

PRIMARY SCHOOL TEACHERS' PERCEPTION, ATTITUDES AND SELF-EFFICACY
ON DIGITAL TECHNOLOGY-ENHANCED SCIENCE INSTRUCTION IN ABUJA
MUNICIPAL AREA COUNCIL

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Abstract

In the last decades, there has been a significant increase in the advocacy for the integration of digital technologies into classroom teaching and learning. Literature has indicated that digital technologies have the potentials to enhance learners' engagement, academic achievement, and critical thinking skills. These competencies and skills are essential skills for success in the 21st century. Nevertheless, there seems to be limited research that focused on children learning using digital technology. Therefore, this study determined the primary school teachers' perception, attitudes, and self-efficacy on digital technology-enhanced science instruction in Abuja Municipal Area Council. The research design was a descriptive survey. The population of the study involves all primary school teachers in Abuja Municipal Area Council Nigeria. The sample size was made up of one hundred and fifty (150) respondents who were selected using simple random sampling. The study was guided by three research questions and two hypotheses, which was tested at 0.05 significant levels. Questionnaires on primary school teachers' perception, attitudes, and self-efficacy towards digital technology-enhanced instruction was developed. The instrument was pilot tested and using Cronbach Alpha, the instrument yielded a reliability coefficient of between 0.72 and 0.76. The findings of the study indicated that primary school teachers have a positive perception and attitudes towards digital technology-enhanced instruction. The findings also indicated that the respondents in this population have strong and positive self-efficacy. It was recommended that Digital technology-enhanced science instruction should be encouraged to enhanced teachers' perception, among others.

Keywords: Attitudes, Digital technology, Perception, Primary teachers, and Self-efficacy.

Introduction

Development in digital technology has broken all national and international barriers and turned the world into a global village, making information available to everyone anywhere, and anytime. Since digital technologies improve the quality of education of a nation, consequently, national development depends on the extent to which a nation integrates these technological devices in education. Digital technologies have the potentials to create a learning environment that will enhance meaningful learning in the classroom. Studies have advocated for the integration of digital technologies for learning at all levels of education, especially among children (Jannah, Prasajo, & Jerusalem, 2020; McEwen & Dubé, 2015; Yaki, Midat, Babagana, & Nmdo, 2020).

Effective early childhood education is vital for children success at other successive levels of education. To achieve this laudable objective, the teacher's perception of these digital technologies is a crucial factor to be considered. However, there seem to be no adequate guidelines to help teachers, and no policy in place to compel teachers, especially at the early childhood education to implement these devices. One of the critical ways' technology integration can be achieved is by increasing teachers' perception and training of teachers to integrate different technological tools into teaching and learning (Hammonds, Matherson, Wilson, & Wright, 2013). There is a need for teachers to focus on technology-enhanced learning to prepare students for academic success (Ertmer & Ottenbreit-Leftwich, 2013). Consequently, the best place to implement digital technologies for learning should be at the childhood level of education, this could form a strong basis and background for the children successful use of technology at the subsequent level of education. Given the importance to implement digital technology among children, it is imperative to consider teacher perspective of

using digital tools to enhance learning. Because while some teachers integrate digital technologies in their classroom, others believe that children may abuse it and become addicted to it (Ibrahim, 2013).

Despite the benefit of digital enhanced-instruction, these devices technology (digital technology devices) on its own cannot guarantee meaningful learning without the teachers' guidance and supervision. Therefore, teachers are the facilitators and mediators of technology-enhanced learning (Blackwell, Lauricella, & Wartella, 2014). Consequently, primary school teachers' viewpoint such as perception, attitudes and self-concept of digital technology could provide an understanding of their disposition towards digital technology-enhanced instruction.

Perception is a vital construct that account for the level of engagement, and diverse opinion among individuals in a given phenomenon (Nikolopoulou and Gialamas 2013). It involves attaching meaning and experiences to a given context. Hence, perception or perspective in this study involves teachers' mental judgment resulting from experiences and awareness of the use of digital technologies among In this study, the use of digital technology-enhanced learning among primary school pupils.

