ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25nov1371

Assessing the Impact of Information and Communication Technology (ICT) on Student Learning in Higher Education: Evidence from Milton Margai Technical University and the College of Business and Information Technology, Sierra Leone

Kabba Haroun Bangura[1]; Zachariyah Bai Conteh[2]; Allieu Edward Kanu[3]

[1]Faculty of Computer Science and Technology,
Department of Computer Science,
Kono University of Science and Technology, Sierra Leone

[2]Faculty of Computer Science and Technology,
Department of Computer Science,
Kono University of Science and Technology, Sierra Leone

[3]Faculty of Computer Science and Technology,
Department of Computer Science,
Kono University of Science and Technology, Sierra Leone

Publication Date: 2025/12/09

Abstract: This study examines the influence of Information and Communication Technology (ICT) on students' learning in higher education, with specific reference to Milton Margai Technical University and the College of Business and Information Technology in Sierra Leone. The research explored how the availability, accessibility, and usability of ICT resources affect students' academic engagement and outcomes. A cross-sectional survey design was employed, using questionnaires and interviews to collect data from 440 respondents selected from a population of 3,173. The analysis applied Pearson correlation to test the hypotheses on the relationship between ICT usage and students' learning. Findings revealed that ICT infrastructure in the two institutions is limited, with inadequate computer laboratories, internet connectivity, and teaching software. Despite these constraints, results indicated a significant positive correlation between ICT availability, accessibility, usability, and students' learning. The study concludes that strengthening ICT facilities and training is crucial for improving academic quality. It recommends that universities invest in ICT infrastructure, ensure reliable internet access, and integrate ICT into teaching and learning practices to enhance educational outcomes. This study examines how Information and Communication Technology (ICT) influences student learning in higher education institutions in Sierra Leone, focusing on Milton Margai Technical University and the College of Business and Information Technology. A cross-sectional survey of 440 respondents was conducted to assess the availability, accessibility, and usability of ICT resources. The results revealed that while ICT facilities are present in limited quantities, their accessibility and effective utilization remain constrained by inadequate infrastructure, unreliable connectivity, and low digital literacy. However, statistical analysis indicated significant positive relationships between ICT integration and student learning outcomes. The study recommends increased investment in ICT infrastructure, capacity building for lecturers and students, and policy measures to promote digital inclusion across tertiary institutions in Sierra Leone. *(López-Sánchez et al., 2023; World Bank, 2022).*

Keywords: *Information and Communication Technology, Students' Learning, Higher Education, Sierra Leone, ICT Resources.*

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25nov1371

How to Cite: Kabba Haroun Bangura; Zachariyah Bai Conteh; Allieu Edward Kanu (2025) Assessing the Impact of Information and Communication Technology (ICT) on Student Learning in Higher Education: Evidence from Milton Margai Technical University and the College of Business and Information Technology, Sierra Leone. *International Journal of Innovative Science and Research Technology*, 10(11), 2865-2872. https://doi.org/10.38124/ijisrt/25nov1371

I. INTRODUCTION

The rapid advancement of Information and Communication Technology (ICT) has transformed every sector of modern society, including education. In higher education, ICT has become a vital tool for teaching, learning, and research. Its integration has redefined traditional methods of knowledge delivery, allowing students and lecturers to access vast educational resources and collaborate beyond physical classroom boundaries. Globally, ICT promotes interactive learning, fosters innovation, and enhances students' critical thinking skills by providing flexible and dynamic learning environments (UNESCO, 2021). As the world increasingly relies on digital systems, the effective use of ICT in higher education has become a key determinant of academic quality and institutional competitiveness (López-Sánchez et al., 2023).

