

**ATTITUDES OF TEACHERS TOWARDS ICT INTEGRATION IN TEACHING OF
MATHEMATICS IN PUBLIC SECONDARY SCHOOLS IN MOROGORO
MUNICIPAL, TANZANIA**

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ABSTRACT

This study examined the attitudes of teachers towards ICT integration in the teaching of mathematics in public secondary schools in Morogoro Municipal, Tanzania. The study addressed how the integration of ICT into education might enhance accessibility and quality of education by allowing educators and students to participate in new forms of information acquisition and analysis. This study employed a convergent design under the mixed research approach guided by Technological Pedagogical Content Knowledge (TPACK) and Technology Acceptance Model (TAM) theories. This study had sixty-six (66) respondents using probability and non-probability sampling techniques. The study used interview guides for heads of schools and questionnaires for teachers as data collection tools and purposive and simple sampling as sampling techniques. The research generated information from 61 teachers and 5 heads of schools from selected public secondary schools in Morogoro Municipal, Tanzania. The reliability of questionnaires was established at 0.825 Cronbach Alpha and the conformability technique for the interview guide for ethical data collection procedures. Quantitative data were analyzed and presented descriptively and by using inferential statistics procedures, additionally, qualitative data were analyzed thematically and presented using narratives. The study concluded that Teachers had positive attitudes as many of them were ready, motivated, and felt comfortable using ICT in teaching mathematics subjects. Nevertheless, there was a shortage of ICT devices and, other technological infrastructures necessary for ICT facilitation. Consequently, the study suggests frequent professional development for in-service teachers on ICT integration in public secondary schools to improve attitudes towards ICT integration and equip them with current knowledge. The government should develop computer laboratories for every school, provide internet services to enhance digital skills and install electricity in all school buildings to ensure ICT services availability.

Keywords: Teachers' Attitudes, ICT Integration, Mathematics, and Professional Development.

1. INTRODUCTION

The integration of Information and Communication Technology (ICT) in mathematics education has been a topic of interest for researchers and educators over the past few decades. An ICT system approach to teaching and learning uses digital technologies to explain and understand the concepts of the study (Timotheou et al., 2022). The integration of ICT into education may enhance accessibility and quality of education by allowing educators and students to participate in new forms of information acquisition and analysis. ICT can enhance learning when integrated with

teaching methodologies, curricula, and assessments (Martinez, 2022). Technology has significantly impacted 21st-century education by making it more engaging, accessible, and designed for individual needs. This apparent fact notifies of the paradigms of preparing students for the digital world and provides access to vast information, interactive learning, personalized learning, global collaboration, remote learning, and streamlined administrative tasks for teachers.

Mathematics is closely linked to visualization, with different visualizations of mathematical objects and procedures supporting students' understanding and learning. Engaging with these integrations of ICT in visualization allows students to discover new features of the mathematical content. The use of ICT in mathematics teaching is aimed at enhancing student engagement, improving learning outcomes, and preparing students for the digital world (Galimullina et al., 2020). Technology plays a crucial role in mathematics education, influencing classroom teaching and enhancing student comprehension. Technology provides visualization and dynamic structure tools to overcome problems in mathematics teaching. Increasing software packages like Maple, Mathematica, Drive, Geometer's Sketchpad, and GeoGebra support creative discoveries and mathematical generalization in classrooms according to Karim and Zoker (2023).

Numerous studies have explored teachers' attitudes towards ICT integration in mathematics teaching. For instance, a study conducted by Saidu et al. (2022) revealed that teachers' positive attitudes toward ICT integration were significantly associated with their effective use of ICT in mathematics classrooms. Similarly, a study by Chen and Wu (2020) found that teachers who perceived ICT as useful for mathematics teaching were more likely to integrate it into their lessons. ICT is becoming more and more important in the classroom due to its potential benefits and the need for students to acquire the necessary skills for today's world, making it crucial for students to adapt and thrive in this digital age. Teachers' attitudes towards technology, whether favorable or unfavorable, affect many students' value and usage of computers in the classroom for the current and prospects (Seufert et al., 2020). Teachers' intentions, perceptions, and attitudes significantly influence their readiness for technology integration. To improve teaching methods, training programs are crucial to spark interest in new technologies. Teachers must participate in ICT training programs to understand the content and practical applications of the technology (Santos and Castro, 2021). Changes in school governance techniques, rules, and investments are also necessary for technology integration into the teaching process.

