosters greater accessibility and flexibility but also promotes collaborative learning and critical thinking skills. This paper highlights the impact of ICT on enhancing teaching and learning, technology operations and concepts, planning and designing learning environments and experiences, assessment and evaluation; productivity and professional practice, Social, Ethical, Legal and Human Issues in tertiary Institutions. The discussion concludes and recommendations for stakeholders to support continuous improvement in tertiary education. Ultimately, the results analysis indicates that students who have a better understanding of technology operations and concepts tend to have higher ICT skills.

Subject Areas

Agricultural Science

Keywords

ICT, Tertiary Education, Teaching and Learning, 21st Century and Educational Technology

1. Introduction

The 21st century has witnessed a significant transformation in the educational landscape, driven by the rapid advancement of Information and Communication Technology (ICT). In higher institutions, ICT has become a critical tool for enhancing teaching and learning experiences. This paper aims to explore the role of ICT in tertiary institutions, examining its benefits, challenges, and prospects. The objectives of this paper are to provide a comprehensive review of ICT tools and applications in higher education, discuss the impact on teaching and learning, and propose strategies for effective integration.

Information and communication technology as a transformative driving tool for Tertiary Education enhancement. One of the earliest studies by [1] examines the impact of information and communication technology on Higher Education in Nigeria in the 21st century. The findings reveal that information and communication technology has become an integral part of modern-day society in

Nigeria. A more recent study by [2] examines the integration of ICT in higher tertiary institutions for the twenty-first century. The study looks into the possible areas where ICT has affected positively vis-a-vis in higher education, research, and teaching. The study revealed that ICT helps students adapt to teaching materials.

The integration of ICT in higher education is not a new concept. However, recent advancements have significantly broadened its scope and application. Studies have shown that ICT can enhance student engagement, facilitate personalized learning, and improve access to educational resources. Theoretical frameworks such as the Technological Pedagogical Content Knowledge (TPACK) model and the Substitution Augmentation Modification Redefinition (SAMR) model provide valuable insights into the effective use of technology in education. This section reviews relevant literature to establish a foundation for understanding the current state of ICT in tertiary institution. The studies by [3] found that from personal reflection and class observation that for managing the behavior of individuals or groups, different strategies may have to be used such as audio/visuals, questioning, role play, rewards, punishment, discussions, paired/group work, observations, switching activities, etc. Also, studies [4] presented text that underscores technology's profound and transformative impact on education in the 21st century. The pervasive influence of technology is evident in the shift from traditional teaching methods to the extensive integration of information technologies, marking a revolutionary change in the educational paradigm. The literature reviews further highlighted the multifaceted dimensions of this impact, ranging from the

emphasis on sustainability and indicators of world-class universities to the emergence of innovative learning methodologies fostering 21st-century skills [5].

Traditional classrooms use blackboards and whiteboards, while digital education uses large interactive screens. Interactive flat-panel displays allow dynamic content to be presented on a larger screen for the class's viewing pleasure. These systems are designed around bricks and mortar, which means they are portable enough to be transported from one place to another without difficulty. National Open University of Nigeria and likes to implement ICT tools fully as a hybrid tertiary institution. The key takeaway is that while digital education is built around technology, it's not just about the technology. The transformation from traditional teaching methods to those that embrace this new way of learning has huge implications for teachers and students alike. For example, students in digital classrooms have access to more resources than ever before. Teachers are no longer limited by the physical location or size of the classroom; instead, they can engage with students anywhere in the world using these new tools.

ICT encompasses a wide range of tools and applications that support teaching and learning in tertiary institutions. Learning Management Systems (LMS) like Moodle and Blackboard facilitate online course delivery, while collaboration tools such as Google Classroom and Microsoft Teams enable interactive and collaborative learning environments. Interactive whiteboards, digital classrooms, and mobile learning applications further enhance the learning experience. Emerging technologies like Virtual Reality (VR) and Augmented Reality (AR) offer immersive learning opportunities. Case studies from various universities illustrate the diverse applications of ICT in higher education. Universities use a diverse set of ICT tools to communicate, create, disseminate, store, and manage information. In some contexts, ICT has also become integral to the teaching-learning interaction, through such approaches as replacing chalkboards with interactive digital whiteboards, using students' smart phones or other devices for learning during class time, and the "flipped classroom" model where students watch lectures at home on the computer and use classroom time for more interactive exercises when lecturers are digitally literate and trained to use ICT, these approaches can lead to higher-order thinking skills, provide creative and individualized options for students to express their understandings, and leave students better prepared to deal with ongoing technological change in society and the workplace. Digital games and toys shape the thinking and creativity ability of learners. Animated cartoon learning videos, storytelling toys, and educational learning tablets, and computer-like gadgets have emerged as guided and effective learning tools for students and kids.