In many advanced economies, ICT integration is considered a core component of educational policy and practice. Universities have adopted learning management systems, digital libraries, and virtual classrooms to improve access to learning materials and enhance instructional efficiency. The European Commission (2020) stresses that digital competence is now a fundamental skill necessary for employability and lifelong learning, while the World Bank (2022) recognizes ICT as a crucial driver for inclusive and equitable education. However, in developing regions, especially Sub-Saharan Africa, the full potential of ICT in higher education remains largely untapped due to infrastructural deficits, limited funding, and inadequate policy implementation. These disparities have led to persistent gaps in technological adoption and quality learning outcomes across African institutions (Mhlanga & Moloi, 2022).

In Sierra Leone, ICT is increasingly acknowledged as an essential instrument for educational and economic transformation. The government, through the Ministry of Technical and Higher Education, has emphasized digital learning as part of its Education Sector Plan (ESP 2022–2026), which seeks to modernize teaching and learning through technology. Despite these policy commitments, implementation remains weak across many tertiary institutions. Existing studies show that most universities face critical challenges such as insufficient computer laboratories, unreliable internet connectivity, and limited access to modern educational software (Kamara & Sesay, 2021; Sesay, 2022). As a result, ICT adoption in teaching and learning is inconsistent and often dependent on individual lecturers' motivation rather than institutional support.

At Milton Margai Technical University and the College of Business and Information Technology, the focus of this study—these challenges are evident. Many students rely on their personal smartphones and mobile data to access online learning materials, while only a small fraction use institutional computer labs. Lecturers also face constraints, including the absence of reliable electricity and digital tools that could facilitate blended learning. Consequently, ICT use is primarily limited to basic administrative tasks, word processing, and presentation preparation. This limited application undermines the transformative potential of technology in fostering interactive and student-centered learning environments (Afolabi & Okeke, 2020).

The issue is compounded by disparities in access and digital literacy among students. Those from urban areas or higher socioeconomic backgrounds tend to have better access to digital devices and internet services than their counterparts from rural regions. This digital divide creates inequalities in learning experiences and academic outcomes, contradicting the principles of inclusive education. According to UNESCO (2021), equitable access to ICT is essential for ensuring that all learners can benefit from the digital revolution. In Sierra Leone, however, the cost of connectivity and lack of institutional infrastructure continue to exclude many students from fully participating in digital learning initiatives.

Furthermore, the pedagogical use of ICT in Sierra Leonean higher education remains underdeveloped. Most lecturers have not received formal training in integrating technology into their teaching practices, resulting in a predominance of traditional, lecture-based methods (World Bank, 2022). Even when ICT tools are available, their use tends to be limited to administrative or assessment-related functions rather than interactive teaching. Mhlanga and Moloi (2022) note that effective ICT integration requires not only equipment but also pedagogical innovation and institutional commitment to continuous professional development. Without such efforts, technology risks becoming an underutilized resource rather than a catalyst for academic improvement.

Given these realities, there is a critical need to assess how ICT affects student learning outcomes within the context of Sierra Leone's higher education system. Specifically, understanding the roles of ICT availability, accessibility, and usability can provide insight into how technology can be leveraged to enhance teaching and learning. These three dimensions form the conceptual framework of this study. Availability refers to the presence of ICT infrastructure such as computers, internet access, and learning management systems. Accessibility examines whether students can easily and equitably use these resources, while usability focuses on the competence and readiness of both students and lecturers to apply ICT effectively in learning processes (López-Sánchez et al., 2023).

This study investigates these dimensions through a case analysis of Milton Margai Technical University and the College of Business and Information Technology. By exploring how ICT resources are distributed, accessed, and utilized, the research seeks to establish the extent to which technology contributes to improved learning outcomes. The findings will not only inform institutional strategies for ICT

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25nov1371

development but also contribute to national policy discussions on digital transformation in higher education. Moreover, the study highlights the importance of building digital competencies among both educators and learners as a pathway to quality and equitable education in Sierra Leone.

A. Objectives of the Study

The overall aim of this research is to examine how Information and Communication Technology (ICT) affects student learning in Sierra Leone's higher education system, with specific reference to Milton Margai Technical University and the College of Business and Information Technology.