Moreover, research has identified various factors influencing teachers' attitudes toward ICT integration in mathematics teaching. For example, a study by Eryiğit and Kılıç (2022) found that Many teachers believe they lack the necessary skills to integrate or utilize ICT in the classroom. The adoption of technology is impacted by the worry that one's knowledge and abilities about its application in mathematics classes are inadequate. Furthermore, cultural factors have also been found to influence teachers' attitudes towards ICT integration in mathematics teaching. For instance, a study by Li (2023) revealed that cultural beliefs about mathematics as a discipline played a role in Egyptian teachers' reluctance to integrate technology into their mathematics classes. The introduction of ICT has altered how teachers and students communicate with one another. The new technology is perceived by many teachers as adding another burden to the teaching process. Therefore, to effectively integrate ICT in mathematics classrooms, teachers need to understand and comprehend the behavior, beliefs, perceptions, and feelings of ICT.

Tanzania in particular, is implementing technology integration in teaching mathematics to improve students' academic performance. Currently, some initiatives by the government have been made including providing tablets to all teachers including secondary school ones, provision of computers and internet connectivity to selected schools, and training teachers on technology integration. Other notable initiatives that have been done so far include an online mathematics center in which most courses are accessed and taught online. However, challenges like limited bandwidth, insufficient infrastructure, and lacking teacher training.

Conclusively, research suggests that teachers' positive attitudes toward ICT integration are crucial for the effective implementation of technology in mathematics classrooms. Factors such as self-efficacy beliefs, perceived benefits of ICT use, access to technology resources, training and support, and cultural beliefs have been identified as influencing teachers' attitudes toward ICT integration in mathematics teaching.

2. STATEMENT OF THE PROBLEM

Integrating Information and Communication Technology (ICT) into education has become increasingly important in modern teaching practices. Ibrahim et al. (2024) perceived teachers as playing a pivotal role in shaping students' experiences and understanding of mathematics. This denotes the crucial need for ICT in the education field. The study by Mwaniki et al. (2024) in Kenya revealed that ICT tools like projectors, printers, and smart televisions are the primary tools for teaching mathematics, but limited resources hinder effective instruction. This implies that ICT integration in teaching mathematics enhances real-world mathematics skills.

Further, the study by Ayeh et al. (2024) highlights the significant impact of integrating ICT in Chinese middle school mathematics instruction, emphasizing teachers' skills in enhancing lifelong learning and sustainable development. With this regard, teachers' attitudes towards ICT integration can significantly impact the effectiveness of teaching processes for the acquisition of 21st-century soft skills for students. However, many studies show that Tanzania is among the East African countries with limited ICT application in the education sector. However, the perception of teachers toward ICT integration in teaching mathematics in secondary schools is still a big puzzle.

Besides, many reviewed studies concerned with the effective teaching of Mathematics focused on leadership styles. The survey by Batoool et al. (2023); Laouni (2023); Schmitz et al. (2023); and Suwanmanee et al. (2023) observed the ICT integration concerning leadership styles. These studies left the gap for the actual application of ICT in teaching mathematics as perceived by classroom teachers. In addition, the study done by Pima (2020) focused on remote schools indicates that teachers were ready to integrate ICT into teaching. Nonetheless, the study dealt with remote school teachers and only quantitative data collection techniques were used. The study left a gap for urban teachers and lacked a holistic approach for adopting only quantitative techniques. Also, Galimullina et al. (2020) in Russia which used the quantitative data collection technique observed that teachers were aware of employing ICT in their daily teaching activities.

Conversely, the study left a gap between the method used and the context, Russia, as it may contradict the Tanzanian context, and lack the holistic study's approach. The inadequateness of literature studies, irrelevant contexts, and unreliable research data collection tools relating to teachers' attitudes related to ICT integration in mathematics instruction made this study come into

place. Consequently, this study aims to provide valuable insights relating to ICT integration in teaching mathematics in improving educational practices in public secondary schools in Morogoro Municipality, Tanzania.