However, teachers' perceptions may vary as concerns the use of technology in primary school level of education. Some teachers rely on technology in their classrooms, while others do not (Ibrahim, 2013). Primary school teachers that perceive that digital technology are vital for pupils learning are likely to integrate technology for teaching and learning. On the contrary, teachers who see technology negatively are less likely to use technology in their classrooms (Hammonds et al., 2013). Consequently, knowledge of teachers' perspective on digital technology in children education could contribute meaningful literature to this important subject matter.

Digital technology-enhanced instruction in this study is broadly defined to include the use of portable computers, electronic books, digital toys, mobile phones, portable computers, video games and desktop, among others for primary pupils teaching and learning. In other words, digital devices in this study refer to all products bought and integrated for pupils learning. Alon and Fuentes (2014) advocated for the integration of technology-enhanced learning among pupils. While other researchers argue that technology-enhanced learning has a negative influence on pupils learning and underscores the importance of hands-on learning and exploratory experience among pupils (Davidson, Given, Danby, & Thorpe, 2014). Contrary to this, others opined that age should not be a barrier to the integration of technology for classroom instruction (Vandewater et al., 2005)

The evolving landscape of the use of digital technology provides the need to assess teachers' perception on the use of technology. However, literature is replete on teachers of older children perspectives on technology use (Ertmer & Ottenbreit-Leftwich, 2013; Teo, 2014). There seem to be limited literature on the perspectives of primary school teachers on digital technology enhanced instruction (Yaki, et al 2020 & Teo, 2014). Despite the benefit of digital technology in learning among children, technology on its own cannot generate meaningful learning. Teachers are mediators of technology-enhanced instruction. Nikolopoulou and Gialamas (2013) highlighted teachers' negative perception and lack of training and development opportunities as some of the problems or barriers to the implementation of digital devices in early childhood education. On the contrary, Yaki et al. (2020) reported that children teachers have a positive perception of digital technology-enhanced learning. This study was conducted in Minna Niger State, Nigeria, thus, this study was done in Abuja, Federal Capital Territory, Nigeria

Ardies, De Maeyer, Gijbels, and Van Keulen (2014) reported that users' attitudes could be used to explain the extent of their intention to adopt technology for instruction. Hence, attitude could play a positive or negative role towards behavioural intention to engage in technology-enhanced learning.

Similarly, positive attitudes towards technology among higher institution students and educators were reported (Al-Emran, Elsherif, & Shaalan, 2016). Lindahl and Folkesson (2012) reported that children teachers' attitudes have a significant influence on their adoption of technology for teaching and learning. Hermans, Tondeur, Van Braak, and Valecke (2008) reported in their study that teachers have positive attitudes towards the integration of digital devices in the classroom. Similarly, Kung-Teck, Rosma bt, Pauline Swee Choo, and Mohd (2013) reported positive attitudes towards technology use for instruction among adult teachers. Given the foregoing, it is imperative to determine children teachers' attitudes towards digital technology used for instruction

Previous research has suggested that an individual's belief seem to have a positive impact on their behaviour and is seen as a strong psychological construct that impact teachers' instructional activities in the classroom (Hsiao & Yang, 2010). An individual perception and attitudes towards a technology device could influence his self-efficacy towards its usage. Self-efficacy is the belief that an individual holds that can influence his perception, judgement, and decision to adopt an approach or technology to achieved set objectives (Bandura, 1997). Therefore, teachers' self-efficacy towards digital technology-enhanced learning involves the beliefs or self-confidence a teacher will display in integrating technology for pupils' instruction. Teachers with high self-efficacy are more likely to integrate technology to achieve the desire learning objectives. On the contrary, teachers with low self-efficacy are less likely to engage in digital technology-based instruction. In support of this, Zee and Koomen (2016) reported that teacher self-efficacy has a positive relationship with the instructional quality. Given the foregoing, self-efficacy is a motivational idea which is contingent on teachers' perception of their ability and not their actual level of ability to integrate technology for children instruction. In this study, digital technology self-efficacy refers to children's teacher's belief towards digital technology-enhanced learning. Studies on teacher self-efficacy are grounded in Bandura's cognitive theory which highlighted that learning occurs as a results of interaction between the learner, environment and behaviour. This interaction could enhance an individuals' self-efficacy. This implies that individual's abilities to achieved set goals and outcomes is greatly impacted by their self-efficacy and intention (Bandura, 1997). Bandura opined that individuals with high self-efficacy are more likely to perform a challenging task and put in more efforts to achieve set objectives compare to those with low self-efficacy.

