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IN-SERVICE TEACHERS' ELECTRONIC READINESS TOWARDS INFORMATION AND COMMUNICATION TECHNOLOGY INTEGRATION IN THE TEACHING OF MATHEMATICS

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Abstract
This study explored the electronic readiness of in-service mathematics teachers towards the integration of ICT in the teaching of mathematics. Three research questions guided the study using descriptive research design. Also, data was collected from 118 senior high school mathematics teachers sampled from six senior high schools in the Cape Coast Metropolis. The data was obtained using closed-ended questionnaires. The study findings revealed that in-service mathematics teachers have the required knowledge to support mathematics learning activities with electronic devices. The teachers expressed a positive perception towards the use of electronic devices and are ready to integrate them into their mathematics teaching practices. It is recommended that stakeholders of Ghanaian senior high schools ensure that in-service mathematics teachers have technology-based in-service training that will continuously enrich their digital knowledge for effective pedagogical practices.

Keywords: Electronic Readiness, Electronic Devices, Digital Literacy, ICT Integration

Introduction

It is impossible to overstate how crucial technology has become in recent years for the educational field. Governments all around the world are making significant investments in ICT integration in education to boost knowledge and skill acquisition and satisfy the needs of contemporary information-based economies (Gyaase & Takyi, 2014). ICT use in the classroom is crucial for giving pupils the chance to learn how to function in the information age (Bingimlas, 2009). The incorporation of technology into the teaching and learning processes appears to be progressing in Ghana's tertiary education. However, it appears that the situation differs at the pre-tertiary level (Mensah et al., 2022). The low level of technology integration into teaching and learning at the pre-tertiary level in Ghana (Mensah et al., 2022) raises questions about whether teachers are ready, whether they have the right ICT skills, whether there are enough resources, and whether they know how to use them.

Due to its extensive adoption and use in enterprises, organizations, engineering, and general society, knowing and applying ICT has become a must. As a result, teachers must be ready to employ technology in the classroom for both teaching and learning. The relevance of digital technologies, such as laptops, mobile phones, projectors, and digital televisions, in fostering development is growing, which could account for government initiatives and demands that teachers incorporate technology into their lesson plans so that students can use and fully appreciate these tools in the classroom. Training, self-efficacy, perspectives, skills, resource availability, preparedness, TPACK knowledge, and readiness are just a few of the variables that may affect how well technology is used in math classrooms. According to research, math teachers have a favourable opinion of incorporating technology into their teaching methods (Boni, 2018; Hudson & Porter, 2010). According to Boni (2018), instructors' pedagogical practices and skills improve when they adopt technology-based teaching methods. Similar to this, 114 math teachers described how the opportunities provided by electronic devices improved their teaching strategies (Hudson & Porter, 2010). Onyia and Onyia (2011) found a link between instructors' perceptions of their efficacy and their use of technology. The likelihood that a mathematics teacher will use technology integration as a substitute for traditional teaching methods is positively correlated with their level of self-efficacy. Boni (2018) found that teachers' attitudes toward technology have an impact on how well they adapt and use these gadgets in the classroom. This introduces the idea that, in the effort to integrate ICT into mathematics teaching and learning, instructors' perceptions about electronic devices are important.

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Pre-service teachers are instructed and inspired to use ICT in the teaching of mathematics at Ghana's higher schools of teacher education (Mensah et al., 2022). Despite receiving the necessary training and showing a keen interest, many teachers are unable to successfully integrate ICT into the learning environment due to a lack of confidence, in-service training, ongoing professional skill development, technical support, resources, and technological infrastructure (Krause et al., 2017). Negative attitudes toward the usage of electronics may also stifle instructors' interest in and desire to include ICT in their instruction. Hence, while contemplating the integration of ICT into education, it is important to take into account instructors' digital knowledge of electronic devices, perceptions of such technologies, and readiness to use those devices in the classroom.