3. RESEARCH QUESTION

What are the prevailing attitudes of teachers towards the integration of ICT in teaching mathematics in public secondary schools?

4. RESEARCH HYPOTHESIS

Ha: There is a significant linear relationship between teachers' attitudes and the availability of ICT integration resources for teaching mathematics in public secondary schools.

5. THEORETICAL FRAMEWORK

5.1 The Technology Acceptance Model (TAM).

The Technology Acceptance Model is a concept proposed in 1986 by Fred Davis in the US. It focuses on understanding the factors that influence technology acceptance and usage, especially in organizational settings (Nzayisenga et al., 2023). TAM is advantageous due to its simplicity and ability to predict user behavior based on perceived usefulness and ease of use. It has been extensively used to study technology adoption and usage in various contexts. However, weaknesses of the model include not considering external variables that influence technology acceptance, emphasizing individual beliefs over social and organizational factors, and being limited to generalizability across different technologies and user groups. This study utilizes the TAM to explore user behavior, design user-friendly technologies, and devise strategies to enhance technology acceptance and usage. It helps assess user attitudes, intentions, and behaviors regarding technology and aids in designing interventions for promoting technology acceptance and usage.

5.2 Technological Pedagogical Content Knowledge (TPACK)

TPACK is a framework that combines technology, pedagogy, and content knowledge to improve teaching and learning. It was proposed by Punya Mishra and Matthew Koehler in 2006 in the United States. TPACK is a comprehensive guide for educators to effectively integrate technology into their teaching practices since it promotes innovation and creativity in teaching (Said et al., 2023). However, implementing TPACK can be complex and time-consuming. In the context of teaching mathematics in secondary schools, implementing TPACK can lead to improved academic performance. The TPACK model is a valuable tool for examining the impact of technology integration in educational settings. It helps researchers assess how teachers' technological knowledge, pedagogical skills, and content expertise influence student learning outcomes. Studying TPACK principles in teaching practices can provide insights into effective strategies for technology integration and inform professional development initiatives to enhance digital literacy and instructional practices (Deng & Zhang, 2023).

6. REVIEW OF EMPIRICAL STUDIES

The study by Ali et al. (2024) explores ICT integration in a rural school in Khoski District, Badin, using a qualitative case study. Results suggest a need for a proper technology integration plan and authorization for management, recommending collaboration between the government, NGOs, and private school teams. However, this study was not intended for teachers, adopting the qualitative

method of data collection. This left a gap for other researchers to deal with ICT integration in teaching mathematics in public secondary schools.

Furthermore, according to the study by Adeola et al. (2022) in Ghana, it was revealed that although teachers have a positive attitude towards ICT integration, they face several barriers such as limited access to facilities, inadequate training, and limited support from school administrators. Addressing these issues through policy initiatives and resources could enhance teachers' positive attitudes.

In South Africa, the study by Graham et al. (2020) found mixed attitudes among teachers towards ICT integration. Factors contributing to resistance include lack of confidence, fear of mistakes, and concerns about the negative impact on traditional teaching methods. They suggested addressing these issues through professional development programs focusing on technological competence and promoting a positive attitude towards ICT integration. Onyema's (2020) study in Nigeria discovered that although teachers have positive attitudes toward ICT integration, they face challenges like a lack of skills, limited access to resources, and insufficient training. They recommend providing adequate training and resources to boost teachers' confidence and competence.

A study by Marpa (2021) on teachers' attitudes towards technology in mathematics revealed positive engagement and confidence, with male teachers showing better attitudes, suggesting the Department of Education should enhance these competencies. However, the study used a descriptive analysis method, lacking mixed methods as a holistic approach. The integration of ICT in education has been widely recognized for its potential to improve teaching and learning processes. In mathematics education, ICT can enhance students' understanding of mathematical concepts through interactive, multimedia-based learning experiences (Chalermnirundorn, 2021). The study implies that technology significantly enhances students' learning achievement, especially when used effectively and thoughtfully, in mathematical topics. However, the success of ICT integration depends on teachers' attitudes and readiness to effectively use ICT tools. This review examines the attitudes of teachers in Kenyan public secondary schools towards ICT integration in mathematics teaching.