The study pursued three specific objectives:

- To determine how the availability of ICT resources influences student learning.
- To examine how the accessibility of ICT facilities affects student learning.
- To investigate how the usability of ICT resources contributes to student learning outcomes.

II. STUDY METHODOLOGY

➢ *Research Design*

The study employed a cross-sectional survey design**.** This design was chosen because it enables the collection of quantitative and qualitative data from a population at a single point in time, allowing comparisons among sub-groups and identification of relationships between ICT factors and learning outcomes. A structured questionnaire captured students' perceptions of ICT availability, accessibility, and usability, while semi-structured interviews with lecturers and administrators provided explanatory depth.

The mixed-methods approach strengthened validity by combining numerical data with contextual insights. Quantitative responses were analyzed using descriptive statistics and correlation analysis, while qualitative comments were thematically reviewed to illustrate trends. This design aligns with recommendations by Creswell and Creswell (2018) that educational technology research benefits from complementary quantitative and qualitative evidence.

➢ *Study Location*

The study was conducted in Sierra Leone's Western Area, encompassing both urban and peri-urban contexts. Data were collected from two institutions: Milton Margai Technical University (Godrich and Congo Cross campuses) and the College of Business and Information Technology. These institutions were selected due to their strategic roles in training professionals and their efforts to expand ICT-based teaching. The Western Area provided a representative setting, capturing both infrastructure challenges and opportunities for ICT adoption in higher education (World Bank, 2022).

