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Gender Differences and Competences of Students in the Usage of ICT for Learning At the St. John's University, Tanzania

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Abstract

This study examined the extent to which students at the St. John's University in Dodoma use information and communication technology (ICT) in learning. A quantitative research design was employed, utilizing the survey method to collect data. Convenience sampling was used to select 110 respondents whose e-mails were obtained. Data was analysed using the Statistical Package for Social Sciences (SPSS). The chi-square test was employed to explore the relationship between certain variables, while the Spearman t-test was employed to determine the correlation between students' use of ICT in learning and their search competences. The key findings indicate that students at St. John's University have a high level of ICT usage in their learning endeavours, despite some inadequacies in the available learning facilities. Moreover, gender does not significantly influence the application of ICT in learning. Additionally, there was no significant relationship found between the use of ICT in learning and students' competences in search skills. The study reveals that students heavily rely on both audio-visual materials and online textual resources. Based on the findings, it is recommended that the St. John's University continues to enhance its ICT infrastructure to facilitate effective access and utilization of information by students. Libraries should allocate sufficient funds for the subscription of mostly electronic resources along with print resources.

Keywords: *students search skills competence, gender; ICT usage*

1. Introduction

The use of information and communication technology (ICT) by students in learning globally has been rapidly increasing (Mahmood, 2009). This trend has led to significant advancements in learning opportunities, breaking down barriers of geography and socio-economic status due to the integration of digital technologies, such as computers, the internet and mobile devices in learning (Jaffer et al., 2007). In the West, France, along with the United Kingdom and the United States, were among the pioneering nations in using ICT in the educational sector (Baron & Bruillard, 2003), a phenomenon which to date has revolutionized learning, offered vast opportunities for educational advancement, and has significantly expanded students' access to information.

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With the internet, for example, students can search for, and access, a vast range of educational resources, including e-books, online courses, research papers and multimedia materials as exemplified by Llorent-Vaquero et al. (2020), who found that there was high usage of ICT in education in Europe, and students demonstrated commendable proficiency in their use, with slightly elevated levels in some countries such as Italy. Furthermore, ICT enable learners to engage in online lectures, access virtual libraries and databases, participate in distance learning, and collaborate with peers (Kaino, 2008). The integration of ICT into learning courses has the potential to enhance educational activities by providing reach, flexibility and immediacy (Thomas & Thomas, 2012).

However, despite this fact, ICT in India has had a relatively modest impact on educational practices, although its influence is poised to increase significantly in the future (Sarkar, 2012). In Africa, Atsumbe et al. (2014) observed that although learners at the Federal University of Technology in Nigeria possessed computers and laptops, these resources were underutilized for internet access and learning due to a number of reasons, including limited digital search competence. Meanwhile, studies by Sofowora (2012), Ani and Esin (2003), and Boni (2018), which were conducted in West Africa, found that ICT usage was high, although they admitted there was inadequate infrastructure. In East Africa, the Makerere University successfully integrated ICT into academic functions and established a dedicated Directorate of ICT (Okello-Obura & Ssekitto, 2015). However, despite the availability of ICT resources in many developing countries, their effective usage in learning is not guaranteed. Therefore, it is important to investigate the extent of students' ICT usage and explore factors that may influence their engagement with these technologies. In Tanzania, challenges in effectively utilizing ICT are reported to persist, as observed in the case of the Open University of Tanzania, where low usage of ICT for learning has been reported due to inadequate infrastructure and digital search competence (Mtae, 2012).

Some studies have examined the usage of ICT in various educational contexts in Tanzania, but few have specifically focused on the St. John's University in Tanzania. Kagugu (2011), Makewa et al. (2014), Mtae (2012) and Mungwabi (2018) have explored ICT usage in different institutions and settings such as in distance learning, teaching integration, and administrative purposes in Tanzania. However, there is a research gap regarding the current state of ICT use for learning at the St. John's University. Therefore, this study aimed to fill this gap and provide insights into the specific context of ICT use at the university since it has an ICT Centre and internet access (Swarts & Mwiyeria, 2010).

This study examined the relationship between students' ICT usage in learning and their gender. Some studies have presented diverging findings on gender, with some indicating significant gender differences in ICT usage (Jorge et al., 2003; Shaw & Marlow, 1999), and others showing only slight differences (Qazi et al., 2021) and Mahmood (2009); i.e., male and female students are not different in

using various ICT-based services. Understanding this relationship within the specific context of the St. John's University would provide valuable insights. Additionally, the study explored the connection between students' ICT resource usage in learning and their competences in information search skills. Competence in information search skills is crucial for effectively utilizing ICTs for learning, as it involves the ability to search, identify, locate, evaluate, and use information (Nolen, 2013). According to Makewa et al. (2014), there is a strong relationship between competence and ICT use in teaching and learning, highlighting the importance of assessing students' competences in this area. Shopova (2014), for instance, found that university students were good at accessing and surfing the Internet for learning. However, their competence was insufficient.