The integration of ICT in tertiary education offers numerous benefits. It enhances student engagement and motivation by providing interactive and multimedia-rich learning experiences. ICT improves access to a vast array of resources and information, enabling students to learn at their own pace. Adaptive learning technologies facilitate personalized learning experiences, while collaboration and

communication are enhanced via online platforms. Additionally, ICT fosters the development of digital literacy skills, essential for the modern workforce. ICTs provide a great solution for information collection and sharing, making learning more relaxed and productive for all, anytime and anywhere. Tools like free and open-source software (FOSS), and websites like github.com and SourceForge.net, help students with knowledge building, reflection, sharing, and collaboration in project work. ICTs also promote self-evaluation and self-study via online tools. Users can learn in their dialects, which fills the language barrier gap in the teaching-learning process. Integration of ICTs in education helps learners, teachers, and administrators alike. ICTs help where traditional methods of learning may not be effective, such as for students with learning disabilities like dyscalculia and dyslexia. Research and revision can be done online and by using storage media like CD-ROMs, USB drives, and application programs. Application programs with animation, video, quizzes, and sound make learning more interactive. Teachers and administrators use ICT tools like electronic data interchange or management information systems for quick and accurate exam entries or other data logging operations. This reduces expenditure (printing and posting) and errors as well. Attendance monitoring software can automatically send a message to parents if their child is absent from class. Some schools now use ICT to manage their day-to-day activities and monitor students. Innovative teaching-learning practices and methodologies are emerging with the integration of ICT in teaching and learning.

This paper delves into how ICT has enhanced teaching and learning in the 21st century, specifically focusing on its influence on teachers and learners. It evaluates the overall impact of ICT on teachers, and students.

2. Statement of the Problem

This paper investigates how ICT enhanced teaching and learning for the teachers and students in higher institutions in the 21st century via the variables:

- A) Technology Operations and Concepts;
- B) Teaching and Learning;
- C) Productivity and Professional Practice;
- D) Social, Ethical, Legal and Human Issues;
- E) Assessment and Evaluation;
- F) Planning and Designing Learning Environment and Experiences.

3. Materials and Method

This study utilized a quantitative research design. Quantitative research is a valuable approach for gaining knowledge and understanding of the social world by systematically collecting and analyzing numerical data related to situations or events that affect people. The study also utilized a descriptive-relationship method for describing the teachers' level of ICT skills and the extent of its relationship to the learners' ICT skills. The descriptive-correlational method allowed for a com-

prehensive analysis of the data collected from the teachers' and students' responses.

The study was conducted in thirteen Higher Institutions in Enugu state (both private and public). Enugu state is in South Eastern state of Nigeria. Enugu City has been known as coal city and has grown to be a highly urbanized city in South Eastern Region of Nigeria. The respondents of the Study involved the intermediate teachers at both identified private and public institutions in Enugu state with the following number of participants. The research study utilized a probability sampling method to select participants from the population of both private and public institutions teachers and learners in Enugu state. Specifically, the study employed the Cochran sampling technique to determine the appropriate sample size. The resulting sample was representative of the population. (See **Table 1** and **Table 2**)

Table 1. Teacher's participation in the survey.

	Higher Institutions for Teachers participation	Number of participants
1.	ESUT	4
2.	SUMAS	5
3.	Enugu State College of Education Technical	3
4.	Coalcity University Nji Nike	2
5.	Renaissance University, Ugbawka	7
6.	Caritas University, Amorji Nike	3
7.	I.M.T, Enugu	3
8.	Peaceland College of Education, Enugu	2
9.	Enugu State Polytechnic, Iwollo	6
10.	College of Education Nsukka	2
11.	Federal Polytechnic, Ohodo	3
12.	Maduka University, Ekwegbe	13
13.	University of Nigeria, Nsukka	10
	Total	63

Table 2. Learner-participants of the study.