The literature on children teachers' digital technology self-efficacy seems to be limited, the bulk of the studies focus on the technology self-efficacy of adult teachers. However, Menon, Chandrasekhar, Kosztin, and Steinhoff (2017) reported that pre-service teachers have high and positive self-efficacy towards technology used for science learning. Similarly, (Anderson, Groulx, & Maninger, 2011) opined that teachers' self-efficacy towards technology has a positive influence on their intention to engage in technology-enhanced learning.

Most of the literature reviewed in this study focused only on self-efficacy (Chandrasekhar, Kosztin, and Steinhoff 2017), while other studies focused on either attitudes or perception (Kung-Teck et al, 2013 & Teo, 2014). Hence, this study focused on the three construct perception, attitudes and self-efficacy among primary school teachers in primary science instruction. Furthermore, most literature reviewed were outside Nigeria and particularly outside the population of this study, hence the drive for the study to examine teachers' opinions on these constructs.

Statement of Problem

Digital technologies are central to the creation of the emerging global knowledge-based economy and play an important role in accelerating economic growth and promoting sustainable development. Consequently, digital technology is critical component needed in the development of manpower in

the 21st-century. The primary level of education is an important level because what happens at this level could impact other levels of education.

Digital natives are today young people in our school who are growing up in the world of digital devices such as computers, cell phone, and internet, among others. Judd (2018) opined that digital natives are those born in the digital age and who have access to digital technology. Therefore, technology is part of their lives both in school and out of school. However, teachers' perspective on the integration of these digital technologies for instructions among children calls for concern. Lindahl and Folkesson (2012) reported that teachers' perception is one of the most common barriers to technology integration among children. However, researchers have highlighted that there is limited use of digital technologies in children's education (Blackwell, 2013; Vockley & Lang, 2011). Considering the critical role of digital technologies in children learning, it is essential to consider teachers perception and behavioural intentions to use of these devices in children instruction (Obielodan, Amosa, Ala, & Shehu, 2019). Perception refers to an individuals' sensory impression of an existing phenomenon. Obielodan et al. (2019) reported that male and female educators have a similar perception of the use of digital devices. Therefore, gender is considered as a moderating variable in this study to determine its effects of teachers' perception. Thus, children teachers' perception of digital technology and children instruction will contribute to the existing literature on the subject matter

Research Objectives

The aim and objectives of the study investigated primary school teachers' perception, attitudes and self-efficacy on digital technology-enhanced science instruction in Abuja Municipal Area Council. Specifically, the study sought to

1. Determine primary school teachers' perception on digital technology-enhanced science instruction.
2. Examine primary school teachers' attitudes towards digital technology-enhanced instruction.
3. Determine primary school teachers' self-efficacy towards digital technology-enhanced instruction.

Research Questions

The following research questions guided the study:

1. What is the perception of primary school teachers towards digital technology-enhanced instruction?
2. What is the primary school teachers' attitude towards digital technology-enhanced instruction?
3. What is primary school teachers' self-efficacy towards digital technology-enhanced instruction?

Research Methodology

The study adopted a descriptive (cross-sectional) survey design. The descriptive design in this study involves the use of a quantitative approach to gathering data (Creswell, 2012). The population of the study is made up of all children teachers in Abuja municipality, Federal Capital Territory (FCT) Abuja. A multi-stage sampling procedure or approach was used in selecting the respondent for this study to achieve a fair representation of the sample across the population. First, the stratified sampling technique was employed to divide the Abuja municipal area council into three (3) strata. From each stratum, forty (30) children teachers were randomly selected. The sample size was made

up of one hundred and fifty (150) children-teachers. The sample size was also made up of 85 female teachers, and 65 were male teachers.