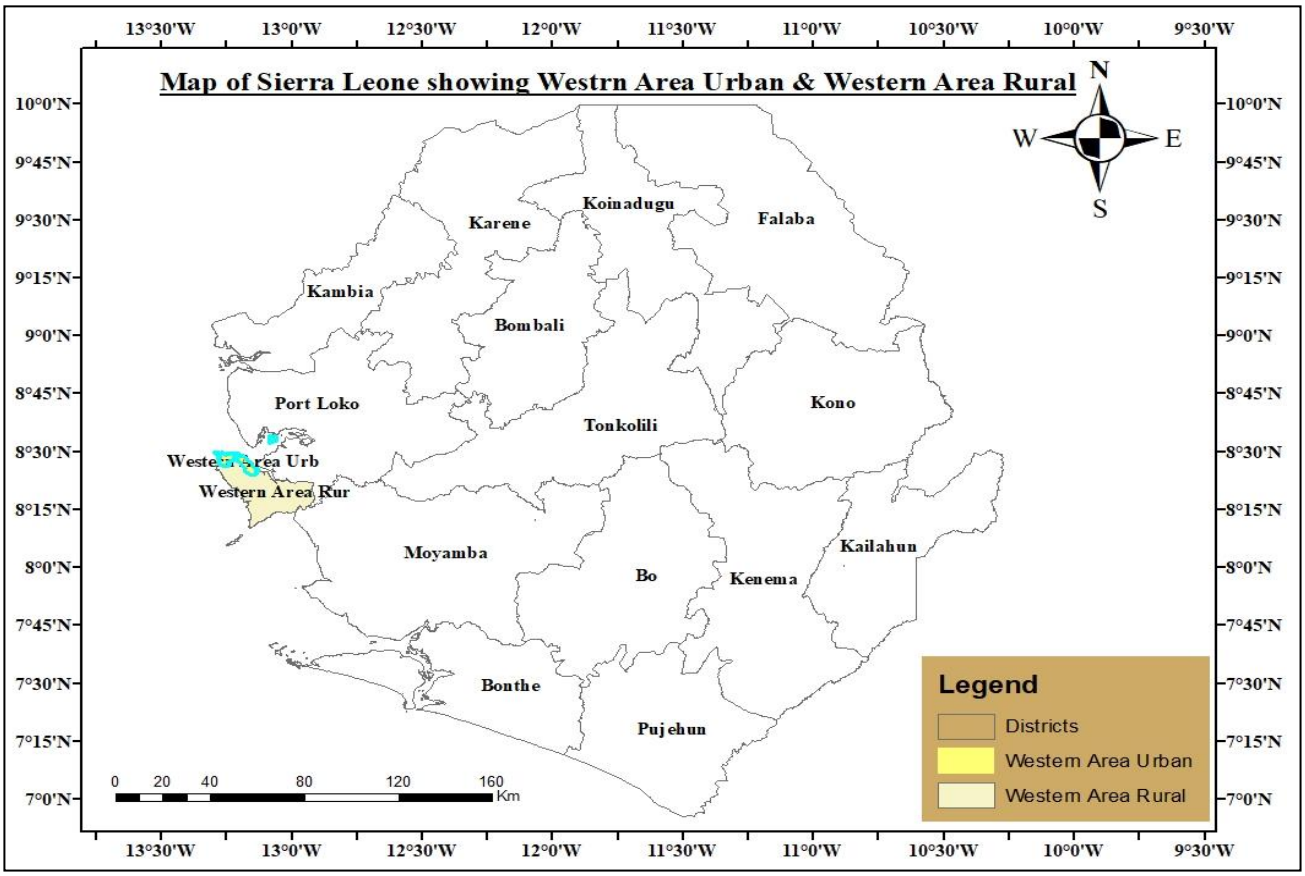

Fig 1: Map of Sierra Leone Showing Western Area Urban & Western Area Rural Districts

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25nov1371

➢ *Study Population and Sampling*

The target population consisted of undergraduate students, lecturers, and administrators from the selected institutions. From a population of 3,173 students, a sample of 440 was drawn to ensure representativeness. Stratified sampling ensured inclusion of students across faculties, years of study, and gender categories. Within these strata, convenience and purposive sampling techniques were employed to identify respondents who could provide relevant insights into ICT use. Including lecturers and administrators provided triangulation of perspectives, enhancing the credibility of the findings (Creswell & Creswell, 2018).

III. 111. RESULTS AND DISCUSSIONS

This section presents and interprets the findings of the study according to its three specific objectives: availability, accessibility, and usability of ICT resources. The discussion integrates both quantitative and qualitative results and aligns them with previous research to provide a comprehensive understanding of the role ICT plays in students' learning in Sierra Leonean higher education institutions.

➢ *Demographic Characteristics*

This section outlines how respondents were distributed across institutions, academic programs, age categories, gender, and year of study.

Milton Margai Technical University and Goderich Campus, Congo Cross Campus, and College of Business and Information Technology address the different colleges under participation in the studies, and the locations.

➢ *Program of Study of Respondents*

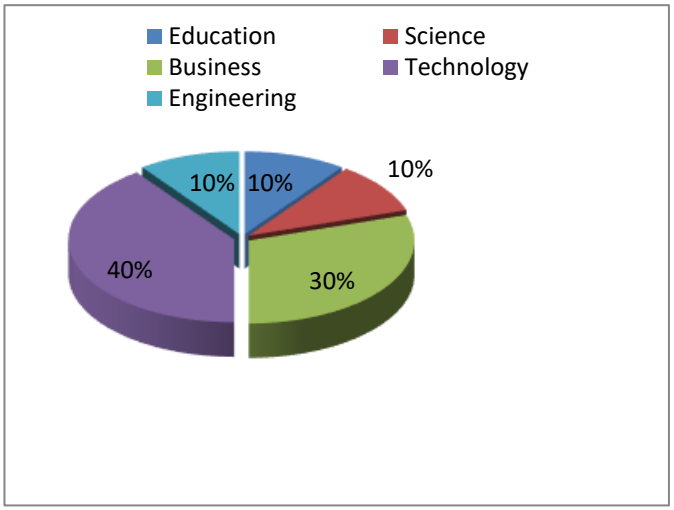

Fig 2 Program of Study of Respondents
Field Survey 2021

Figure 2 shown above displays the number of respondents from each Department who participated in the research.