	Higher Institutions for Learners participations	Number of participants
1.	ESUT	34
2.	SUMAS	22
3.	Enugu State College of Education Technical	12
4.	Coalcity University Nji Nike	5
5.	Renaissance University, Ugbawka	23
6.	Caritas University, Amorji Nike	29
7.	I.M.T, Enugu	8
8.	Peaceland College of Education, Enugu	17
9.	Enugu State Polytechnic, Iwollo	28
10.	College of Education Nsukka	13
11.	Federal Polytechnic, Ohodo	14
12.	Maduka University, Ekwegbe	23
13.	University of Nigeria, Nsukka	14
	Total	242

The validity of the research instrument was secured through the scrutinized review of the experts as to the appropriateness of the content, structure, the order, and the grammar in the State institutions. After the validity was secured, the instrument was piloted to thirty teachers and learners in the selected pilot test higher institutions.

The responses of the participants that were gathered in the pilot testing were statistically treated to reveal whether the data collected from the instrument was reliable. Eventually, it garnered an $r = 0.968$ which signifies reliability of the instrument.

4. Sample Population

Afterwards, a letter of intent to administer survey was given to the Public and Private tertiary institutions, and University heads before conducting the survey.

The survey tool was administered to the lecturers and learners to assess their ICT skills and challenges in teaching and learning. The data gathered were responsibly taken from the samples in observance. The participants' responses to questions about their knowledge, instructional skills, and challenges in teaching ICT will be categorized using statistical measures such as mean, range, and value, along with their corresponding descriptive interpretations.

Table 3 displays the assigned scale, range, and interpretation for each item related to teaching and learning skills.

Table 3. Scoring and quantification table for teaching and learning skills.

Responses	Scale	Range	Interpretation
Very Confident	5	4.50 - 5.00	The participant possesses outstanding ICT skills.
Fairly Confident	4	3.50 - 4.49	The participant possesses evident ICT skills.
Neutral	3	2.50 - 3.49	The participant possesses adequate ICT skills.
Fairly Unconfident	2	1.50 - 2.49	The participant manifests poor ICT skills.
Very Unconfident	1	1.00 - 1.49	The participant has very inadequate ICT skills.

The gathered data underwent several statistical treatments to derive meaningful insights. The level of ICT skills and challenges of the tertiary institution lecturers and learners (students) in teaching and learning ICT were determined using the weighted mean. Correlation was utilized to examine the relationship between the ICT skills of the Higher Institution lecturers and those of the learners which are students. Meanwhile, regression analysis was used to determine the extent to which the ICT skills of the lecturers influence the ICT skills of the learners. These statistical tools provided a comprehensive understanding of the relationship between the variables and allowed for the interpretation of the data in a meaningful manner.

Prior to commencing data collection, this study adhered to the ethical guidelines protocol of the institutions. The respondents were provided with information about the study and given a consent form to sign. To protect the confidentiality and safety of the participants, the researcher had exclusive access to all

the surveys and ensured they could not be used in any legal actions against the respondents. These measures were implemented to ensure privacy and maintain ethical considerations that prevent any harm to the personal and academic lives of the respondents.

5. Technology Operations and Concepts

Table 4 below, presents the mean distribution of the extent of ICT skills of higher institution learners in terms of technology operations and concepts. The overall mean value of 2.01 indicates that learners have a slight level of confidence in their ICT skills related to technology operations and concepts.

One finding is that learners are very confident in communicating and collaborating online using different types of communication tools and platforms, with a mean value of 2.53. This suggests that teachers and learners have a good understanding of how to use communication tools effectively. However, learners are less confident in navigating and operating different hardware and software systems and troubleshooting technical issues, as well as understanding and applying basic coding and programming concepts, with mean values of 1.24 and 1.36, respectively.

These results imply that educators may need to focus more on teaching learners how to navigate and operate different hardware and software systems effectively, troubleshoot common technical issues, and apply basic coding and programming concepts. Policymakers may need to develop and implement policies that promote the integration of ICT skills related to technology operations and concepts into the curriculum of higher institutions.

Several studies have explored the role of ICT in enhancing learners' technology operations and concepts skills. For example, [6] found that using online collaborative tools can enhance students' problem-solving skills and knowledge related to technology operations and concepts. Similarly, [7], [8] and [9] found that the using of gamification in ICT courses can enhance students' motivation and engagement and improve their understanding of technology operations and concepts.