Additionally, Mpiza, (2022) study on ICT integration in Tanzanian public secondary schools proved that it improved students' performance in mathematics, particularly in problem-solving and critical thinking, using a quasi-experimental design and data collected through pre-tests and post-tests, highlighting the potential of ICT in enhancing learning outcomes. Connectively, the study by Minga & Ghosh, (2024) found that the acceptance and utilization of ICT in mathematics teaching practices are significantly influenced by factors such as the availability of ICT facilities, teacher training, and perceived benefits of ICT use, as revealed by a cross-sectional survey of 220 teachers. Furthermore, the study by Mwisu et al. (2022) examined the attitudes of mathematics teachers towards ICT integration in their teaching practices.

The researchers used a qualitative approach, interviewing and focusing on grouping 50 teachers. The findings revealed positive attitudes but challenges such as lack of access to ICT facilities, insufficient training, and inadequate infrastructure persist. Additionally, the study by Njiku et al.

(2023) explores the impact of collaborative lesson design activities on Mathematics teachers' attitudes toward technology integration. A quasi-experiment with 125 participants in Dar Es Salaam, Tanzania, found that these activities had more potential to develop attitudes than isolated implementation. The findings offer valuable insights for teacher education and in-service training, emphasizing the importance of developing teachers' competencies, particularly attitudes toward technology integration. However, the study lacked a holistic approach, leaving a gap for the mixed research.

7. METHODOLOGY

Research philosophy is the set of beliefs, assumptions, and principles that guide the conduct of research (Kasirye, 2024). This study involved a pragmatic approach. The pragmatic research philosophy emphasizes the practical application of research findings and a flexible, problem-solving approach that prioritizes real-world relevance and effectiveness (Kelly & Cordeiro, 2020). **Research design** is a strategy for responding to the research question using empirical data (Poucher et al., 2020). This study employed a convergent mixed-methods approach. The mixed methods approach combines both quantitative and qualitative data collection and analysis techniques. Quantitative data were collected through questionnaires for teachers and academic records analysis, while qualitative data were gathered through interviews with heads of schools.

The study area was the public secondary schools in Morogoro Municipality, Tanzania. Population includes all people to participate in a study, whereas and sample is a part of the population (Poucher et al., 2020). The population of this study was five government secondary schools within Morogoro Municipal, Tanzania. The sample involved 65 respondents; 60 teachers from selected secondary schools; and 5 heads of schools for selected schools. The sample for this study consisted of probability and non-probability sampling techniques. Probability sampling techniques can use simple random sampling for teachers and non-probability sampling techniques can use purposive sampling for heads of schools.

The sampling procedure is a way that allows data collection at a faster and at a low cost than attempting to reach every member of the population (Zickar and Keith, 2023). The sampling of this study was drawn from the study area by using a simple random technique. Description of data collection instruments included the consultation with the District Administrative Secretary to seek permission to conduct the study. The questionnaires and interview guide were used to collect both qualitative and quantitative data from heads of schools, and teachers.

The validity and reliability of data collection instruments were regarded. A *pilot study* was conducted before the actual data collection to test the validity and reliability of research tools, as it is regarded as practical and optimal (Gümüş et al., 2023). The test-retest approach was used to measure the reliability of quantitative data collection instruments; and for the qualitative data collection instruments prepared for this study, pilot data collection and analysis helped to ensure the trustworthiness of the instruments.

Description of data analysis procedures included quantitative analysis by using statistical tools to examine the relationships between teachers' attitudes and ICT integration in teaching practices whereas descriptive statistics were used to summarize and analyze quantitative data. Qualitative

Analysis used thematic analysis for qualitative data obtained from interview guides and questionnaires to identify patterns and themes related to the integration of ICT in teaching processes. Ethical considerations in this study included obtaining informed consent from participants before collecting data, and to ensure confidentiality and anonymity in reporting and storing data; and adherence to ethical guidelines, and obtaining approval from Jordan University College's ethical review board.