Furthermore, this study compares the means of students' use of ICT-based resources such as audio-visual materials and textual online resources in learning. Prior research has highlighted the benefits of audio-visual aids and materials in enhancing learning (Al Mamun, 2014; Idris et al., 2018; Al Aqad, et al., 2021). Tang and Intai (2017) and Ho and Intai (2017) for instance, observed that a significant portion of students concurred that the incorporation of audio-visual materials heightened their enthusiasm, and enhanced their capacity to retain the subject matter. Therefore, there was a need to explore students' preferences and usage patterns of these resources within the context of ICT integration at the St. John's University. Lastly, this study identified the constraints to effective ICT use in learning. Understanding the challenges faced by students in utilizing ICTs for learning purposes can inform the development of strategies and interventions to overcome these obstacles.

Therefore, this study bridges the afore-mentioned research gaps regarding the extent of ICT use in learning at the St. John's University. The findings provide valuable insights into students' ICT usage patterns, gender differences in ICT use, information search skills, preferences for audio-visual or textual resources, and the constraints faced. These findings are crucial in the context of evolving technology and changing educational needs. The specific objectives and aspects mentioned in this introduction were the driving factors behind the adoption of the Katunzi-Mollel model, presented hereunder as the theoretical framework.

1.2 Theory Governing the Study

The study adopted the Katunzi-Mollel (2013) model for ICT and technological adoption in universities as the theoretical framework on account of several reasons. First, the model has been previously utilized in the field of ICT in universities. Its application and relevance have been established through prior studies, providing a foundation for its use in the current research. The existing body of literature supports the credibility and suitability of the model for investigating ICT adoption and use in the educational context. Second, the

model offers a comprehensive framework that takes into account multiple factors influencing ICT adoption and use in teaching and learning. By incorporating this model, the study aims to provide a holistic understanding of the various elements that contribute to the use of ICT at the St. John's University. Third, the model's focus on institutional, individual, and technological factors aligns with the specific objectives of this study at the St. John's University. It allows for the examination of institutional policies, skills, as well as individual factors such as students' gender, competences and attitudes towards ICT. Lastly, the model acknowledges the importance of technological resources and infrastructure, which are crucial aspects to consider in a university setting.

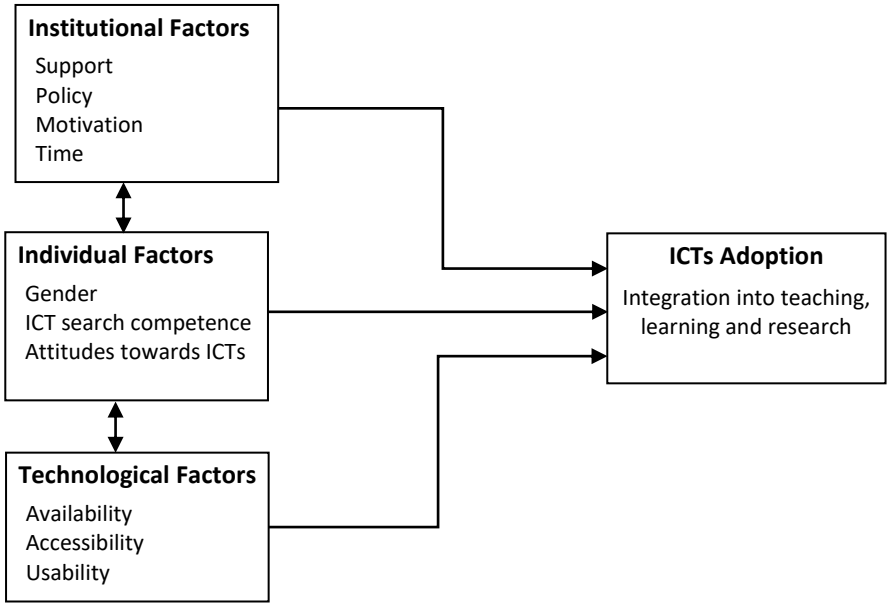

Figure 1: Model on ICT Adoption in Universities for Learning
Source: Katunzi-Mollel (2013)

The Katunzi-Mollel model was developed for ICT adoption in universities. Adoption of ICT in learning refers to the decision and process of incorporating ICT into educational institutions or classrooms. It involves the planning, implementation, and infrastructure development required to integrate ICT effectively into teaching and learning. The model identifies three key factors as independent variables that influence the incorporation of ICT into teaching and learning: institutional, individual, and technological factors. These factors play crucial roles in the successful adoption and integration of ICTs in education. Institutional factors refer to policies, skills, and attitudes of higher learning

institutions towards the application of ICT in teaching and learning. It emphasizes the importance of institutions having the necessary skills to integrate ICT into the curriculum, and cultivating positive attitude toward its use. Policymakers also play a vital role in influencing and integrating other stakeholders to embrace ICT in education. This aspect is particularly relevant to the study at the St. John's University, as it seeks to examine the application of ICT within a private institution; and explore the extent to which institutional factors contribute to its usage.