Table 4. Mean distribution of the extent of ict skills of the teachers and learners in terms of technology operations and concepts.

Teachers and Learners' ICT Knowledge/Skills in Technology Operations and Concepts	Mean	Description
I use technology tools to...		
1. Navigate and operate different hardware and software systems and to troubleshoot common technical issues.	1.24	Not at all Confident
2. Manage and organize digital files and folders and to backup and recovery data.	2.21	Slightly Confident
3. Communicate and collaborate online using different types of communication tools and platforms.	2.53	Very Confident
4. Create and edit different types of digital media, including text, graphics, audio, and video.	1.97	Slightly Confident
5. Conduct online research and to access and evaluate different types of digital information sources.	2.32	Slightly Confident

Continued

6. Protect personal privacy and security online and to avoid cyber threats and attacks.	2.05	Slightly Confident
7. Understand and apply basic coding and programming concepts to create and modify digital products and solutions.	1.36	Not at all Confident
8. Evaluate and compare different technology tools and platforms for specific tasks and purposes.	1.64	Slightly Confident
9. Stay up-to-date with emerging technologies and to understand their potential impact on society and the environment.	2.21	Slightly Confident
10. Develop and apply critical thinking and problem-solving skills to solve technical problems and challenges.	2.53	Slightly Confident
Overall Mean	2.01	Slightly Confident

6. Teaching and Learning of ICT

Table 6 shows the mean distribution of the level of skills in ICT in teaching and learning among teachers and students. The results indicate that the teachers are highly confident in using technology to support active and student-centered learning experiences, develop instructional materials aligned with curriculum standards, and innovate instruction based on the context of the high institutions and learners. Additionally, the teachers are also confident in using multimedia tools and resources to create interactive and engaging learning experiences, facilitate collaborative learning and communication among students, use data to inform instruction and improve learning outcomes, provide timely and meaningful feedback to students, design and implement authentic assessments that measure student learning outcomes, support inquiry-based learning and critical thinking skills, and improve their teaching practices based on students' level of learning.

The mean average results suggest that the use of ICT in teaching and learning has become an essential component of education. Teachers need to continue to enhance their ICT skills to keep up with technological advancements and improve their teaching practices. Additionally, higher institutions and policymakers should provide the necessary resources and support to help teachers integrate technology into their tutoring practices successfully. [10] provide the same evidence that teachers' strong understanding of how to integrate technology effectively into their teaching practices and their technological, pedagogical, and content knowledge are more likely to use technology to support student-centered and active learning experiences. (See **Table 5-9**)

Table 5. Mean distribution of the level of skills in ict in teaching and learning.

Teachers and learners' Level of Skills in ICT in Teaching and Learning.	Mean	Description
<i>I can:</i>		
1. Use technology to support active and student-centered learning experiences.	3.76	Very Confident
2. Develop instructional materials that align with curriculum standards and use technology to enhance student engagement and achievement.	3.67	Very Confident
3. Use technology to innovate instruction based on the context of the school and learners	3.67	Very Confident
4. Use multimedia tools and resources to create interactive and engaging learning experiences.	3.68	Very Confident
5. Use technology to facilitate collaborative learning and communication among students.	3.67	Very Confident

Continued

6. Use data to inform instruction and improve learning outcomes.	3.71	Very Confident
7. Use technology to provide timely and meaningful feedback to students.	3.62	Very Confident
8. Design and implement authentic assessments that measure student learning outcomes.	3.57	Very Confident
9. Use technology to support inquiry-based learning and critical thinking skills.	3.67	Very Confident
10. Use technology to improve my teaching practices based on students' level of learning.	3.65	Very Confident
Overall Mean	3.67	Very Confident

Table 6. Mean distribution of the level of skills in ict in productivity and professional practice.