(1.7%) Milton Margai Technical University (Godrich Campus) respondents, 10% respondents of the Department of Education, Department of Science, and 10% from the Department of Business. (20%) of Congo Cross Campus, with (10%) of the Department of Engineering and (10%) of the Department of Technology.

(10%) Respondents of the College of Business and Information Technology (6%), the Department of Technology (4%), and the Department of Business.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25nov1371

This shows that the largest percentage of the respondents, which is 20%, are from Congo Cross Campus.

➢ *Year of Study of Respondents*

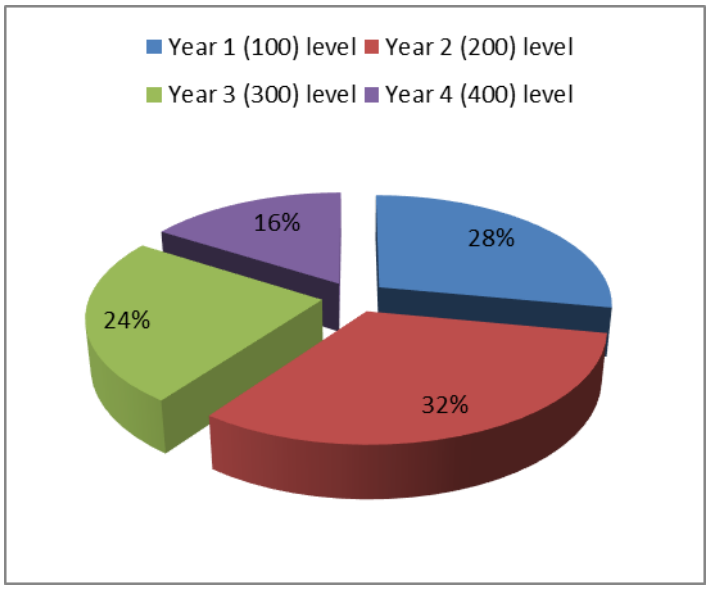

Fig 3 Year of Study of Respondents
Field Survey 2021

Figure 3 displays the frequency distribution of their levels within the colleges, i.e., Year 1 which accounts for 28% (100 Level) is the first year in the colleges; Year 2 which accounts for 32% (200 Level) is the second year; Year 3 which accounts for 24% (300 Level) is the third year, and Year 4 which accounts for 16% (400 Level) is the fourth year.

➢ *Age Groups of Respondents*

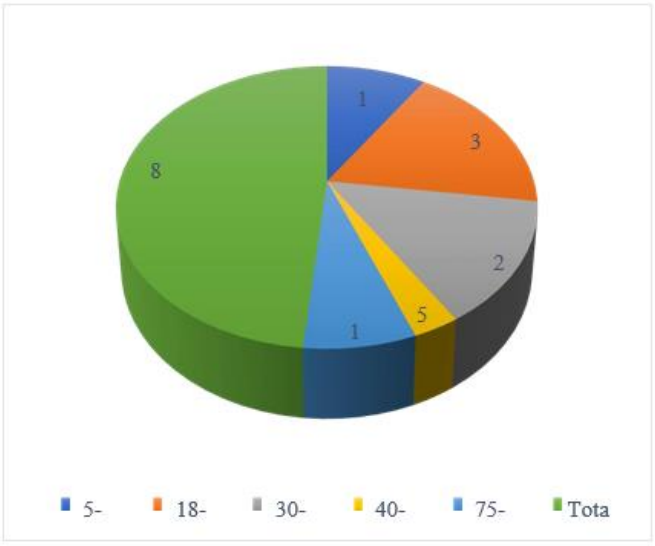

Fig 4 Age Groups of Respondents
Field Survey 2021

From Figure 4 above, 15 of the respondents between the age of 5-10 years representing 37% while 30 of the respondents between 18-25 years representing 38% while 23 of the respondents between the age of 30-40 years representing 26.1% were 5 respondents between the age of 40-60 representing 9% while also 12 respondents between the age of 75-85 were represent 14%. This implies that the majority of the respondents who were ready to participate in this study were aged 18 to 25 years.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25nov1371