Individual factors focus on the skills, attitudes, and confidence of students and faculty members toward ICT usage. Understanding these individual perspectives is crucial for understanding the dynamics of ICT usage in learning. By considering individual factors, the study aimed to explore the relationship between students' ICT applications in learning and their gender, as well as their competences in information search skills. These individual factors can greatly influence the effective utilization of ICT resources. Technological factors pertain to the availability, accessibility, usability, and quality of ICT infrastructure and facilities. These include the presence of necessary technological resources, such as computers, internet access, and software; as well as the support systems in place to ensure efficient use of these resources.

In this study, which was conducted at the St. John's University, the research aimed to investigate the extent of ICT usage in learning, and explore factors that influence its adoption and utilization. By adopting the Katunzi-Mollel model as the theoretical framework, the study acknowledged the significance of institutional, individual, and technological factors in ICT adoption and use. To align the theory with the study's specific focus on ICT usage in learning, the conceptual framework was modified. For instance, the framework includes the availability of ICT infrastructure as an independent variable, recognizing the importance of resources such as computers, internet access, and audio-visual materials for effective ICT usage. This aligns with the technological factors highlighted in the Katunzi-Mollel model. Furthermore, the modified framework incorporates the variable of the competence of students' information search skills, recognizing that individual factors, as emphasized in the Katunzi-Mollel model, play a crucial role in the utilization of ICT resources for learning. It acknowledges that students' abilities to navigate and effectively use ICT tools are vital for successful ICT adoption in educational contexts.

1.3 Conceptual Framework for the Study

The conceptual framework for the study had to be modified from the Katunzi-Mollel (2013) model for ICT and technological adoption in learning to align with the specific focus of the study, which was about the usage of ICT in learning. ICT usage in learning refers to the active utilization of ICT tools and resources by learners and educators in their teaching and learning activities. It

encompasses how individuals engage with technology to support and enhance educational processes. Usage focuses on the actual application and utilization of ICT within the learning environment, and involves activities such as accessing online resources, using educational software or applications, participating in online discussions, collaborating on digital platforms, and creating digital content.

The modified conceptual framework is tailored to examine the influence of gender, availability of facilities, and individuals' competence in the usage of ICT in learning. The framework (Figure 2) identifies the independent variables that may influence the use of ICT in the learning processes within academic institutions, specifically at the St. John's University. These independent variables include the availability of adequate ICT infrastructure, which encompasses the presence of necessary ICT resources such as computers, internet access, and audio-visual materials.

