Assessing Gender Differences in Teachers' Digital Literacy Skills for Assisting Students with Functional Diversity

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Abstract--- Education provides an opportunity for all students to learn skills and knowledge that will assist them to develop their full potentials. However, functional diversity presents significant challenges to some students which make them require additional assistance in order to learn especially in this digital era. The digital era has brought about changes in education which in turn require teachers' acquisition of the digital literacy in order to remain efficient in assisting students with functional diversity. This work assessed gender differences in teachers' digital literacy for assisting students with functional diversity. Questionnaire was used for data collection. The study adopted percentage, mean, standard deviation and t-test for data analysis. This study revealed that both male and female teachers possess some digital literacy skills for assisting students with functional diversity. It found that gender is not a significant factor that influences teachers' digital literacy skills for assisting students with functional diversity. The study recommends that there should be consistent training of the teachers who handle students with functional diversity at least twice in a year on emerging ICT services and facilities that enhance teaching and learning processes for effective instructional delivery of inclusive and special education.

Keywords--- Digital Literacy, Functional Diversity, Gender, Teachers.

I. Introduction

The school is an institution where students have equal rights to be equipped with life-long skills to survive the evolving issues of life. The advancement in technology has improved deliveries in schools such that teachers leverage technologies toprovide assistance for learners including those with functional diversity. Functional diversity is a term used to refer to special needs children in order to remove the derogatory nature attributed to the words previously used to address children with challenges or special needs. This change in terminology tries to see children with disability as humans with diverse and multiple abilities who perform the same functions in different ways. It also means students who require additional support with schooling that results from a wide variety of cognitive and physical impairments. Adam and Tatnall (2017) noted that some terms in the same category include 'Students at Learning Risk' and 'Students with Specific Learning Needs'. Categories of children with functional diversity include those with learning disabilities, those with behavior disorders, hearing impairment, visual impairment among others. The Nigerian National Policy on Education listed the following categories of students as students with functional diversity: visually impaired, hearing impaired, physically and health impaired, mentally retarded, emotionally imbalanced, speech impaired, learning disabled, multiple handicapped, and the gifted and talented (Federal Republic of Nigeria, 2004).

Students with special needs usually face learning difficulties that can be effectively addressed with the use of assistive technologies (Gomwalk& Abdulkareem 2017; Omede 2014; Seale, Draffan& Wald, 2010). In the teaching profession, digital literacy skills are the core competency requirement for teachers whose basic duties include searching, processing, and sharing information (Saikkonen &Kaarakainen, 2021). This is important in this era as students are continuously receiving data, interacting, displaying media, and using a variety of technology-based resources and this requires competent teachers who are skilled (Heidari &Tabatabaee-Yazdi, 2021). This is in line with the earlier assertion byOmede (2014) that the usefulness of digital knowledge and technologies for special needs education can be characterized in at least four dimensions: instructional, environmental, human resources and learner technologies.

Communication and interaction in the 21st century require digital literacy. As part of the information production process, digital literacy involves seeking, organizing, analyzing, interpreting, evaluating, transferring, as well as reading and writing digital texts (Akkoyunlu& Soylu, 2010). Digital literacy as defined by Martin (2008) is the

awareness, attitude, and proficiency with digital tools and facilities which empowers an individual to be able to discover, access, manage, integrate, evaluate, analyze, and integrate digital resources, create new knowledge, express oneself through media, and exchange ideas, based on particular life circumstances, with the purpose of facilitating constructive social action and to reflect on this process.It involves using technology effectively and safely and not just being able to operate the tools but having knowledge combined with critical thinkingabout how to use it as well as use it safely and responsibly.

Digital literacy skills are also the capabilities concerned with enabling users to make effective use of technology responsibly. They include basic computer skills like switching on/off a computer, opening, editing and saving files, using email and internet browsers. Others are ability to create and maintain social connections through social media like facebook, capability to locate, evaluate, and effectively retrieve information from library websites and databases. As part of 21st century digital literacy, Ferrari (2013) emphasized that the following skills such as browsing, searching and filtering information; storing and retrieving information; interacting through technologies; engaging in online citizenship; collaborating through digital channels; netiquette; managing digital identity; developing content; copyright and licenses; programming; protecting devices; and protecting personal data among others.Calvani, Cartelli, Fini, and Ranieri (2008) identified three main dimensions of digital literacy: technological skills (TS); cognitive skills (CS), and ethical knowledge (EK). The TS represents a user's flexibility in exploring new technology; CS encompasses an individual's ability to access, select, analyze, and evaluate information in a critical manner; while EK refers to the sense of responsibility users have towards their rights and obligations when interacting with ICT.