Teachers and learners' Level of Skills in ICT in Productivity and Professional Practice	Mean	Description
<i>I can:</i>		
1. Use technology tools to design and implement engaging and personalized learning experiences that align with the needs, interests, and abilities of all learners.	3.70	Very Confident
2. Use technology tools to provide timely and specific feedback to students that supports their learning and growth.	3.75	Very Confident
3. Use technology tools to develop and share resources with colleagues, including lesson plans, assessments, and other instructional materials.	3.71	Very Confident
4. Participate in professional development opportunities that focus on technology integration and related best practices.	3.70	Very Confident
5. Use technology tools to collect and analyze data to inform instructional decisions and improve student learning outcomes.	3.68	Very Confident
6. Use technology tools to facilitate and support student-centered learning, including project-based learning, collaborative learning, and inquiry-based learning.	3.67	Very Confident
7. Use technology tools to provide access to authentic learning experiences that connect students to real-world issues and problems.	3.67	Very Confident
8. Use technology tools to support flipped and blended learning models that promote student agency and ownership of learning.	3.67	Very Confident
9. Use technology tools to support formative and summative assessments that measure student progress and inform instructional decisions.	3.71	Very Confident
10. Use technology tools to provide students with opportunities for self-reflection, self-assessment, and goal setting.	3.62	Very Confident
Overall Mean	3.69	Very Confident

Table 7. Mean distribution of the level of skills in ict in social, ethical, legal and human issues.

Teachers and learners' Level of Skills in ICT in Social, Ethical, Legal and Human Issues	Mean	Description
<i>I can:</i>		
1. Teach students to use technology tools to communicate and collaborate respectfully and responsibly with peers, teachers, and other members of the community.	3.62	Very Confident
2. Teach students to recognize and address cyber bullying, online harassment, and other digital dangers and to seek help when needed.	3.73	Very Confident
3. Teach students to respect and protect intellectual property rights and to practice ethical use of digital resources.	3.76	Very Confident
4. Teach students to be aware of their digital footprints and to manage their online identity responsibly.	3.67	Very Confident
5. Teach students to recognize and report incidents of digital fraud, hacking, and other cybercrimes.	3.62	Very Confident
6. Teach students to evaluate the credibility and reliability of digital resources and to use critical thinking skills to evaluate online information.	3.67	Very Confident
7. Teach students to use technology tools to promote cultural awareness, diversity, and inclusion.	3.63	Very Confident

Continued

8. Teach students to protect their privacy and personal information online and to be responsible digital citizens.	3.68	Very Confident
9. Teach students to use technology tools to promote social and environmental sustainability.	3.59	Very Confident
10. Use technology tools to create a safe, healthy, and positive learning environment that promote well-being and personal growth.	3.59	Very Confident
Overall Mean	3.66	Very Confident

Table 8. Mean distribution of the level of skills in ict in assessment and evaluation.

Teachers and learners' Level of Skills in ICT in Assessment and Evaluation	Mean	Description
<i>I can:</i>		
1. Use technology to create and administer assessments that align with curriculum standards.	3.63	Very Confident
2. Use data to monitor student progress and adjust instruction to improve learning outcomes.	3.60	Very Confident
3. Use technology to provide timely and meaningful feedback to students.	3.52	Very Confident
4. Use technology to support formative assessment and differentiated instruction.	3.70	Very Confident
5. Use assessment data to inform instructional decision making.	3.57	Very Confident
6. Design and implement authentic assessments that measure student learning outcomes.	3.56	Very Confident
7. Use technology to support self-assessment and reflection.	3.59	Very Confident
8. Use assessment data to evaluate the effectiveness of instructional practices.	3.60	Very Confident
9. Use technology together and analyze data to inform program evaluation and improvement.	3.60	Very Confident
10. Continuously update my assessment and evaluation practices to reflect the latest technology tools and trends.	3.63	Very Confident
Overall Mean	3.60	Very Confident

Table 9. Mean distribution of the level of skills in ict in planning and designing environment and experiences.

Teachers and learners' Level of Skills in ICT in Planning and Designing Environment and Experiences	Mean	Description
<i>I can:</i>		
1. Develop learning objectives that are aligned with curriculum standards and supported by appropriate technology tools.	3.73	Very Confident
2. Create lesson plans that incorporate technology to enhance student engagement and achievement.	3.71	Very Confident
3. Use data-driven decision making to design learning experiences that meet the diverse needs of students.	3.52	Very Confident
4. Use multimedia tools and resources to create interactive and engaging learning experiences.	3.70	Very Confident
5. Design assessments that measure student learning outcomes and provide feedback for instructional improvement.	3.62	Very Confident
6. Use technology to differentiate instruction and personalize learning for individual students.	3.68	Very Confident
7. Use technology to provide access to learning resources and support for students with disabilities or special needs.	3.54	Very Confident
8. Collaborate with colleagues to design and implement technology-enhanced learning experiences.	3.65	Very Confident
9. Use design thinking principles to create innovative and effective learning environments.	3.57	Very Confident
10. Continuously reflect on and refine my instructional practices to improve student learning outcomes.	3.59	Very Confident
Overall Mean	3.63	Very Confident

7. Results Analysis

Multiple Regression Analysis Summarized the Influence of ICT on the Enhancement of Teaching and Learning in Higher Institutions.