Instrument

The instrument for data collection was adopted structured questionnaire. The questionnaire is a 5-point Likert scale of Strongly Agree (SA) Agreed (A) Undecided (U) Disagree (D) and Strongly disagree (SD), graded from 5 – 1 respectively. The instrument was made up of section A, B, C and D. Section A is made up of respondent demographic data, gender, age, and years of experience. Section B is made up of 10 items that sought to determine primary school teachers' perception of digital technology for science instruction. Section C consists of 10 items that sought to determine primary school teachers' attitudes towards the use of digital technology for science instruction. Finally, section D is made up of 8 items that sought to determine primary school teachers' self-efficacy towards the use of digital technology for science instruction. The structured questionnaire was validated for face and content by two educational technology experts, two educational psychologists, and one English language expert. The instrument yielded a relatively coefficient index of 0.74, 0.75 and 0.78 for perception, attitudes and self-efficacy respectively using Cronbach alpha. This agrees with Sekaran and Bougie (2010) who reported that the Cronbach's Alpha reliability value of 0.70 and above is considered acceptable for instruments developed in the field of education and social science. The researchers administered the 170 Questionnaires, but only 150 respondents returned their responses.

The data collected were analysed using descriptive and inferential statistics. Research questions were answered using percentage and mean. The benchmark for high or low was determined using the average mean of a 5-point Likert scale (3.00). The mean of 3.00 and above is considered high, while less than 3.00 is considered low. The formulated hypothesis was tested using t-test at 0.05 level of significance.

Results

The results of this study were presented based on the stated research questions and the formulated hypothesis as displayed below.

Perception of Primary school teachers on Digital Technology-enhanced Instruction for science instruction

To answer research question one: What is the perception of primary school teachers on digital technology-enhanced instruction? To answer this research question, percentage, mean, and standard deviation were employed, and the analysis is presented in Table 1.

Table 1: Percentage and Mean of the Perception of Primary School Teachers on Digital Technology-enhanced Science Instruction

Item	N	SA	A	U	D	SD	Mean	Decision
Digital technology allows the child to develop creative skills	150	99 66.0%	48 32.0%	0 0	3 2.0%	0 0.0%	4.62	High
Using digital technology encourages children participation in achieving learning goals	150	75 50.0%	42 28.0%	12 8.0%	9 6.0%	12 8.0%	4.38	High
Digital technologies enrich students understanding of the	150	60 40.0%	90 60.0%	0 0.0%	0 0.0%	0 0.0%	4.40	High

learning concept								
Digital technology provides children with instant feedback	150	15 10.0%	111 74.0%	12 8.0%	12 8.0%	0 0.0%	3.86	High
Children concentration during learning is enhanced using digital technologies	150	63 42.0%	84 56.0%	3 2.0%	0 0.0%	0 0.0%	4.40	High
Teaching and learning through digital technologies allow children and facilitators to brainstorm on the subject matter	150	75 50.0%	39 26.0%	12 8.0%	15 10.0%	9 6.0%	4.04	High
I have the knowledge to employ digital technologies for children learning	150	51 34.0%	54 36.0%	39 26.0%	0 0.0%	6 4.0%	4.00	High
I can facilitate and monitor my children's learning process using digital technologies	150	48 32.0%	87 58.0%	9 6.0%	0 0.0%	6 4.0%	4.14	High
Digital technologies have positive effects on students learning	150	102 68.0%	39 26.0%	3 2.0%	6 4.0%		4.58	High
I feel digital technology scaffold quality children instruction	150	66 44.0%	75 50.0%	0 0.0%	6 4.0%	3 2.0%	4.30	High
Grand Mean		43.6%	44.6%	6.0%	3.40%	2.40%	4.07	High

Table 1 shows the findings of children teachers' perception of digital technology-enhanced instruction. The result indicates that 43.60% and 44.60% of the respondents in the population strongly agree and agree, respectively. While 6.00% were undecided, On the contrary, 3.40% and 2.40% disagree and strongly disagree respectively, indicating that only 5.80% has a negative perception of digital technology-enhanced instruction.

The primary school teachers from the population have a positive perception of the use of Digital technology-enhanced instruction. The average mean of 3.0 was used as the benchmark for agreeing and less than 3.0 for disagree on each item. Consequently, all the items show the mean of between 3.86 – 4.58, and the grand mean 4.07, indicating that primary school teachers from the population have a positive perception towards the use of Digital technology-enhanced science instruction.