It has been observed that Ghanaian math professors leave reputable universities with enough IT capabilities. As a result, the teachers have the expertise needed to educate using technology effectively. The usage of electronic gadgets in the classroom, though, is not widely accepted at the senior high school level. Although teachers in Ghana's pre-university institutions have a high level of ICT literacy, they rarely use it to create and deliver technology-based lesson plans that enhance students' learning experiences (Gyaase et al., 2019). There is a wealth of literature on the issues that prevent math teachers from regularly and effectively integrating technology into their lesson plans. According to Kirkok and Karanja (2018), the low availability of infrastructure (computer labs, computer hardware, and software) is a barrier to lesson plans. According to Kirkok and Karanja (2018), low availability of infrastructure (computer labs, computer hardware, and software) is a barrier. Teachers are not utilizing the facilities to their full potential, according to Keong et al. (2005), due to a lack of knowledge on how to use ICT to enhance the curriculum, as well as difficulties integrating and using various ICT in a single class. They emphasized that one of the biggest obstacles to teachers integrating technology is a lack of understanding about electronic devices and the skills necessary to operate them. The extent to which a teacher can adapt and use electronic devices in educational activities is thought to be correlated with and affected by the teacher's understanding of those technologies.

The Ghana Education Service (GES) has organized several in-service trainings for teachers to provide them with TPAC knowledge, with a focus on integrating technology into instructional practices. The higher education institutions for teacher education (the University of Cape Coast [UCC] and the University of Education, Winneba [UEW]) launched teacher education programmes to prepare future educators to plan and carry out technology-based classes successfully. These initiatives by GES, UCC, and UEW indicate the necessity for teachers to possess digital knowledge and skills to integrate ICT into the classroom. According to Mensah et al. (2022), the teachers' digital literacy, attitudes about using technology in the classroom, and readiness to do so all have a role in how well technology integration works. The goal of this study is to determine how well-prepared teachers are to use electronic devices to integrate ICT. This study is therefore organized to determine the electronic readiness of mathematics teachers to use ICT in terms of their level of digital knowledge, perceptions about electronic devices, and willingness to integrate electronic devices into the teaching of mathematics. As a result, the study proposed and addressed the following three research questions: What level of digital literacy do senior high school mathematics instructors currently possess? How do senior high school mathematics instructors who are still in training view the use of technology in the classroom? What level of electronic readiness do senior high school math instructors have?

Digital Knowledge of Mathematics Teachers

In a classroom setting, technology may both be helpful and problematic. On the one hand, it can support curriculum reinforcement for kids with various learning preferences. Electronic devices make it easier for both students and teachers to access photographs and information than they could use a textbook. But, if they are always within reach, electronic devices can also act as a distraction (Van Braak et al., 2004). To maximize the advantages of technology in education for the following generation of students, teachers must comprehend all sides of the argument. For text, audio, or video conversations, there exist electronic gadgets. Using a computer, a smartphone, a calculator, a projector, an electronic watch, a tablet, or a virtual reality device falls under this category (Chege, 2014). The instructors' computer expertise, digital knowledge, and skills must be utilized for the appropriate use of electronic devices in mathematics teaching. Consequently, the extent of the success of integrating technology into instructional methods depends on the mathematics teacher's level of digital literacy.

Peralta and Costa (2007) assert that instructors' willingness to use technology in their lesson plans is significantly influenced by their level of digital literacy. Teachers' anticipated likelihood of success while utilizing ICT for educational reasons is referred to as their level of confidence (Peralta & Costa, 2007). This demonstrates the need for mathematics teachers to possess the knowledge and expertise necessary to integrate ICT into their teaching methods

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effectively. It has been stated that a mathematics teacher will struggle to confidently incorporate various electronic gadgets into teaching and learning if they are unfamiliar with them. According to Tezci (2010), teachers have a positive attitude toward employing electronic devices to supplement instruction, regardless of their level of technological proficiency.