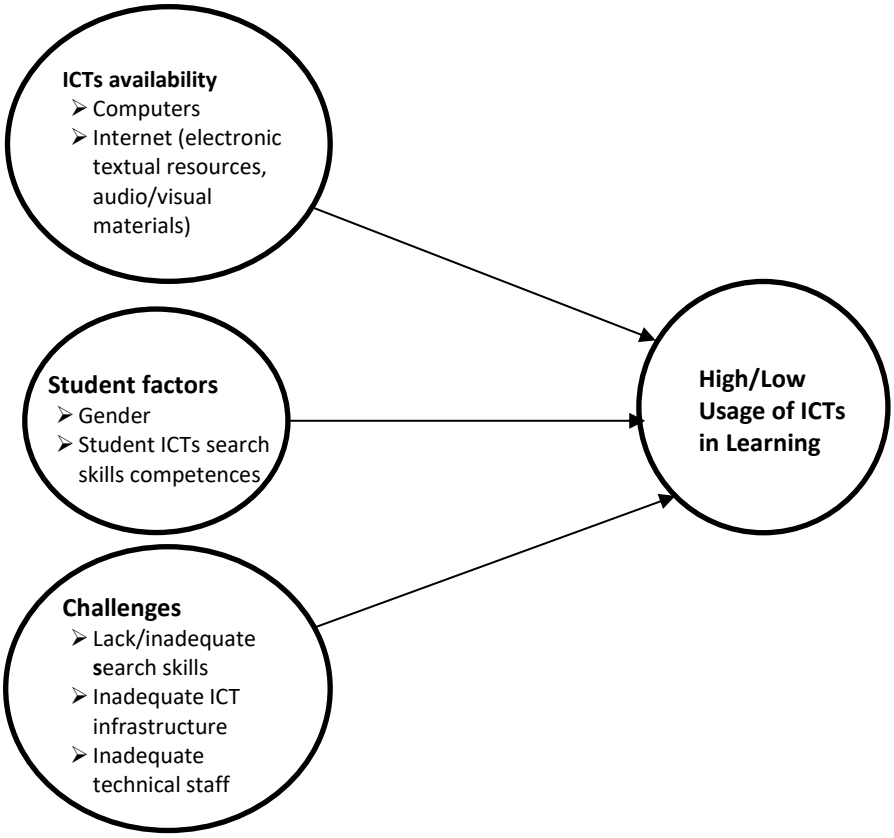

Figure 2: Modified Katunzi-Mollel (2013) Model on ICT Usage in Learning
Source: Adapted from Katunzi-Mollel (2013)

The availability of these infrastructure components is crucial for supporting the application of ICT in learning. The competence in search skills of students is the variable that focuses on their ability to identify, evaluate and use information resources available through ICT. It recognizes that effective utilization of ICT resources in learning is contingent upon individuals' ability to navigate and utilize available ICT tools.

The dependent variable in the framework is the usage of ICT in learning, which represents the desired outcome of the study. The framework suggests that successful use of technology involves the utilization of technological tools such as networked computers and audio-visual materials. To achieve this, it is essential for students to possess the necessary information search skills and ICT competences. The modified conceptual framework also acknowledges the challenges that can hinder a successful use of ICT in learning. These challenges include inadequate infrastructure and the lack of skills to effectively utilize ICT resources. By aligning the variables in the conceptual framework, the study aims to explore the relationships between gender, ICT availability, student competence, and the usage of ICTs in learning. This framework provides a theoretical basis for understanding factors that influence effective usage of ICT resources, and guides the investigation into the current state of ICT use for learning at the St. John's University.

To conclude, the modified conceptual framework served as a guide for the study, informing the research questions and providing a structure for examining the interplay between gender, facility availability, individual competence, and the usage of ICTs in learning at the St. John's University. Also, the conceptual framework guided the methodology and research design of the study, as described below.

2. Methodology

2.1 Research Design

This study employed a mixed-methods research design, incorporating both quantitative and qualitative data collection methods and analysis to comprehensively address the research problem. The utilization of multiple data types allows for a more holistic understanding and comparative exploration of a research topic (Hesse-Biber, 2010). The researchers opted for a descriptive design that describes specific features of the population under study at a given point in time. This design choice facilitated the collection of both qualitative and quantitative data, enabling the researchers to employ triangulation in data collection and analysis. By employing multiple approaches, the study aimed to enhance the reliability and validity of the data gathered on the application of ICT in teaching and learning at the St. John's University of Tanzania. The mixed-methods research approach allowed for a more comprehensive investigation of the research problem by integrating both numerical and contextual information.

The quantitative data provided insights into the extent of ICT usage, relationships between variables, and comparisons of means. On the other hand, the qualitative data obtained through observation supplemented the quantitative findings by offering contextual details and a deeper understanding of the participants' engagement with ICT. By combining quantitative and qualitative data collection techniques, the researchers gained a more nuanced and comprehensive understanding of the application of ICT in teaching and learning at the St. John's University. It allowed for the exploration of both numerical patterns and contextual factors, contributing to a more robust examination of the research topic.

2.1 Study Area

The study was conducted at the Chief Mazengo Campus of the St. John's University in Dodoma, Tanzania, which is the university's headquarters. This was selected purposefully because, in addition to being among the emerging higher learning institutions in Tanzania that have embraced ICT in teaching and learning, it has a number of facilities, including desktop computers; and offers different programmes that range from certificates to postgraduate programmes that could be leveraged using new information and communication technologies.

2.2 Sample Size and Sampling Technique

This study involved 110 respondents who returned the questionnaires among undergraduate and postgraduate students. This sample was expected to provide the researchers with information-rich cases, and was deemed appropriate to save money and time, and also not too small to be questionable. Following the prevalence of diseases, this study collected data using online Google forms sent to conveniently selected respondents whose emails were obtained from programme admission offices.

2.3 Data Collection and Analysis

This quantitative study utilized closed-ended questionnaires as the primary data collection method. A hyperlink to the format containing the survey was generated and dispatched to 130 potential participants through e-mails. A total of 110 (92%) of the respondents returned well-filled-in questionnaires. The purpose of the questionnaire was to obtain quantitative data that would provide insights into the participants' ICT usage patterns in learning by gender and search skills competence.

The sample size was determined to ensure adequate representation of information-rich cases, while at the same time considering the practical constraints of time and resources. During the data collection process, observation was conducted to supplement the online questionnaires. The researchers made observations on certain aspects related to ICT usage, such as the presence of a

computer labs and students actively using ICT for learning purposes. This qualitative data from observation provided contextual information and a deeper understanding of the participants' engagement with ICT. After the data collection phase, the collected data was analysed using the SPSS (Statistical Package for the Social Sciences) software.