Primary School Teachers' Attitude towards Digital Technology-enhanced Science Instruction

To answer research questions two: What is the attitude of primary school teachers towards digital technology-enhanced instruction? To answer this research question, the mean and standard deviation was employed, and the finding is as presented in Table 2.

Table 2: Percentage and Mean of the Attitudes of Primary School Teachers on Digital Technology-enhanced Science Instruction

Item	N	SA	A	U	D	SD	Mean	Decision
I believe it is a decent idea to use digital technology for children instruction	150	129 86.0%	21 14.0%	0 0.0%	0 0.0%	0 0.0%	4.86	High
I like the idea of using digital technology for	150	45 30.0%	93 62.0%	9 6.0%	3 2.0%	0 0.0%	4.20	High

children instruction.									
I have positive feelings about digital technology for children instruction.	150	33 22.0%	96 64.0%	12 8.0%	9 6.0%	0 0.0%	4.02	High	
I believe digital technology Apps can help me to manage my work.	150	93 62.0%	51 34.0%	6 4.0%	0 0.0%	0 0.0%	4.58	High	
I like using digital technology to prepare learning materials for my students	150	63 42.0%	81 54.0%	0 0	6 4.0%	0 0.0%	4.34	High	
I am skillful in digital technology-enhanced instruction.	150	117 78.0%	30 20.0%	3 2.0%	0 0.0%	0 0.0%	4.76	High	
Digital technologies can help me to improve instructional skills.	150	60 40.0%	90 60.0%	0 0.0%	0 0.0%	0 0.0%	4.40	High	
I am enthusiastic about digital technology-enhanced instruction.	150	78 52.0%	69 46.0%	3 2.0%	0 0.0%	0 0.0%	4.40	High	
I am relax using digital technology devices to teach	150	90 60.0%	45 30.0%	12 8.0%	3 2.0%	0 0.0%	4.48	High	
Technology-enhanced instruction is a comfortable exercise	150	54 36.0%	87 58.0%	9 6.0%	0 0.0%	0 0.0%	4.30	High	
Grand Mean		50.80%	44.20%	3.60%	1.40%	0.00%	4.43	High	

Table 2 shows the findings of primary school teachers' attitudes on digital technology-enhanced instruction. The result indicates that 50.80% and 44.20 of the respondents in the population strongly agree and agree, respectively. Indicating they have positive attitudes towards digital technology-enhanced instruction. While 3.60% were undecided, On the contrary only 1.40% disagrees, indicating that only 1.40% has negative attitudes of digital technology-enhanced instruction.

The primary school teachers from the population have positive attitudes towards the use of digital technology-enhanced science instruction. The average mean of 3.0 was used as the benchmark for agreeing and less than 3.0 for disagree on each item. Consequently, all the items show the mean of between 4.02 – 4.8, and the grand mean 4.43, indicating that primary school teachers from the population have positive attitudes towards the use of Digital technology-enhanced instruction.

Primary School Teachers' Self-efficacy towards Digital Technology-enhanced Instruction

To answer research questions three: What is children teachers' self-efficacy towards the use of digital technology-enhanced instruction? To answer this research question, the mean and standard deviation was employed, and the finding is as presented in Table 2.

Table 3: Primary School Teachers' Self-Efficacy towards Digital Technology for Children Instruction

Item	N	SA	A	U	D	SD	Mean	Decision
I am prepared for digital technology-enhanced instruction	150	45 30.0%	96 64.0%	6 4.0%	3 2.0%	0 0.0%	4.22	High

I can use digital technology devices for children instruction	150	39 26.0%	93 62.0%	15 10.0%	3 2.0%	0 0.0%	4.10	High
I have enough skills for digital technology-enhanced instruction	150	99 66.0	42 28.0%	6 4.0%	3 2.0%	0 0.0%	4.58	High
I am well prepared in using talking computer to support teaching and learning.	150	105 70.0%	42 28.0%	3 2.0%	0 0.0%	0 0.0%	4.68	High
I can select appropriate devices for each instruction.	150	72 48.0%	45 30.0%	15 10.0%	9 6.0%	9 6.0%	4.08	High
I encounter minimal problem in using digital devices	150	48 32.0%	99 66.0%	3 2.0%	0 0.0%	0 0.0%	4.28	High
I can use digital platforms to support my teaching	150	45 30.0%	90 60.0%	15 10.0%	0 0.0%	0 0.0%	4.20	High
I can determine when and how to use digital technology devices	150	57 38.0%	87 58.0%	6 4.0%	0 0.0%	0 0.0%	4.34	High
Grand Mean		42.50%	49.50%	5.75%	1.50%	0.75%	4.31	High