The availability of infrastructure and computer training are determinants of teacher preparedness, according to research that examined the factors influencing mathematics teachers' willingness to use ICT in the classroom (Chege, 2014). According to Amuko et al. (2015) research, the adoption of technology in math classrooms is hampered by a lack of self-training in the development of digital abilities. Some studies suggest that teachers' professional training-based necessary digital literacy is constrained. According to Sheila (2016), math teachers are ill-equipped to incorporate ICT into their lessons. Statistics show that in 298 South African schools, 73.9% of teachers do not use electronic devices to support their lesson activities, 64.8% have not participated in ICT-based professional development, and about 55.5% have stated that they need technical support to incorporate technology into their lesson processes (Saal, 2017). To profile a mathematics teacher's needs for professional development, Saal (2017) advised determining their level of digital literacy. According to research done in Ghana by Agyei and Voogt (2011) on the use of ICT in math instruction, teachers' competency is impacted by their lack of training opportunities and knowledge on how to use ICT in lessons. Mensah (2017) also looked into how much technology was used by Ghanaian math teachers to offer teaching. The results showed that math teachers with significant technology training were skilled users of ICTs such as Microsoft Word, Microsoft PowerPoint, Excel, and the calculator. Hence, professional development to advance teachers' technical understanding might result in greater capabilities for technology integration.

Perception of Mathematics Teachers on the Use of Electronic Devices

Electronic teaching is the practice of supporting classroom learning activities with electronic tools or equipment, either directly or indirectly. The teacher and the learner have no restrictions with electronic teaching methods (Nielit & Thaunuskodi, 2020). Due to the technology's dual benefits and drawbacks within the same context, teachers are still forced to make the difficult decision of whether to permit or encourage students' use of it in the classroom (Lam & Tong, 2012). Yet, the likelihood of its use in the classroom may depend on the mathematics teacher's opinion of the impact of technology. When students' learning activities are supplemented by technology, several advantages have been documented in the literature. According to Keong et al. (2005), using technology to support mathematics lessons encourages interaction between students to share their knowledge and skills; it causes educators to act as facilitators and the learning process to become student-centred; it fosters students' self-exploration; it enhances their interest in, motivation for, and perceptions of mathematics; it produces higher-level thinking skills among students; and it encourages students to think a d differently. The advantages and disadvantages of technology on teachers' instructional strategies and students' educational experiences are potential determinants of teachers' attitudes toward incorporating technology into their lesson plans (Adedokun-Shittu & Shittu, 2015). A study of 114 Australian math teachers reveals that they had a favourable opinion of technology-focused classes (Hudson & Porter, 2010). The instructors' attitudes, perceptions, and knowledge of technology integration were examined using a logistic regression model, which validated perception and knowledge as important predictor variables of technology integration. Almekhlafi and Almeqdadi (2010) employed a mixed technique of data collecting consisting of focused group interviews and questionnaires to explore the integration of technology at United Arab Emirates (UAE) model schools. The findings demonstrated that teachers at both schools had favourable opinions of how ICT was incorporated into lessons. Similar findings were found in Onyia and Onyia's (2011) study, which looked for any statistically significant relationship between instructors' perceptions of their efficacy and their use of technology. The results showed a link between instructors' self-efficacy and how well they incorporate technology into their lesson plans. How effectively someone uses technology depends on how they view the technological gadgets they might need for their job.

In the effort to include ICT in the teaching of mathematics, teachers' perceptions of electronic devices are important. A study on math instructors' preparedness to include ICT in the classroom was done by Baya'a and Daher (2012), utilizing 475 Arab elementary school teachers. According to the findings, nearly 70% of the participating teachers showed good self-esteem towards the use of technology in their mathematics classrooms, as well as positive opinions of their competency in technology and technology integration. According to the study's findings, teachers are prepared to include ICT in their methods of teaching and learning as well as students' learning processes. Contextually, a study on the use of technology by Ghanaian math instructors showed that the teachers had favourable opinions of using electronic devices in the teaching and learning of mathematics (Boni, 2018). The teachers acknowledged that utilizing

technology-based instruction enhanced their pedagogical abilities, even though they mostly employ a traditional method of instruction rather than ICT. The debate that has just been had suggests that math professors have favourable opinions of using technology to aid both their teaching methods and the academic progress of their pupils.

Teachers' Electronic Readiness

How successfully ICT is incorporated into the teaching and learning of mathematics depends on the teacher's level of electronic preparedness. According to Baya'a and Daher (2013), the positive impressions of Arab instructors may result from their willingness to employ technology to supplement their teaching methods), the positive impressions of Arab instructors may result from their willingness to employ technology to supplement their teaching methods. It is also noted that the use of ICT to promote learning is an effective pedagogical strategy; thus, it is important to examine the readiness of the mathematics instructor and students to use these technologies to enhance teaching and learning (Mazana et al., 2019). Mensah (2017) concluded that, in the Ghanaian context, the widespread use of scientific calculators in math classes is a hint that both teachers and students may be prepared to support learning using electronic devices.