The analysis involved mainly quantitative techniques. The researchers used statistical tests to explore the relationships and correlations of interest. The Chi-square test was employed to determine the relationship between the extent of ICT use and gender. A Spearman correlation test was conducted to establish the correlation between ICT application in learning and skills competency in searching online information resources using diverse tools. Additionally, a t-test for equality of means was performed to compare the means of students' use of ICT tools in audio-visual materials and textual online resources. These statistical analyses provided numerical evidence and statistical significance for the identified relationships and comparisons. Regarding the qualitative data from observation, it served as supplementary information to enrich the understanding of the participants' ICT usage context. However, it is important to note that the qualitative data was not subjected to formal analysis or statistical tests, but were rather used to support and provide insights into the quantitative findings.

3. Results and Discussion

3.1 Demographic Characteristics of the Respondents

The demographic characteristics of the respondents in the study were analysed to gain insights into their profiles and understand the extent to which information and communication technology (ICT) is utilized in learning at the St. John's University in Tanzania. The study considered age, sex and study programmes as key characteristics of interest since they provide a snapshot of the participants involved.

According to the data presented in Table 1, a total of 110 respondents participated in the study. The age distribution of the respondents revealed that the majority (83.6%) fell within the 21–30 age range. This age group, comprising 92 individuals, represented a significant portion of the sample. Additionally, 4.5% of the respondents were below 20 years of age; while 11.8% fell within the 31–40 age bracket.

Table 1: Distribution of the Respondents by Age (n=110)

Category	Frequency	Percent
Below 20	5	4.5
21-30	92	83.6
31-40	13	11.8
Total	**110**	**100**

Source: Survey data (2020)

The analysis of the respondents' demographic characteristics highlighted the predominance of young individuals, particularly those aged 21–30 years in the study sample. This age group is known for its proficiency in technology and propensity to embrace ICT in various domains, including education. Furthermore, an almost equal distribution of men and women among the respondents indicates the inclusive nature of ICT adoption at the St. John's University. These findings provide a valuable context for understanding the use of ICT in learning.

1. Distribution of Student Respondents by Gender

The gender distribution of the student respondents in this study is presented in Table 2.

Table 2: Gender of Respondents (N=110)

Category	Frequency	Percent
Male	74	67.3
Female	36	32.7
Total	**110**	**100**

Source: Survey data (2020)

The findings indicate that out of the 110 respondents, 67.3% were male and 32.7% were female. These findings do not necessarily indicate a gender imbalance within the university itself. The distribution of male and female respondents in this study is based on the specific sampling method employed, which may not accurately reflect the overall gender composition of the population of the university students. The fact that male respondents outnumbered female respondents in this particular study echoes the findings by Mungwabi (2018), who also found the number of male students at the University of Dar es Salaam to be greater than that of female students due to chance. It is essential to interpret these results within the context of the sampling approach used. Further research and analysis would be necessary to draw definitive conclusions about gender representation and participation at the St. John's University.

2. Distribution of Student Respondents by Programme

The data were collected from students who were pursuing different courses at the university as follows: 2 (2%) were pursuing Master of Education, 21 (19%) Bachelor of Science in Nursing, 9 (8%) Bachelor of Science with Education, 16 (15%) Bachelor of Pharmacy, 12 (11%) Bachelor of Arts in Education, and 16 (15%) Diploma in Nursing. Only 6 (5%) were pursuing a diploma in pharmaceutical science, 4 (4%) a diploma in laboratory technology, 9 (8%) a diploma in a medical laboratory, 3 (3%) a certificate in pharmacy, and 12 (11%) were pursuing a technician certificate in pharmaceutical science. The results indicate that the majority of the respondents were pursuing courses in Bachelor of Science in

Nursing, Bachelor of Pharmacy, and Diploma in Nursing. The distribution of the respondents by programme was influenced by the availability of the respondents' email addresses as questionnaires were distributed through Google Forms.

3.2 Extent of Students' Usage of ICT for learning

The first specific objective of this study was to determine the extent to which students utilize information and communication technology (ICT) for learning purposes. Table 3 provides an overview of the respondents' self-reported utilization of ICT in learning.