➢ *Gender of Respondents*

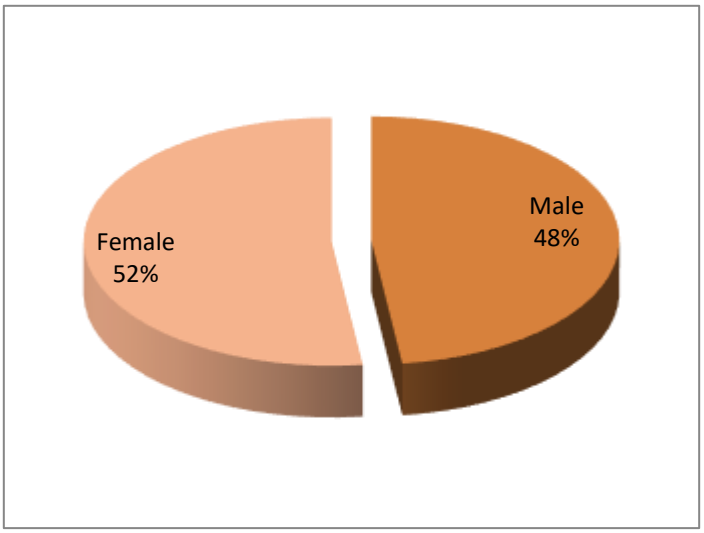

Fig 5 Gender of Respondents
Field Survey 2021

Figure.5 shows that (48%) of the population of the study sample are male and (52%) of the sample population are female, which shows that there are more females in the study.

Table 1: Respondents' Opinion on the Availability of ICT Resources

	Not Available	**Fairly Available**	**Available**
Computers in the Classroom	71%	28%	26%
Internet and E-Mail	67%	56%	28%
Projector	44%	92%	60%
Computer laboratory	9%	50%	40%
Software	31%	46%	21%

Field Survey 2021

The study found that ICT resources are present but unevenly distributed across the campuses. For example, a large majority, 71% of respondents said that computers were not available in classrooms. Only 26% confirmed that computers were available, and 28% said they were fairly available. This clearly shows that most teaching spaces lack essential ICT equipment.

Availability of internet facilities was also uncertain. About 67% of students were not sure whether the institutions had functioning internet, which reveals inconsistent or unreliable connectivity. While 56% said internet was fairly available and 28% said it was available, these values show that internet access is not dependable or widespread.

Projectors performed the best in terms of availability. An overwhelming 92% said projectors were fairly available, and 60% said they were available for use. However, 44% still stated that projectors were unavailable in certain areas, showing inconsistent distribution across campuses.

Computer laboratories appeared more accessible: 50% of respondents said labs were fairly available, 40% said they were available, and only 9% were unsure. This suggests that computer labs are one of the more reliable ICT access points for students.

Software availability was still weak. 31% indicated that software was not available, 46% said it was fairly available, and 21% said it was available. This means students may be limited in what they can learn or work on because necessary programs and applications may not be accessible.

Overall, these findings show that although the institutions have some ICT facilities, the distribution is unbalanced and does not adequately support students' learning needs.

Table 2: Respondents' Opinions on Accessibility of ICT Resources and Students' Learning

	Never at all	**Not sure**	**Sometimes**	**Always**
Library	23%	4%	61%	10%
Computer Lab	5%	6%	59%	29%
Lecture rooms	43%	1%	28%	26%
Resource center	40%	21%	31%	6%
Halls of residence	67%	7%	16%	9%

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25nov1371

Internet kiosk	37%	11%	38%	12%

Field survey 2021

Table 2 shows that the most frequented place for students to access ICT for general purposes is the college library and computer lab, as 29% of the students use ICT resources in the computer lab always, and 59% of the respondents opined that sometimes they use ICT resources in the computer lab. This finding is reinforced by most (61%) of the library users to using ICT occasionally from the library. 6% did not know and 5% responded that they never utilized any form of ICT materials in the computer lab. This means that restricted access to ICT facilities both in computer lab and library tends to deprive students of exploration of ICT resources for information and knowledge procurement necessary for their research work.