Aim and Objectives of the study

The study investigated how practising teachers in selected senior high schools in Ghana are electronically ready to integrate information and communication technologies to teach mathematics. The objectives of the study are to:

1. examine the digital knowledge level of senior high school mathematics teachers
2. explore the perceptions of senior high school mathematics teachers on the use of electronic devices in teaching mathematics
3. determine the electronic readiness of mathematics teachers

Methodology

The purpose of this study was to determine the level of electronic readiness of senior high school mathematics teachers in Ghana. The specific goals were to determine their level of digital literacy, how they view using technology, and how ready they are to use technology. To explain the electronic readiness of in-service mathematics instructors at the senior high school level in the Ghanaian environment, the descriptive study approach was used to collect quantitative data. Based on the assumption that the qualities of the math teachers would be evaluated based on their willingness to use technology in the teaching and learning of mathematics, the descriptive design was chosen. The dependent variables in this study are the teachers' perceptions of the use of electronic devices in mathematics instruction, their level of digital literacy, and their readiness for using electronic devices in teaching mathematics. The Cape Coast Metropolis in Ghana's Central Region served as the study's location. The 22 Metropolitan, Municipal, and District Assemblies (MMDAs) in the Central Region include the Cape Coast Metropolis. The Cape Coast Metropolis, Ghana's largest metropolis and home to a huge number of senior high schools, served as the study's location.

There were roughly 170 mathematics teachers in all across the chosen schools. The six schools for this study were chosen using a straightforward random method (using the Excel random number generator). The sample was chosen using the Krejcie and Morgan (1970) sample size table, with a total of 170 mathematics teachers in the chosen schools. However, the study was able to get 118 in-service mathematics teachers to respond to the questionnaires meant for the study. The main instrument of measure in this study was a questionnaire. The digital knowledge, perception and electronic readiness questionnaire of Alshehri (2012) was adapted for this study. The questionnaire was structured in four major sections: (A) required participants' demographic information, (B) consisted of questions based on the knowledge level of using electronic devices in teaching mathematics, (C) provided questions on mathematics teachers' perceptions of using electronic devices for teaching and (D) contained questions on the teachers' electronic devices readiness. The Cronbach Alpha reliability coefficient of the questionnaire was determined. The reliability of the teachers' knowledge level of using electronic devices, their perceptions about using electronic devices to teach, and their readiness to use electronic devices were 0.82, 0.87, and 0.85, respectively. The mathematics teachers were to indicate the extent of their agreement to each statement, on a five-point Likert scale ranging from strongly disagree to strongly agree. Frequency counts and percentages were used to analyze the respective research questions. Strongly agree and agree were merged and taken as agree, while disagree and strongly disagree were merged and taken as disagree. The frequencies of agree, disagree and neutral were then calculated and compared against one another.

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Results

This section presents the results of the study. The results are presented based on the research questions. The purpose of the study was to determine the electronic readiness of in-service mathematics teachers at the senior high school level to integrate ICT into the teaching of mathematics.

Digital Knowledge Level of Senior High School Mathematics Teachers

This research objective sought to determine the digital knowledge level of the senior high school mathematics teachers of the selected schools. Frequency counts and percentages were generated for each item and shown in Table 2.

Table 2: In-service mathematics teachers' knowledge level of electronic device usage

	Digital Knowledge level	**Agree**		**Neutral**		**Disagree**	
SN		**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**
1	I know how to connect the projector and use the printer	74	77.9	10	10.5	11	11.6
2	I frequently play around with electronic devices	68	71.6	21	22.1	6	6.3
3	I am able to use electronic devices to explore mathematical ideas	66	69.5	17	17.9	12	12.6
4	I know how to use different electronic devices	63	66.3	23	24.2	9	9.5
5	I am able to select certain electronic devices to communicate mathematics processes	62	65.3	26	27.4	7	7.4
6	I am able to use electronic devices to solve mathematics problems	62	65.3	23	24.2	10	10.5
7	I know how to use electronic devices to represent mathematical ideas	57	60.0	27	28.4	11	11.6
8	I know how to fix electronic devices when I encounter challenge(s) when using them	48	50.5	24	25.3	23	24.2