8. FINDINGS AND DISCUSSIONS

The study had one question related to teachers' attitudes towards ICT integration in teaching mathematics in public secondary schools in Morogoro Municipality, Tanzania. To guide and limit the study, two theories of Technology Acceptance Mode (TAM), and Technological Pedagogical Content Knowledge (TPACK) were used. This research had sixty-six (66) respondents, the study used interview guides for heads of schools and questionnaires for teachers as data collection tools and purposive and simple sampling as sampling techniques.

The research generated information from 61 teachers and 5 heads of schools from selected public secondary schools in Morogoro Municipal, Tanzania. Table 1 summarizes teachers' attitudes toward ICT Integration in Teaching Mathematics at secondary schools. Table 1 sought information about teachers' attitudes related to belief, perception, feelings, values, willingness, and thinking of collaborative strategies toward facilitating ICT integration in teaching mathematics in secondary schools in Morogoro Municipality.

Table 1: *Teachers Responses on ICT Integration in Teaching Mathematics: Teachers' Attitudes (n=61)*

S/N	STATEMENTS	Responses (%)					MEAN
		SD	D	U	A	SA	
1	Teachers believe that integrating ICT in teaching mathematics enhances students' understanding.	1.6	0	4.9	47.5	45.9	4.36
2	Teachers feel confident in using ICT tools in teaching mathematics effectively.	0	3.3	1.6	72.1	23.0	4.15
3	Teachers perceive ICT integration as essential for improving students' performance in mathematics.	0	4.9	0	47.5	47.5	4.38
4	Teachers are willing to invest time and effort to learn how to integrate ICT into mathematics lessons.	0	3.3	9.8	65.6	21.3	4.05
5	Teachers think that ICT integration makes mathematics lessons more engaging for students.	0	0	8.2	45.9	45.9	4.38

6	Teachers believe that ICT integration can help address individual learning needs in mathematics.	0	3.3	4.9	60.7	31.1	4.20
7	Teachers see the value of incorporating real-world applications of ICT in teaching mathematics.	0	3.3	8.2	52.5	36.1	4.21
8	Teachers perceive resources for ICT integration as sufficient in school.	26.2	34.4	8.2	24.6	6.6	2.51
9	Teachers are open to collaborating with colleagues to enhance ICT integration in mathematics teaching.	1.6	1.6	4.9	63.9	27.9	4.15
10	Teachers feel that professional development opportunities on ICT integration are beneficial.	1.6	1.6	4.9	52.5	39.3	4.26
11	The teacher believes that using ICT tools can make assessment and feedback more effective in mathematics.	0	0	6.6	42.6	50.8	4.44
12	Teachers are motivated to continuously explore new ways of integrating ICT into mathematics instruction.	1.6	4.9	6.6	60.7	26.2	4.05

Key: 1. SD – Strongly Disagree 2. D – Disagree 3. U – Undecided 4. A - Agree
5. SA – Strongly Agree

Source: Field Data (2024)

Data in Table 1 indicates that an extreme majority (95.1%) of respondents agreed and strongly agreed that teachers feel confident in their ability to effectively use ICT tools in teaching mathematics with a high mean score (4.15). The same Table also signposts that the majority (91.8%) of respondents agreed and strongly agreed that teachers feel that professional development opportunities on ICT integration are beneficial with a high mean score (4.26). This suggests that teachers can enhance their confidence in effectively using ICT tools for teaching mathematics by attending training workshops and seeking guidance from experienced educators who have successfully integrated technology into their teaching practices. This is noticed that Teachers feel confident in their ability to effectively use ICT tools in teaching mathematics, and think that professional development opportunities on ICT integration are beneficial for career development. The statement is interconnected with the study by Kariuki (2021) in Kenya with the claim that a professional development program can improve teachers' attitudes towards ICT integration in mathematics teaching. This implies that with professional development there is an increased confidence and readiness to use technology to facilitate teaching of mathematics. In connection to the statement, the TPACK theory insists the increased professional development for teachers on

the combination of components of technology, pedagogy, and content knowledge to maximize teaching processes. The information given by HoS B supported those who claimed that:

“Teachers participated in the Africa Digital School Initiative (ADSI) program to enhance mathematics, science, and English language teachers to use ICT in teaching activities. The trained teachers used a cascade model to train other teachers, and eventually, all teachers were reached by the program. However, the training was conducted many years back, as far as 2017–2020, when the program officially phased out” (HoS B, Personal communication, 13th May 2024).