Table 3: Extent of Student's ICT Usage in Learning (n=110)

Category	Frequency	Percent
Very large extent	4	3.6
Large extent	69	62.7
Moderate	22	20
Small extent	12	10.9
Very small extent	3	2.7
Total	**110**	**100**

Source: Survey data (2020)

According to the data presented in Table 3, a significant majority of 73 (66%) respondents indicated that they used ICT to a large extent when accessing resources for learning. An additional 20% of the respondents reported using ICT moderately. This finding was confirmed through observation, for there was a high level of ICT use in learning among students in the university's Computer Centre. The purposes for which students employ ICT in their learning activities include accessing various online resources such as e-books, journals, and databases; as well as engaging in communication, accessing online presentations, utilizing audio-visual materials, and participating in forum discussions. These findings align with previous studies conducted by Ani and Esin (2003) and Mungwabi (2018), which also reported a high level of ICT utilization in learning. Similarly, Sofowora's (2012) study highlighted the prevalence of ICT use in learning despite infrastructure challenges in Nigeria.

However, it is important to note a contrasting finding from a study by Atsumbe et al. (2014), conducted at the Federal University of Technology, Minna, Nigeria; which indicated that students primarily used ICT for administrative purposes rather than accessing internet resources for learning. This difference could potentially be attributed to the lack of integration of ICT into teaching and learning practices at the Federal University of Technology. The students' responses might have differed—and aligned more closely with the current study's findings—if ICT had been more extensively incorporated into the educational process. The results imply that students in the study area

recognize the advantages of utilizing electronic resources that are accessible only through ICT infrastructure. The high extent of ICT application in learning suggests that students are harnessing technology to enhance their educational experiences and access a wide range of digital learning materials. These findings provide valuable insights into the extent of students' ICT applications for learning purposes. They contribute to the existing literature and highlight the importance of integrating ICT into educational practices to further enhance students' access to resources and improve their learning outcomes. After finding out the extent of students' usage of ICT for learning, it was important to examine whether there was any relationship between the extent of students' ICT usage in learning and gender.

3.3 Relationship between the Extent of ICT Use in Learning and Gender

The second specific objective of this study was to investigate whether there was any association between the extent of ICT application in learning and the gender of the respondents. The results of this analysis are presented in Table 4, which displays the chi-square test for testing the association between the extent of use and gender. The null hypothesis tested in this analysis was: "there is no association between the extent of use and gender."

Table 4: Chi-square Test for Testing Association Between the Extent of Use and Gender (N=110)

Category			Gender		Total	Chi-square	P-value
			Male	*Female*			
Extent of use	High	Frequency	73	1.788	0.181	1.788	0.181
		% within sex	62.2%	75.0%	66.4%		
	Low	Frequency	28	9	37		
		% within Sex	37.8%	25.0%	33.6%		
Total		Frequency	74	36	110		
		% within Sex	100.0%	100.0%	100.0%		

Source: Survey data, 2020 Key: % = Percentage

The findings in Table 4 show that the *p*-value is above the common significance level of 0.05, indicating that there is insufficient evidence to reject the null hypothesis. This suggests that there is no significant association between the extent of use and gender in the given data. The results align with those of Shaw and Marlow (1999), who did not observe differences in learning between genders. However, it contrasts with the findings of Jorge et al. (2003), who reported significant differences between men and women in using ICT, with females using technology in learning to a lesser extent than males. Perhaps limited access to technology and internet resources can be a barrier, particularly in certain regions or socio-economic groups. If females have less access to ICT

devices, connectivity, or opportunities for technology training, it can affect their ability to engage with ICT in learning. Another aspect which could have acted as a catalyst or barrier to students' use of ICT in learning was their competence in search skills.

3.4 Students' Competences in ICT Search Skills

The study also aimed to explore the relationship between students' extent of ICT application in learning and their competencies in ICT search skills. Table 5 provides an overview of the respondents' competencies in searching for online resources using various tools.

Table 5: Skills Competence of Respondents in Searching Online Resources (n=110)

Category	Very Competent		Competent		Moderate		Not Competent	
	F	*%*	*F*	*%*	*F*	*%*	*F*	*%*
Searching for textual materials on the Internet	47	43	43	39	17	16	3	3
Searching for topics on YouTube	30	27	45	41	31	28	4	4
Searching for online PowerPoint presentations	19	17	40	36	40	36	10	9
Searching for information on CD-ROMs	9	9	33	30	47	43	21	19

Source: Survey data (2020) Key: F=Frequency, % = Percentage

The findings in Table 5 indicate that more than half of the respondents demonstrate competence in utilizing ICTs for learning purposes. Specifically, 82% of the respondents are competent in searching for textual materials from the internet, 53% in searching topics on YouTube, and 53% in searching for online PowerPoint presentations. However, competence in searching for information on CD-ROMs is lower, with less than half of the respondents being proficient in this skill. This finding does not support those of Shopova (2014), who found that the majority of young people are good at surfing the internet, but their knowledge and competence for effective use of technology in the learning process are superficial.