Digital literacy skills are very important for the teachers because they need those skills to be able to function well in the 21st century. However, teachers have continued to face challenges in overcoming the disability digital divide. In today's digital age, it is very important for teachers of students with disabilities to acquire digital literacy skills in order to raise independent learners (Abed, 2018). While many students use laptops and phones, they do not know how they can utilize these facilities to help themselves in achieving their educational goals and most students with special needs who have difficulty in learning may not be aware of how to use technology to improve their learning. This study, therefore, seeks to find out the digital skills of teachers for assisting students with functional diversity.

Theoretical Background

The theory of connectivismby Siemens (2005)supports the use of digital technologies in teaching students with functional diversity.Connectivism posits that knowledge is distributed across networks and that learning involves successfully navigating these connections and understanding the connections which are made using technologies. Therefore, effective instructional strategies consist of the instructor assisting students to identify, navigate, and evaluate information from their networks of learning (Transue, 2013). Learners are nodes and connections are links and these connections include those we make through ICTs. That is to say that, learners have to learn by making connections through technology the teacher adopts in teaching.Siemens (2006) stated that learning is a network which is shaped by technology and socialization. With respect to this study, learners should not be led to memorize but to have the capacity to access and apply information where necessary.As the world becomes more interconnected, learners need to be able to deal with interconnectedness. Therefore, they need digital literacy so as to be able to access resources and critically analyse the information. Students can use digital tools to explore connections and develop skills of communication, collaboration, and critical thinking. Developing these skills in learners can make them feel supported to become competent learners in a digital age. Digital literacy allows teachers to assist students in communicating, collaborating and understanding the complexities of what they are using.

Review of Literature

In Park and Nam's (2014) study of people with and without disabilities in South Korea, it was discovered that students with impairments are just as able as anyone else to gain digital literacy once technical barriers are addressed. Research has also shown that there is a concern about the lack of assistance provided by teachers for students with disabilities to handle and use technology (Martinez, 2011).Teachers should assist students with functional diversity to conduct informational search online, introduce them to relevant search engines, and how to retrieve and store information, joining teleconferences, zoom meetings, how to draw and how to be ethical and honest in sharing and collecting information, protect their privacy and how to avoid plagiarism or copy and paste (Tohara, Shuhidan, Bahry & Nordin, 2021).

The use of digital technologies is intended for all teachers, regardless of gender. In a study that explored teachers' attitude toward ICT with a gender perspective by Islahi and Nasrin (2019), it was discovered that in terms of various factors, including training, location of schools, medium of instruction and marital status, the attitude toward information technology did not differ between genders. Thus, the study concluded that gender is not a significant factor that influences the utilization of ICT in the classroom. Other studies have found that teachers

incorporate digital literacy in their classrooms and that prospective teachers' digital skills are high (e.g. Ongoren, 2021; Sadaf & Johnson, 2017). On the contrary, some scholars reported that teachers have low competence in the utilization of digital technologies especially when it comes to the use of digital technologies for students with disabilities (Fernandez-Batanero, et al. 2022a; Hassan & Mirza, 2021). Also,Saripudin, Ida, Listlana and Ana (2021) and Ongoren (2021) found out that prospective teachers did not differ according to gender in terms of the digital skills needed in the classrooms. Research has further found conflicting results regarding gender differences in ICT use, knowledge, and skills. Rizal, Rusdiana, Setiawan and Siahaan and Ridwan (2021) in their study found that male and female teachers differed in their digital literacy, with the males having a higher digital literacy than females. A study by Fernandez-Batanero, et al. (2022b) showed that teachers' competence levels differed by gender due to the perception that female teachers are more knowledgeable than male teachers.

In a similar study, MirÌe, Cakula and Tzivian (2019) reported that male teachers possessed higher levels of digital skills and readiness to study and those teachers who were younger appeared to possess a greater level of digital literacy than older respondents. Based on the factors that affect teachers' digital literacy skills,Saripudin, Ida, Listlana and Ana (2021) also found out that younger teachers possess higher levels of digital literacy than older teachers due to a greater exposure to digital technology. It was also discovered that the longer a teacher teaches, the lower their digital literacy rate since long-time teachers are generally old, thus inversely related to digital literacy.

II. Method

This research which aimed at identifying gender differences in teachers' digital skills for assisting students with functional diversity adopted a descriptive survey design. A descriptive survey deals with determining and establishing the state of the art or mechanism of information at the time of the study and presents such information as reported (Creswell & Plano Clark, 2011). The sample of the study consists of a total of 80 teachers (54 females and 26 males) obtained through convenience sampling technique from 5 special needs schools and 5 inclusive schools located in Southern states in Nigeria. The sampled participants prior to answering the research questionnaire filled the consent form in line with ethical guideline of American Psychological Association for conducting research with human beings. The instrument for data collection is a 10-item self-developed questionnaire designed to collect data on teachers' digital skills for assisting students with functional diversity. The questionnaire was made up of Section A and B. Section A dealt on the bio data of the participants while section B dealt on teachers' literacy skills. The questionnaire is a 4-point Likert rating scale which ranged from SA (strongly agree) to SD (strongly disagree).The questionnaire was validated by three experts. The internal consistency of the instrument was established using the Cronbach Alpha reliability estimate. The instrument yielded an internal coefficient of 0.719 which indicates that the instrument is highly reliable. Data were collected on the spot to ensure high return. The data collected underwent preliminary tests. IBM SPSS program was used for data analysis. The study adoptedpercentage, mean, standard deviation and t-test for data analysis.