Table 2 shows that (77.9, 71.6, 69.5, 66.5, 65.3, 65.3, 60.0, and 50.5) % of the respective questionnaire items of respondents agree to have the requisite digital knowledge for using electronic devices to support the teaching and learning of mathematics as against (11.6, 6.3, 12.6, 9.5, 7.4, 10.5, 11.6, and 24.2) % who disagree of possessing the needed digital knowledge. A relatively low percentage of the teachers remained indecisive about their digital knowledge level. The frequency counts of the respective items show that (10.5, 22.1, 17.9, 24.2, 27.4, 24.2, 28.4, and 25.3) % of the teachers were unable to judge their digital knowledge level in using electronic devices to teach mathematics. Specifically, 65.8% of teachers agree to use different electronic devices like projectors, communicate with these devices, use electronic devices to explore mathematic concepts and use them to represent mathematics ideas and solve problems. Also, 22.5% of mathematics teachers disagree with possessing digital knowledge for using electronic devices to support the teaching of mathematics, while 11.7% revealed an average digital knowledge level. From Table 2, the frequency counts of the items show that SHS mathematics teachers have a high level of knowledge in using electronic devices to teach mathematics. The percentage of teachers who agree to possess the repertoire of digital knowledge is greater than the percentage of those who disagree with the items. Therefore, the majority of mathematics teachers from the sampled teachers have high digital knowledge for teaching mathematics.

Mathematics teachers' perception of the use of electronic devices in teaching mathematics

This research objective sought to determine the perception of mathematics teachers on the use of electronic devices for teaching mathematics. Frequency counts and percentages were generated for each item and shown in Table 3.

Table 3: Mathematics teachers' perception of using electronic devices

SN	Teachers' perception of digital devices	Agree		Neutral		Disagree	
		Freq.	%	Freq.	%	Freq.	%
1	Engaging with electronic devices is not difficult.	71	74.7	14	14.7	10	10.5
2	Teaching with electronic devices can help me organize tasks well and in simple forms.	69	72.6	18	18.9	8	8.4
3	The use of electronic devices as instructional tools can increase the interest of students in learning mathematics	69	72.6	16	16.8	10	10.5
4	Teaching with electronic devices makes students understand the concepts well.	67	70.5	27	28.4	1	1.1
5	Using electronic devices makes teachers more productive	66	69.5	22	23.2	7	7.4
6	Teaching with electronic devices does not delay the instruction process.	63	66.3	20	21.1	12	12.6
7	The usage of electronic devices makes it easier to prepare course materials (assignments, handouts)	62	65.3	21	22.1	12	12.6
8	Using electronic devices for instructional purposes is important rather than printed materials only	54	56.8	34	35.8	7	7.4

Based on the item-by-item analyses, Table 3 shows that (74.7, 72.6, 72.6, 70.5, 69.5, 66.3, 65.3, 56.8) % of the respective teachers' perception items agreed to have a positive perception about the use of digital devices in the teaching and learning of mathematics. On the contrary, (10.5, 8.4, 10.5, 1.1, 7.4, 12.6, and 7.4) % of the teachers disagreed with having positive perceptions regarding the use of electronic devices to augment the teaching and learning processes of mathematics. And a relatively moderate percentage (14.7, 18.9, 16.8, 28.4, 23.2, 21.1, 22.1, and 35.8) % of the teachers were undecisive of their perceptions about supporting mathematics learning with electronic devices. The general view of the results suggests that 68.8% of the teachers demonstrate positive perceptions of supporting mathematics teaching with electronic devices and thereby agree that using electronic devices to support learning is not difficult and makes preparing course materials easier, electronic devices help organize learning activities, students learning interests increases, teachers' instructional practices improve and makes them more productive, and make students understand concepts better. About 8.8% of the teachers disagree with the affordances of electronic devices in supporting students learning of mathematics and 22.4% of the teachers showed average perceptions about the use of electronic devices in the teaching and learning of mathematics. The results of Table 3 indicate that Ghanaian SHS mathematics teachers have positive perceptions regarding supporting learning activities and processes with electronic devices.