Discoveries in 2 indicate that just 26% of the respondents said they always utilize ICT resources in the lecture rooms, while almost 28% said sometimes they utilize ICT resources in the lecture rooms. Few of the respondents (1%) were uncertain if there are ICT facilities available in the lecture rooms, and 43% of the respondents answered that they never utilize any ICT facilities in the lecture room. The conclusion indicates that the availability of ICT facilities in the lecture rooms remains poor, and if the lecture room is a shared learning space, then access to ICT resources needs to be improved in an effort to offer both lecturers and student's access to and production of resource materials surrounding the lectures and learning processes.

Effective use of ICT in colleges would call for whole institutions as working networks to grant access to rich learning resources and multimedia on the university Intranet and the Internet wherever lecturers and students are, in or out of campus. The computer labs and class computers should be sufficient in numbers to offer ready access by staff and students in most courses in multiple campuses.

Despite the above desired situation, most Institutions in Africa are deprived of effective integration of ICT in the learning and teaching process; limited infrastructure in the form of adequate physical conditions of laboratories and the resultant accessibility of the facilities (ICT) to the students (Singh, 1993).

Table 3: User-Ability (ICT Skills) Among Students

	Very poor	**Poor**	**Fair**	**Good**	**Very Good**
Word processing	6%	5%	22%	41%	24%
Spreadsheet	7%	8%	33%	34%	16%
Online instruction Blackboard	23%	22%	29%	17%	6%
Video conferencing	30%	34%	22%	8%	5%
Slide presentation	10%	13%	37%	23%	14%
Publication software	23%	28%	26%	15%	5%
Projectors	17%	20%	26%	24%	12%
Internet and E-mails	4%	8%	21%	29%	36%

Field Survey 2021

Findings in Table 3 show that the majority of the participants 41% emphasized that their ability to utilize MS word is good. Likewise, 24% respondents claimed that their ability was very good, whereas 22% rated their ability as fair. Although 5% and 6% respondents rated their ability as poor and very poor, respectively, to utilize MS Word. The finding shows that the students' capacity to use MS Word for their educational requirements, such as coursework preparation, is quite good and shows that ICT has the potential to influence learning.

Table 3 contained 16% of the respondents who anticipated their ability to use spreadsheets as very good and 33%of the respondents who indicated their ability as fair. The majority of the respondents 34% marked their ability to use spreadsheets as good. Though 8% marked their ability as poor, and 7% marked them as very poor. Several students gave an interview to the researcher where they revealed that the curriculum taught to them is very superficial, and one teacher also concurred that "we teach them only elementary parts," which was another sign of the superficiality of the taught material.

The findings that were obtained from the aforementioned Table 3 revealed that 14% of all respondents agreed that their skills to use presentation software in carrying out learning tasks were very good. 23% of the respondents agreed that their skills were good. On the other hand, most of the respondents, representing 37%, believed that their skills to use presentation software in carrying out learning tasks were fair. While, 13 % thought that their skills were poor and 10% thought their skills were very poor in using presentation software. The above results show that the students were very capable and competent in using presentation software like PowerPoint in presenting the course content in class discussions and lessons.