III. Results

The demographic variables of the respondents showed that 54 participants were female while 26 participants were male. The age range of the participants indicated that 15% were below 30 years, 48.8% were between 31-40 years while 36.2% were 41 years and above. In addition, 65% of the participants taught in inclusive schools while 35% taught in special schools.The homogeneity of variance was established using Levene's test of equality of variance. The Levene's test equality of variance coefficient $F(1, 77) = 9.018$; $P = 0.004$; shows that there was a significant difference in the variance of the two groups because the p-value is below the 0.05 level of significance. Therefore, there was a violation of the assumption of equality of variance. As a result, equal variance not assumed was used for reporting independent sample t-test.

Table 1: Mean Ratings and Standard Deviations on Teachers' Digital Skills for Assisting Students with Functional Diversity

S/N	Item statements	Male Mean(SD)	Remarks	Female Mean(SD)	Remarks
1	Possess the skills to type, edit, print, send, save and retrieve documents/files.	3.35(.689)	Agree	3.28(.690)	Agree
2	Has ability to search for information using web browsers	3.38(.637)	Agree	3.38(.627)	Agree
3	Able to use projector to present learning contents to improve learning of students with special needs.	3.38(.637)	Agree	3.38(.562)	Agree
4	Able to create and design images using CorelDraw, Photoshop, etc.	2.04(.958)	Disagree	1.89(.640)	Disagree
5	Can create presentation slides using multimedia (in the form of images, text, video, sound) to be used as	2.38(.941)	Disagree	2.06(.602)	Disagree

	instructional aids.				
6	Knows how to use digital/intelligent assistants like Google assistant, Siri, Google voice and indigo to get information or assistance online.	2.00(.938)	Disagree	1.58(.570)	Disagree
7	Able to use online platforms like Google classroom, Zoom, and Google meet as means of delivering the contents to the learners.	1.85(1.008)	Disagree	1.58(.570)	Disagree
8	Knows how to protect privacy and data by using strong password.	3.46(.647)	Agree	3.43(.605)	Agree
9	Can communicate with colleagues and students without violating the rules of ICT and the rights of others through Facebook, WhatsApp, and Instagram etc.	3.46(.706)	Agree	3.28(.568)	Agree
10	Possess skills for creating animated videos via ICTs as instructional videos to assist students with functional diversity.	1.96(.958)	Disagree	1.94(.663)	Disagree

Table 1 showed the item-by-item mean ratings and standard deviation of the participants on teachers' digital skills for assisting students with functional diversity based on gender. The participants rated items 1, 2, 3, 8 and 9 above 2.50, indicating that these are digital literacy skills possessed by the teachers. In contrast, items 4, 5, 6, 7, and 10 were rated below the 2.50 benchmark, which indicates that teachers lack these necessary digital skills. Therefore, this study revealed that both male and female participants overwhelmingly agreed that teachers possess the skills to type, edit, print, send, save and retrieve documents, ability to surf the web, ability to use a projector in presenting contents, skills to protect privacy and data by using strong passwords and ability to communicate with colleagues and students without violating the rules of ICT and the rights of others. Similarly, this study revealed that teachers do not possess digital literacy skills such as the potential to create and design images using CorelDraw and Photoshop; skills to design presentation slides using multimedia, skills to use digital/intelligent assistants like Google assistant, Siri, Google voice and indigo, skills to use online platforms like Google classroom, Zoom, and Google meet as means of delivering the contents to learners, and skills for creating animated videos via ICTs as instructional videos to assist students with functional diversity.

Table 2:t-test Analysis Mean Ratings of Male and Female Participants on theTeachers' Digital Literacy Skills for Assisting Students with Functional Diversity

Gender	N	Mean	SD	t	df	Sig. (2-tailed)
Male	26	27.2692	5.32584	1.329	30.234	.194
Female	54	25.8113	2.43418			

In Table 2, a t-test analysis was conducted to analysed the mean difference in the ratings of male and female participants on the teachers' digital literacy skills for assisting students with functional diversity. The result indicated that there was no significant difference in the mean ratings of male and female participants on the digital literacy skills of teachers for assisting students with functional diversity,$t(1, 30.23) = 1.329$, $p=.194$. This is because the p-value (sig.) is greater than the 0.05 level of significance. Therefore, gender was not a significant factor influencing the digital literacy skills of teachers for assisting students with functional diversity in Southern Nigerian states.