For further analysis of the relationship between ICT application and search skill competencies, Table 6 presents the correlation coefficients between respondents' extent of ICT use in learning and their competences in searching online information resources. The results in Table 6 show a negative correlation between the extent of ICT use and competence in searching ICT tools. This indicates that as the extent of ICT application in learning increases, the competence in search skills decreases as well. The correlation coefficients for competence in internet use, YouTube search, PowerPoint presentations, and CD-ROMs are all statistically significant at a 5% level of significance.

Table 6: Correlation between Respondents' Application of ICT in Learning and Skill Competency in Searching Online Information Resources using Diverse Tools (n-110)

Category		Extent of Use
Competence in Internet	Correlation Coefficient	-.367**
	Sig. (2-tailed)	0
Competence in YouTube	Correlation Coefficient	-.506**
	Sig. (2-tailed)	0
Competence in PowerPoint presentations	Correlation Coefficient	-.360**
	Sig. (2-tailed)	0
Competence in CD-ROMs	Correlation Coefficient	-.422**
	Sig. (2-tailed)	0

Source: Survey data, 2020

The findings further suggest that there is no significant relationship between students' extent of ICT use and their competency in information search skills. Thus, students who extensively use ICT in their learning activities do not necessarily demonstrate higher levels of competence in utilizing search tools. These findings echo those of Shopova (2014), which indicated that university students often access ICT tools such as the Internet while their knowledge and skills are limited. This result highlights the need for focused attention on developing students' search skills, particularly in areas where competencies are relatively lower, such as searching for information on CD-ROMs. Enhancing these skills will enable students to navigate and extract relevant information more efficiently from various online resources.

Therefore, while a significant number of respondents demonstrate competence in utilizing ICT for learning, there is no significant correlation between their extent of ICT application and their competence in information search skills. It is essential for educational institutions to emphasize the development of search skills alongside the integration of ICT in the learning process. By doing so, students will be better equipped to leverage the full potential of ICT resources for effective and efficient learning experiences. Since the assessment of skills competence in searching online resources indicated that students were good at searching textual and audio-visual materials, it was beneficial to establish which of the two was being used more.

3.5 Comparison between the Use of Audio-visual Materials and Textual Online Resources in Learning

The study compared the application of online audio-visual materials and textual resources in learning. A one-sample test was conducted to analyse the results, as shown in Table 7.

Table 7: One-Sample Statistics (n=110)

Category	N	Mean	Std. Deviation	Std. Error Mean
Audio/Visual Materials	110	2.35	1.153	.110
Internet textual resources	110	2.12	1.115	.106

Source: Survey data (2020)

The mean values for audio-visual materials (2.35) and internet textual resources (2.12) shown in Table 7 indicate that, to a large extent, respondents use both types of resources. This finding was also confirmed through observation during which some students were found either accessing multimedia or textual e-resources. However, the findings reveal that the use of internet textual resources, such as electronic journals and books, is slightly higher than the use of audio-visual materials for the same purpose. Overall, it can be inferred that respondents extensively utilize both types of resources in their learning activities. The findings are consistent with those of previous studies. Al Mamun (2014) found that as technology advances, the use of audio-visual aids -- such as audio textbooks, pictures, videos, PowerPoint slides, and posters in teaching and learning -- also increases. Ho and Intai (2017) noted that the use of audio-visual materials as supplementary resources in the classroom was high and provided inspiration and motivation for teaching and learning. However, the findings differ from Idris et al. (2018), who found that audio-visual materials were not available for use by students in some locations. Tang and Intai (2017) observed that audio-visual aids increased students' understanding, attentiveness, interest, and ability to remember contents. It is likely that these factors contribute to the increasing use of audio-visual materials in learning, making it comparable to the use of textual internet resources.

While the purpose of a one-sample statistics was to calculate statistics that provide a summary of the participants' reported usage of these resources in their learning activities, there was a need to run a t-test to determine if there was a significant difference between the means of two independent groups: those using textual material, and those using audio-visual material. Table 8 presents the t-test results, which further examine the difference in means between the use of audio-visual material and textual resources in learning. The slim mean difference suggests that respondents use both types of resources, but they tend to utilize e-books and e-journals slightly more than multimedia resources.

Table 8: T-test Results

		t-test for Equality of Means				
t	*df*	*Sig. (2-tailed)*	*Mean Difference*	*Std. Error Difference*	*95% Confidence Interval of the Difference*	
					Lower	*Upper*
1.486	218	.139	.22727	.15291	-.07409	.52864

Source: Survey data, 2020

The findings in Table 8 reveal that respondents make extensive use of both audio-visual materials and internet textual resources for learning. Although there is a slight preference for internet textual resources, the difference in usage is minimal. This finding supports those by Al Aqad et al. (2021), who found that multimedia serve as a catalyst for learning endeavours. The integration of multimedia resources into the learning environment can enhance students' learning experiences and contribute to their overall academic success. By providing access to a variety of multimedia materials, institutions can cater to the evolving needs and preferences of students, as these resources enhance engagement, motivation, and understanding.