Teachers in the developed world are making fullest use of ICT in all aspects of professional life to improve their own learning and that of their students (Davis, 2000). Teachers use ICT to assist students in assessing their own learning in the process of carrying out some personal projects. Exchanging experiences for problem-solving is a routine phenomenon among teachers where they communicate with other teachers. ICT becomes the driving force for thrilling new lecturing and learning opportunities

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25nov1371

IV. CONCLUSION

The study concludes that the existing ICT infrastructure in the University is still largely inadequate, unevenly distributed, and insufficient to support effective teaching and learning. Although some facilities, such as computer laboratories, projectors, and basic software, are available to a reasonable extent, they remain far below the levels required for meaningful ICT integration. Despite these limitations, the institutions have shown an awareness of the importance of ICT and have made initial efforts toward improvement.

Access to ICT tools across departments is still limited for both students and lecturers. A major constraint remains the shortage of ICT resources compared to the rising student population. Although there are facilities that can be used as a foundation for future growth, access is still minimal, often restricted to computers alone.

Additionally, the ICT skills acquired by most students are confined mainly to simple MS Office applications. This restricts broader skill development and does not sufficiently prepare students for more advanced ICT-related tasks or digital learning opportunities.

V. RECOMMENDATIONS

Based on the research findings, several actions are recommended to strengthen ICT integration and enhance student learning:

- *Expand ICT Infrastructure*

The University should significantly increase investment in computers, projectors, printers, and other modern technologies. More equipment in classrooms and laboratories will boost both accessibility and practical usage.

- *Improve Internet Connectivity*

Reliable internet access must be restored and maintained across all campuses. Additional computers should be connected to the internet to ensure students and lecturers can utilize online learning materials, digital libraries, and communication tools.

- *Establish ICT Resource Centers*

There is a need to create comprehensive ICT centers where up-to-date software, digital tools, and learning materials are available to everyone in the institution. These centers should be fully equipped and open for frequent use.

- *Broaden ICT Training Programs*

Training should go beyond MS Office packages. More advanced software, academic tools, and specialized ICT programs relevant to university-level learning should be introduced. Students and lecturers need continuous ICT capacity-building programs.

- *Integrate ICT into Teaching and Learning*

ICT should no longer be treated as a standalone component. Instead, it must be embedded into the overall instructional process, allowing technology to enhance pedagogy, research, and assessment.

- *Encourage Students to Seek Supplementary Access*

Given the current gap between available facilities and the number of students, learners should be encouraged to supplement their ICT use through commercial services such as internet cafés until the University fully scales up its capacity.

Implementing these recommendations can strengthen digital learning environments, improve student performance, and support modern teaching practices across the institutions.

REFERENCES

[1]. Afolabi, F., & Okeke, C. (2020). ICT integration in African universities: Opportunities and constraints. *African Educational Research Journal*, *8*(3), 112–124.*
[2]. Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage Publications.
[3]. European Commission. (2020). *Digital education action plan 2021–2027: Resetting education and training for the digital age.* Brussels: European Union.
[4]. Kamara, M., & Sesay, S. (2021). ICT integration in higher education in Sierra Leone: Challenges and prospects. *Journal of African Higher Education Studies, 5*(2), 45–60.*
[5]. López-Sánchez, J. A., García-Peñalvo, F. J., & Conde, M. Á. (2023). ICT adoption and student learning outcomes in higher education: A systematic review. *Computers & Education, 194*, 104685. https://doi.org/10.1016/j.compedu.2023.104685
[6]. Mhlanga, D., & Moloi, T. (2022). COVID-19 and the digital divide: Lessons for online learning in Sub-Saharan Africa. *International Journal of Educational Technology in Higher Education, 19*(1), 21. https://doi.org/10.1186/s41239-022-00336-7
[7]. Sesay, Z. (2022). The digital divide and student learning in Sierra Leonean universities. *Sierra Leone Journal of Education and Development, 3*(1), 88–102.*
[8]. UNESCO. (2021). *The digital transformation of education: A review of global practices.* Paris: UNESCO Publishing.
[9]. World Bank. (2022). *Sierra Leone Education Sector Plan 2022–2026: Transforming learning for all.* Washington, DC: World Bank.