The statement by HoS B notified all of the importance of professional development and how it can be spread to all teachers within a respective school to facilitate technology integration in teaching mathematics. However, teachers are lacking current skills since many years have passed without another PD for teachers, which calls for other current training. This statement is against with the study by Graham et al. (2020) in South Africa who suggested the improvement of ICT integration in teaching mathematics through professional development.

Additionally, Statistics in Table 1 show that the extreme majority (93.4%) of respondents with a mean of 4.36 rated agreed and strongly agreed with the statement that teachers believe that integrating ICT in teaching mathematics enhances students’ understanding. Also, the extreme majority (91.8%) of students with 4.20 mean scores rated agreed and strongly agreed with the statement that teachers believe that ICT integration can help address individual learning needs in mathematics. This indicates that ICT integration in teaching mathematics can be an alternative solution to students’ negative attitudes towards learning mathematics in public secondary schools. The statement is compatible with the theory of Technological Pedagogical Content Knowledge (TPACK) for educators to facilitate effective integration of technology into their teaching practices since it promotes innovation and creativity in teaching. This implies that studying TPACK principles in teaching practices can provide insights into effective strategies for technology integration for initiatives to enhance digital literacy and instructional practices. Said et al. (2023) supported the idea by revealing that teachers’ positive attitudes toward ICT integration were significantly associated with their effective use of ICT in mathematics classrooms. Moreover, the statement given by the HoS of secondary school C supported the argument that: *“Teachers interact with online teaching materials for mathematics. These online materials actualize the mathematics learning experience for students by using YouTube” (HoS C, personal communication, 13th May 2024).* The statements from HoS C reveal that ICT integration in secondary schools is positively integrated into teaching mathematics.

Furthermore, in response to the statement teachers perceive ICT integration as essential for improving students’ performance in mathematics, Table 1 indicates that 95% of students with a high mean (4.38) agreed and strongly agreed. Nevertheless, 31.2% of respondents with a mean of (2.51) agree and strongly agree with the statement that teachers perceive resources for ICT integration as sufficient in school, while 60.6% of respondents disagree and strongly disagree. This implies that the school adopts technology in teaching to enhance mathematics competencies but there is a shortage of ICT resources in teaching mathematics at a school. This shortage of ICT facilities in a given secondary may hinder the mathematics teaching process. The result also contradicts the TPACK which emphasizes technological skills, among many other skills. This

perception of teachers is supported by the study by Kennedy, (2023) who revealed that the ICT shortage and negative attitudes of teachers towards ICT integration in teaching mathematics may hinder the learning process. This infers that ICT integration in mathematics teaching encounters several challenges, and they should be addressed early. This statement is also opposed to TAM theory on the environmental factors that can hinder ICT integration in the teaching process. The statement was also approved by HoS A who said:

“We use ICT devices connected to the internet. We prepare slides for teaching, prepare students’ results, and students solve many questions for further topic understanding. However, there is an extreme lack of ICT devices. Most of the devices used in school are personally owned” (Teacher A, Personal Communication, 10th May 2024).

The statement of HoS A denotes that ICT is not fully adopted in teaching mathematics in secondary schools due to various challenges leading to mathematics concept misconceptions failing to be applied in real-life situations. Additionally, HoS E demonstrated the challenges of ICT integration in teaching mathematics in secondary schools:

“The school is faced with a shortage of electricity to some classes as they are not currently connected to the power source, limiting the process of using projectors. Other challenges are lack of projectors, printers, laptops, and photocopier machines, and lack of internet access” (HoS E, personal communication, 13th May 2024).

Another HoS B who faced similar challenges as that of school E solved these challenges in different ways such as: *“We usually use the extra time to teach during weekend days, especially for the national examination classes of forms two and four” (HoS D, personal communication, 14th May 2024).* The statements from HoS A, HoS E, and B reveal that although ICT is integrated into teaching mathematics, different challenges hinder the process including internet connections and lack of technological tools. These challenges are solved by using personal internet and using extra time to integrate technology in mathematics. This statement is also aligned with the study by Adeola et al. (2022) in Ghana who suggested adaptability in using ICT in teaching mathematics. This means that whenever challenges are encountered there is a need to improvise other alternative strategies to solve ICT's existing challenges.