The electronic readiness of mathematics teachers

The third research objective was to determine the electronic readiness in-service mathematics at the senior high school level. The frequency counts and percentages of teachers' electronic readiness are reported in Table 4.

Table 4: Mathematics teachers' electronic devices readiness

SN	Teachers' E-readiness	Agree		Neutral		Disagree	
		Freq.	%	Freq.	%	Freq.	%
1	I can download files from the internet using electronic devices	74	77.9	15	15.8	6	6.3
2	I am competent in using presentation software such as PowerPoint	68	71.6	18	18.9	9	9.5
3	I am confident when using electronic devices	68	71.6	15	15.8	12	12.6
4	I possess basic skills in operating electronic devices.	67	70.5	21	22.1	7	7.4
5	I am willing to integrate electronic devices in teaching mathematics (computers, mobile phones, projectors, printers, etc.)	65	68.4	18	18.9	12	12.6
6	I can use electronic devices to support my teaching methods	64	67.4	25	26.3	6	6.3
7	I can develop electronic learning activities that urge my students to become critical thinkers	60	63.2	24	25.3	11	11.6
8	I can design online quizzes and use them in teaching my classes.	49	51.6	27	28.4	19	20.0

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From Table 4, it is revealed that (77.9, 71.6, 71.6, 70.5, 68.4, 67.4, 63.2, 51.6) % of the mathematics teachers agree to be ready to support their instructions with electronic devices. On the other hand, (6.3, 9.5, 12.6, 7.4, 12.6, 6.3, 11.6, 20.0) % of the teachers suggest not being ready to use electronic devices during their mathematics lessons. A relatively moderate number of the teachers (15.8, 18.9, 15.8, 22.1, 18.9, 26.3, 25.3, 28.4) % expressed average readiness about their ability to use electronic devices during mathematics instruction. The total frequency counts show that 67.8% of the mathematics teachers have expressed readiness to use electronic devices to augment teaching and learning activities of mathematics in Ghanaian senior high schools. The responses revealed that teachers can download instructional materials from the internet, they have high presentation competencies when using PowerPoint, they are willing and confident when using electronic devices, they have the skills to operate and integrate, they can use electronic devices to develop learning activities, design and conduct online quizzes and integrate electronic devices into various teaching approaches. Conversely, 10.8% of the mathematics teachers indicated unreadiness to employ electronic devices in instructional practices. A relatively low percentage of 21.4% of the teachers showed average readiness about the use of electronic devices in the teaching and learning of mathematics. The results suggest that the e-readiness of mathematics teachers to support teaching and learning processes with electronic devices is relatively high, and hence, Ghanaian mathematics teachers are ready to adapt and employ these devices in curriculum activities.

Discussion

This study aimed to investigate the electronic readiness of in-service mathematics teachers at the senior high school level. The study pivoted on the digital knowledge level, the perception of electronic device usage and the electronic readiness of mathematics teachers. The results on the digital knowledge level of the senior high school mathematics teachers showed that generally, mathematics teachers have the digital knowledge to integrate electronic devices into the teaching and learning of mathematics. The teachers' responses have revealed their capability to use devices such as printers, projectors, computers, mobile devices and mathematical software. Thus, the knowledge of available electronic devices for teaching mathematics is reportedly high among teachers. This finding aligns with the literature that, high knowledge of classroom technological resources translates into effective technology adaptation into teaching practices (Chege, 2014). Hence, Ghanaian in-service mathematics teachers at the senior high school level have demonstrated to have the requisite knowledge of electronic devices that can be employed as teaching-learning resources for teaching different mathematics concepts.

The results also suggest that mathematics teachers know how to use different electronic devices to support learning activities. This indicates that they are capable of employing appropriately different electronic tools in the teaching processes of various mathematics concepts. The ability of teachers to use different or multiple electronic devices to support learning is an expression of the extent of their high digital knowledge. It was also reported that the teachers had attained proficiency in choosing specific electronic devices that are suitable for teaching some specific mathematics content. The ability of teachers to specify which device can be used to communicate what mathematical concept exemplifies their competencies in technology integration. Agyei and Voogt (2011) agree with this conclusion that technology integration competencies are defined by the teacher's ability to know the ways through which technology should be used to communicate mathematics ideas to the student. Therefore, teachers' ability to select certain electronic devices to communicate mathematical content and represent mathematical ideas suggests that the teachers possess the necessary digital knowledge which helps them to select the appropriate electronic devices to support in communicating and representing mathematical ideas appropriately.