Table 3 shows the findings of children teachers' self-efficacy on digital technology-enhanced instruction. The result indicates that 42.50% and 49.50% of the respondents in the population strongly agree and agree, respectively. While 5.75% were undecided, On the contrary only 1.50% and 0.75% disagree and strongly disagree, respectively. Signifying that only about 2.25% has negative attitudes of digital technology-enhanced instruction.

The children teachers from the population have positive self-efficacy towards the use of Digital technology-enhanced instruction. All the items show the mean of 4.02 – 4.8, and the grand mean 4.31, indicating that children teachers from the population have positive attitudes towards the use of digital technology-enhanced instruction.

Discussion of Results

Meaningful teaching and learning among primary school teachers using digital technology have been highlighted in the literature. However, technology alone cannot yield the desired result without the teacher as facilitator. Therefore, the study investigated primary school teachers' perception, attitudes, and self-efficacy on digital-enhanced science instruction in Abuja Municipal Area Council. The findings indicate that primary school teachers' have a positive and high perception of digital technology-enhanced instruction. The findings corroborate with the earlier findings of Yaki et al. (2020) reported that primary school teachers' have a positive perception on digital technology-enhanced learning. This also agrees with Lindahl and Folkesson (2012) who reported that digital technology is an important tool for instruction among children. This finding did not correspond with Nikolopoulou and Gialamas (2013) who reported teachers' negative perception towards digital technology-enhanced instruction. The findings of the study could be attributed to the fact that the present teachers are either digital natives or digital immigrants and therefore, technology has become an integral part of their lives. Hence, daily usage of digital devices for personal used could have influenced their perception.

The findings also indicated that primary school teachers have positive attitudes towards digital technology-enhanced instruction. Positive attitudes towards technology among higher institution

students and educators were reported (Al-Emran et al., 2016), hence this supported the finding of the study. Similarly, Ardies et al. (2014) reported that users' attitudes could be used to explain the extent of their intention to adopt technology for instruction. Contrary, this finding did not correspond with Nikolopoulou and Gialamas (2013) who reported teachers' negative attitudes towards digital technology for teaching. This finding could be attributed to the fact that the integration of technology is encouraged probably during their teacher education.

The findings also indicated that children teachers have high and positive self-efficacy towards digital technology-enhanced instruction. These results agree with Menon et al. (2017) reported that pre-service teachers have high and positive self-efficacy towards technology used for science learning. Similarly, Anderson et al. (2011) opined that teachers' technology self-efficacy has a positive influence on their intention to engage in technology-enhanced learning. The finding could be attributed to the ease of use of digital technology devices among the population of this study. Furthermore, the result could be attributed to the fact that digital technology has infiltrated children educators, and this was demonstrated by their positive self-efficacy

Conclusion

Digital technology-enhanced instruction is viewed as a critical paradigm to enhance meaningful learning at all levels of education. The study contributes to the literature and provides insight into primary school teachers' perception, attitudes and self-efficacy towards digital technology-enhanced teaching and learning among children. The data shows that primary school teachers' have a positive and high perception, attitudes, and self-efficacy towards utilization of digital technology-enhanced instruction. Therefore, the study provided an empirical understanding of primary school teachers' perspectives on digital technology-enhanced science instruction.

Recommendations

Given the findings of this study, the following were recommended.

1. Digital technology-enhanced science instruction should be encouraged to enhanced teachers' perception
2. Conducive learning environment and provision of digital technology devices should be provided to enhance positive attitudes towards digital technology-enhanced science instruction.
3. Self-efficacy and competency in the integration of digital technology should be encouraged during teacher training

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