Moreover, Statistics in Table 1 show majority 86.9% of respondents with a mean of 4.05 agree and strongly agree with the statement that teachers are willing to invest time and effort to learn how to integrate ICT into mathematics lessons. Table 1 indicates that 91.8% of students with a high mean (4.38) agreed and strongly agreed that teachers think that ICT integration makes mathematics lessons more engaging for students. The result indicates that teachers believe ICT integration enhances mathematics classes to be more participatory for students and teachers willing to spend time and effort in learning how to integrate it. This statement is aligned with the study by Mpiza (2022) who claimed the importance of ICT in teaching mathematics in schools as it improves academic performance. This indicates that there is a need to integrate ICT in teaching and learning to enhance 21st-century skills and apply interactive pedagogical approaches. In connection to the statement, the TAM theory is applicable since it suggests the user-friendly and readiness to use by individuals. Furthermore, the statement given by the HoS of secondary school A that: *“With the ICT integration, the teaching process is easy, time is saved, the subject is easily explored, and the feedback to students is maximized” (HoS A, Personal Communication, 10th May*

2024). The statement implies that, with the integration of ICT the teaching facilitation in Mathematics subject is maximized and timely implemented.

Moreover, an extreme number (88.6%) of respondents with a mean of (4.21) agreed and strongly agreed with the statement that teachers see the value of incorporating real-world applications of ICT in teaching mathematics. Connectively, also extreme number (91.8%) of respondents with a mean of 4.15 agreed and strongly agreed with the statement that teachers are open to collaborating with colleagues to enhance ICT integration in mathematics teaching. The result indicates that teachers believe ICT integration enhances mathematics lessons and incorporates real-world applications. The process enhances and stands as a motivating factor for collaboration among colleagues to improve ICT integration in mathematics teaching. This finding correlates with Ayeh et al. (2024) who claimed that by using technology wisely and collaborating to include ICT in their lesson plans, teachers can provide students with the information and abilities necessary to thrive in an increasingly digital environment. The TAM theory also supported the statement, which requires the easiness and applicability of ICT within a conducive environment. This theory insists on the preparatory stage for the smooth acquisition of ICT applications. The same statement was further supported by the information given by HOS A who said:

“Teachers who are experts in ICT share experiences with other teachers in daily application at school. These expert teachers also share their experiences within in-house workshops through the cascade model. Finally, almost all teachers are nowadays able to integrate ICT in teaching subjects including mathematics” (HOS A, Personal communication, 10th May 2023).

This information given by HOS A demonstrates the existence of a positive perception towards ICT integration in teaching mathematics in secondary schools. This statement is also reinforced by Kariuki (2021) that a professional development program improves teachers' attitudes towards ICT integration in mathematics teaching. This indicates that professional development is a key element in increasing the confidence and readiness of teachers to integrate technology in teaching mathematics.

Lastly, Table 1 indicates that the majority (86.9%) of respondents agreed and strongly agreed that teachers are motivated to continuously explore new ways of integrating ICT into mathematics instruction, with a high mean score of 4.05; and another response to the statement the teacher believes that using ICT tools can make assessment and feedback more effective in mathematics as Table 1 indicates extreme majority (93.4%) of teachers with a high mean (4.44) agreed and strongly agreed. These two statements suggest that teachers are motivated to integrate ICT in teaching mathematics due to the frequent face-to-face and online professional development. This statement also concurs with TPACK principles in teaching practices and it can provide insights into effective strategies for technology integration and inform professional development initiatives to enhance digital literacy and instructional practices. This contention was also aligned with the statement given by the HoS C supported the argument that: *“Sometimes teachers participate in online webinars as a professional development strategy” (HOS C, Personal Communication, 13th May, 2024).* The information given by HOS demonstrates teachers' positive attitudes towards ICT integration in teaching mathematics. These statements are also supported by Kariuki (2021) that a professional development program improves teachers' attitudes towards ICT integration in

mathematics teaching. This indicates that professional development increases confidence and readiness to use technology in classrooms.