The objective was to determine the extent to which ICT enhances teaching and learning in higher institutions. Based on the multiple regression analysis summarized in table 10, the results show that several variables significantly influence pupils' ICT skills. The variables are Technology Operations and Concepts, Teaching, Learning and Curriculum, Assessment and Evaluation, Productivity and Professional Practice, and Social, Ethical, Legal and Human Issues. Technology Operations and Concepts have a negative coefficient (-0.434) and a significant effect ($p = 0.032$), indicating that pupils who have a better understanding of technology operations and concepts tend to have higher ICT skills (See **Table 10**). This finding is consistent with previous research that highlights the importance of technology literacy in developing ICT skills among pupils [11]

Table 10. Multiple regression analysis summary influencing the pupils ICT skills.

Variables	B	SE	β	t	p
(Constant)	7.343	0.234		7.003	0.000
Technology Operations and Concepts	-0.772	0.134	-0.434	-3.217	0.032*
Planning and Designing Learning Environment and Experiences	-0.027	0.037	-0.067	-0.723	0.471
Teaching and Learning	0.067	0.039	0.153	1.986	0.035*
Assessment and Evaluation	0.459	0.034	0.278	3.561	0.000*
Productivity and Professional Practice	0.765	0.092	-0.478	-3.425	0.015*
Social, Ethical, Legal and Human Issues	-0.187	0.287	-0.348	-3.712	0.016*

8. Discussion of the Major Findings:

Teaching and Learning have a positive coefficient (0.153) and a significant effect ($p = 0.035$), signifying that teachers and students who received effective instruction and learning experiences in ICT tend to teach and learn better. This finding is consistent with previous research that highlights the importance of pedagogical strategies offer ICT in higher institutions and among teachers and students [12].

Assessment and Evaluation have a positive coefficient (0.278) and a significant effect ($p = 0.000$), indicating that effective assessment and evaluation of teachers and students' ICT skills can contribute to the enhancement of teaching and learning in higher education. This finding is consistent with previous research that emphasizes the importance of assessment and evaluation in improving ICT education [13].

Productivity and Professional Practice have a negative coefficient (-0.478) and a significant effect ($p = 0.015$), showing that teachers and students who use ICT tools to increase productivity and improve professional practice in higher institutions tend to have higher ICT skills. This finding is consistent with previous research that highlights the importance of integrating ICT in institution of higher learning [14].

Social, Ethical, Legal, and Human Issues have a negative coefficient (-0.348) and a significant effect ($p = 0.016$), indicating that teachers and students who have a better understanding of social, ethical, legal, and human issues related to ICT tend to contribute more in enhancement of teaching and learning in higher institutions. This finding is consistent with previous research that highlights the importance of ethical and social considerations in ICT education [15]. Planning and Designing Learning Environment and

Experiences do not have a significant effect on teachers and students' ICT knowledge, as shown by its non-significant coefficient ($p = 0.471$).

9. Conclusion

In conclusion, ICT has become an indispensable tool for enhancing teaching and learning in tertiary education in the 21st century. The integration of ICT offers numerous benefits, including improved student engagement, personalized learning, and increased access to resources. Professional development and continuous assessment and evaluation are essential for effective enhancement. By embracing emerging technologies and fostering a culture of innovation, tertiary institutions can ensure they remain at the forefront of educational excellence.

10. Recommendations

A. The critical success factor in enhancing Teaching and Learning in Tertiary Institutions is majorly through the support of the government. Governments should step up their efforts in funding technology-enhanced training and necessary policies to enhance the effective and efficient use of ICT in all Tertiary Institutions [16].

B. Intensive computer programs should be organized every year for students and teachers to enable them to become efficient in the use of ICT. To make this possible, computer and internet-related assignments should be given to the Learners (students and teachers) to enable them to put more effort into the learning of the ICT packages.

C. Electricity supply should be steady and reliable (they can even change to solar energy). Computer competency tests should be given to students before admission into any Tertiary Institution [17].

Conflicts of Interest

The authors declare no conflicts of interest.

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