The final objective of this study was to identify constraints to effective usage of ICT in learning at the St. John University. Although earlier findings indicate that the majority of respondents use ICT to a large extent when accessing resources for learning, there was still room to identify bottlenecks as the extent of use was below 75%, and a significant number (20%) of the respondents reported using ICT moderately.

3.6 Constraints to Effective Usage of ICT in Learning at St. John University

The researchers examined the availability of ICT infrastructure for learning at the St. John's University, focusing on the adequacy of various components. The results indicate that more than half of the respondents considered the ICT infrastructure and facilities to be inadequate. This finding was also confirmed through observation. Specifically, a significant number of participants reported insufficiency in computers (54%), internet access (61%), audio-visual materials (62%), and the lack of a comprehensive ICT policy (60%). The majority of the respondents who cited the lack of ICT policy indicated that policy is important to address specific needs such as ICT infrastructure requirements and user training. It was observed that some students possessed personal laptops or smartphones, which they utilized to access online information, mitigating the problem of limited computer availability. For these individuals, the presence of computers on campus was not a significant concern. The findings reveal that the ICT infrastructure and facilities in the university are insufficient, reflecting a common issue faced by educational institutions in various developing countries.

Similar studies conducted elsewhere have highlighted limitations in ICT resources. For instance, Boni (2018) observed a scarcity of computers in Ghanaian schools; and Sofowora (2012) identified the lack of ICT infrastructure, including computers, in Nigerian educational institutions. Atsumbe et al. (2014) reported inadequate ICT infrastructure for learning at the Federal University of Technology in Minna. Additionally, Kagugu (2011) cited insufficient infrastructure as a major constraint to the use of ICT facilities at the Open University of Tanzania. However, Mungwabi's (2018) study on the University of Dar es Salaam did not report problems related to inadequate computers. The

availability of sufficient ICT resources, including computers, at the University of Dar es Salaam could be attributed to its status as an established government institution that receives funding from the government and donors. Additionally, the high number of privately owned laptops and smartphones among students, who often rely on higher education student loans, may contribute to addressing the computer availability issue. Overall, the findings highlight the constraint of policy and inadequate ICT infrastructure and resources at the St. John's University, particularly regarding computers, internet access, audio-visual materials, and e-resources generally. Addressing these limitations is crucial to ensure effective application of ICT in learning.

4. Conclusions and Recommendations

This study has revealed that there is a substantial use of ICT in learning among students at the St. John's University. This indicates a recognition of the importance of technology in education, and a willingness to incorporate it into learning processes. Gender was not found to be significantly associated with the extent of ICT usage in learning. This suggests that both male and female students at the university utilize ICT in a similar manner, highlighting the absence of gender-based differences in ICT usage. Students demonstrated varying levels of competence in ICT search skills. While the majority of respondents showed competence in accessing online resources, there is still room for improvement, particularly in searching for information on CD-ROMs. Enhancing students' search skills will enable them to optimize the application of ICT for learning purposes.

Both audio-visual materials and textual online resources are extensively used by students in their learning. While the use of audio-visual materials slightly lagged behind that of textual resources, the difference was minimal. Therefore, it is crucial for educational institutions to consider the integration of multimedia resources alongside textual electronic resources. The study identified constraints to the effective application of ICT in learning at the St. John's University. The lack of policy and inadequate ICT infrastructure—including computers, internet access, e-resources, particularly audio-visual materials—are major concerns expressed by the respondents.

Based on the findings, the university should prioritize investments in ICT infrastructure and facilities to address the identified constraints. These include ensuring enough computers are available, reliable internet access, up-to-date audio-visual materials and e-resource databases. This will provide students with the necessary tools to enhance their learning experiences through ICT. The university should offer training programmes and workshops to improve students' ICT search skills. By enhancing their competence in searching for, and evaluating, online resources, students will be better equipped to utilize ICT effectively in their learning. It is essential for the university to develop and

implement policies that promote equal access to ICT resources and facilities among students. This can be achieved by improving ICT infrastructure for students, especially those who cannot afford personal laptops or smartphones. Collaboration with relevant stakeholders, such as government bodies, other private institutions and donors, should be pursued to secure funding and support for ICT infrastructure development. This will enable the university to create a conducive environment for ICT usage in learning.

Moreover, regular assessment and evaluation of the effectiveness of ICT resources and facilities should be conducted to identify changing students' information needs. Feedback from students and faculty should be actively sought and used to guide future ICT development initiatives. The university should consider adopting a comprehensive ICT policy that outlines strategies, guidelines, and best practices for the integration and utilization of ICT in learning. This policy should address issues related to infrastructure, training, support, and continuous improvement to ensure an effective use of ICT across all academic disciplines.

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