The results on the perception of the mathematics teachers on the usage of electronic devices revealed that the teachers have a positive perception of supporting mathematics classroom learning activities with electronic devices. It is revealed that about 68.8% of the mathematics teachers expressed positive perceptions of supporting mathematics learning with electronic devices. This result agrees with the research of Boni (2018) which pointed out that teachers demonstrated positive perceptions about the use of ICT in teaching and learning. Boni (2018) concluded that the teachers who used technology-based teaching improved their pedagogical skills and practices. It is reported that the teachers do not experience difficulties in using electronic devices. The teachers also expressed that the use of technology does not delay the progress of lesson delivery. Thus, the positive perception of teachers could be explained by the minimal challenges experienced when using electronic devices. It could also be associated with the success of achieving their teaching-learning objectives within stipulated time frames. The positive impact of technology in mathematics learning expressed by the teachers could explain their positive perception regarding using electronic

devices in learning mathematics. Baya'a (2010) posited that the perception one may have about electronic devices extends to the success of using them to support work activities. Again, the teachers indicated that the usage of electronic devices as instructional tools can increase the interest of students towards the learning of mathematics. The responses suggest that students engage or participate actively when they are being taught through the use of electronic devices. The opinion that electronic devices can serve as mediating tools to enhance mathematics learning could also explain the positive perception of the teachers.

Results on the digital readiness of the mathematics teachers revealed that about 67.8% of them were digitally ready to use electronic devices to support the teaching and learning of mathematics. The results showed that the teachers are confident when using electronic devices, the teachers possess basic skills to operate electronic devices and are willing to integrate electronic devices in teaching mathematics. The willingness of the teachers to integrate electronic devices into the teaching of mathematics means that the mathematics teachers are purposeful, passionate and committed to integrating the electronic devices into the teaching of mathematics. The electronic readiness of Ghanaian mathematics teachers agrees with the results of Mazana et al. (2019) that mathematics teachers and their students of the 21st century are always electronically ready in terms of perception, knowledge, skills and psychology. This informs that the Ghanaian mathematics classroom is ready to undergo a technological transformation from the old face-to-face traditional approach to a technological interactive platform for effective mathematical discourse.

Conclusion

Senior high school mathematics teachers have the necessary knowledge to use electronic devices in teaching mathematics. They know how to connect the projector and use the printer, they frequently play around with electronic devices, they know how to use different electronic devices, and they can use electronic devices to explore mathematical ideas during the instructional process. The teachers do not have difficulties in using electronic devices. They believe that teaching with electronic devices does not delay the instruction process, and the devices help them organize tasks well and in simple forms. It is also noted that using electronic devices as instructional tools enhances understanding and increases the interest of students towards learning mathematics. The Ghanaian mathematics teacher has a positive orientation about supporting lessons with electronic devices. Thus, teachers reported their willingness, confidence and competencies in using electronic devices such as GeoGebra, Autograph, mobile devices, calculators, projectors and printers. Therefore, in-service mathematics teachers at the senior high school level in the Cape Coast Metropolis have digital knowledge levels are high. The teachers have positive perceptions about using electronic devices to support the teaching of mathematics and, thereby, are electronically ready to adopt technology-based instructions as a pedagogical approach.

Recommendations

In light of the reported high digital knowledge levels, educational authorities and policymakers must step up and support professional development programmes for mathematics teachers. Efforts can be made to allocate resources for easy access to electronic devices and software while also implementing policies that encourage the use of technology in mathematics education. Additionally, principals and school administrators need to prioritize providing teachers with sufficient electronic resources. This includes essential software like GeoGebra and Autograph, as well as necessary hardware like projectors and printers to help educators maintain a positive attitude towards incorporating technology into their teaching. Finally, teacher training institutions can integrate digital pedagogy into their curriculum to enhance the teaching methods for new educators.

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