To establish the relationship between teachers' attitudes and the availability of ICT integration resources for teaching mathematics in public secondary schools, a simple linear regression statistical technique was used to test the Null Hypothesis (H₀), which stated that there is no significant linear relationship between teachers' attitudes and the availability of ICT integration resources for teaching mathematics in public secondary schools in Morogoro Municipal, Tanzania. The establishment of the decision rule was done at a significant level of 0.05 (2-tailed), guided by assumptions of normal distribution of data with no significant outliers. The tested output is displayed in Table 2.

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.339	1	.339	.198	.658 ^b
	Residual	100.907	59	1.710		
	Total	101.246	60			

a. Dependent Variable: Availability of ICT integration resources for teaching mathematics

b. Predictors: (Constant): Teachers attitudes

From Table 2, the data shows the p-value of the statistical test was 0.658 at a significance level of 0.05. This indicates that a P-value is greater than the significance level of 0.05; consequently, the statement of the hypothesis was accepted as there is no significant linear relationship between teachers' attitudes and the availability of ICT integration resources for teaching mathematics in public secondary schools in Morogoro Municipal, Tanzania. The data may also indicate the existence of teachers' positive attitudes towards ICT integration in teaching mathematics in public secondary schools in Morogoro Municipal, Tanzania which provides opportunities for teachers to deploy the available ICT resources in respective secondary schools. However, there are insufficient ICT devices which hinder the full integration in teaching mathematics in public secondary schools in Morogoro Municipal, Tanzania. Attitudes of Teachers towards ICT Integration in Teaching of Mathematics in Public Secondary Schools in Morogoro Municipal, Tanzania, relates to the TAM theory which assesses user attitudes, intentions, and behaviors regarding technology and aids in designing interventions for promoting technology acceptance and usage. The statement is also supported by Kennedy (2023) said, how important it is to remove obstacles to ICT integration in teacher education to give teachers the skills and resources they need to successfully integrate technology into their pedagogies. This indicates that emphasis on removing barriers to ICT Integration in teacher education so that educators can be equipped with the knowledge and tools necessary to properly incorporate technology into their pedagogies.

9.CONCLUSIONS AND RECOMMENDATIONS.

This part presents the conclusions drawn from the study findings, recommendations, and suggestions for further research.

9.1 CONCLUSION OF THE STUDY

Regarding the question about the attitudes of teachers towards ICT integration in teaching Mathematics in Public Secondary Schools in Morogoro Municipal, Tanzania, the study generated a conclusion with different perspectives.

Concerning teachers' attitudes towards ICT integration in teaching Mathematics in Public secondary schools in Morogoro Municipal; the study found that teachers had positive attitudes as many of them were ready, motivated, and felt comfortable in using ICT in teaching the aforementioned subject. This observation was supported by the information given by HOS and teachers through interviews and questionnaire data collection tools respectively

ICT integration in teaching mathematics in Morogoro Municipal public secondary schools is implemented. The fact was consistently approved by all five interviewed HoS, and by the teachers through questionnaires that ICT was integrated into mathematics lessons and it brought positive impacts towards students' academic achievements. However, there was a shortage of ICT devices and, a shortage of electricity which hindered the full deployment of technology in teaching mathematics in Morogoro Municipal public secondary schools.

9.2 RECOMMENDATION

The following recommendations are given in response to the conclusions of the study about the attitudes of teachers towards ICT integration in the teaching of Mathematics in Public Secondary Schools in Morogoro Municipal, Tanzania. The study is recommended due to the generated conclusive different perspectives.

1. Professional development (PD) for in-service teachers on ICT integration in teaching mathematics in public secondary schools should be frequently conducted to strengthen teachers' attitudes towards ICT integration in teaching Mathematics. PD will equip teachers with current knowledge to fully utilize ICT services in teaching mathematics while imparting mathematics competencies to students.
2. The government should develop a computer laboratory for every public secondary school to facilitate ICT integration in teaching mathematics. Furthermore, internet services should be provided in those computer laboratories to enhance digital skills in using online education materials. Also, electricity should be installed in all school buildings to necessitate ICT services availability.

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