IV. Discussion

This study revealed that both male and female participants agreed that teachers possess digital literacy such as the skills to type, edit, print, send, save and retrieve documents, ability to surf the web, ability to use a projector in presenting contents, skills to protect privacy and data by using strong passwords and ability to communicate with colleagues and students without violating the rules of ICT and the rights of others. These digital literacy skills are fundamental for assisting students with functional diversity to learn because they enhance learning processes, especially for students that find it difficult to concentrate in the classroom. For teachers, the ability to surf websites is a fundamental digital literacy skill. This is because it enables the teacher to acquire relevant materials to assist students comprehend the contents of the instruction. Similarly, the potential to utilize a projector during instructional delivery helps in capturing and refocusing students' attention. This is because a projector is designed to project words, charts, graphs, pictures, video and audio, thus making teaching and learning interesting. The finding of this study is in agreement with the finding of Sadaf and Johnson (2017) which showed that teachers integrate digital literacy in their classes.

This study equally revealed that the teachers are lagging behind in some digital literacy skills like the ability to create and design images using CorelDraw and Photoshop; ability to design presentation slides using multimedia,

ability to use digital/intelligent assistants like Google assistant, Siri, Google voice and indigo, ability to use online platforms like Google classroom, Zoom, and Google meet as means of delivering contents to learners, and skills for creating animated videos via ICTs as instructional videos to assist students with functional diversity. The finding of this study conforms to the finding of Fernandez-Batanero et al. (2022b) and Hassan and Mirza (2021) who reported that teachers have low competence in the use of digital technologies especially with respect to the use of digital technologies for assisting students with disabilities. These skills are crucial, especially when it comes to assisting students with functional diversity since it would make teaching and learning less stressful for teachers and students, as well as more interesting, motivating, and engaging for students. The teachers' lack of these digital literacy skills could be as a result of lack of availability ICT materials that foster digital literacy which could be computers, internet services, ICT personnel among others. This could also be attributed to the inconsistency in organizing workshops and seminars that concerns acquisition of skills and utilization of ICT in teaching and learning processes for the teachers.

Finally, this study affirmed that gender is not a significant factor that influences digital literacy skills of teachers for assisting students with functional diversity. This means that both the male and female teachers possess similar digital literacy skills for assisting students with functional diversity. This finding is consistent with the finding of Ongoren (2021) who also found out that teachers did not differ according to gender on digital skills needed in the classrooms. However, the finding of this study contradicts the finding of Rizal, Rusdiana, Setiawan and Siahaan and Ridwan (2021) which revealed a difference in digital literacy between male and female teachers with the males having a higher digital literacy than females. In addition, this study differs with Fernandez-Batanero(2022a) which revealed that teachers differ in their competence levels according to gender as female teachers were perceived to demonstrate more knowledge than male teachers. These controversies in the literature could be attributed to environmental factors that limit the exposure of either gender to ICT skills.

This present study has both practical and theoretical contributions to knowledge in the area of application of digital literacy skills by teachers in assisting students with functional diversity. Digital literacy skill plays a significant role in connecting the teacher and students to available instructional contents housed on the web as well as establishing interaction between the teacher and students irrespective of location.This study unveiled that the teachers possess some digital literacy skills for assisting students with functional diversity. Thus, digital literacy skills could have been helpful to the teachers in assisting students with functional diversity in teaching and learning processes. However, the teachers are still lagging behind on some aspects of digital literacy that are essential in sustaining students' interaction and engagement within and outside the classroom environment. If teachers do not measure up on crucial digital literacy skills, the inclusiveness of students with functional diversity may not be realized. This study made a significant theoretical contribution to knowledge by lending support to the tenet of connectivism theory (Siemens, 2005) which supports the use of digital technologies in teaching students with functional diversity.

This study has some limitations that should be noted. The generalization of our findings to a wider population should be done with caution since this study used only teachers that teach students with functional diversity. Similarly, this study employed a quantitative measure to demonstrate that teachers possessed some digital literacy skills; however, the teacher's personal opinions concerning digital literacy skills were not investigated. A systematic study into these limitations of these studies is a fruitful area for further research.

This study recommends that there should be consistent training of the teachers who handle these students with functional diversity at least twicein a year on emerging ICT services and facilities that enhance teaching and learning processes for effective instructional delivery of inclusive and special education. State and federal ministries of education should supply the state-of-the-art computer gadgets to facilitate the acquisition of these digital literacy skills among teachers.

V. Conclusion

This study assessed gender differences in teachers' digital literacy skills for assisting students with functional diversity. This study used a quantitative lens to reveal that teachers that teach students with functional diversity possess similar digital literacy skills irrespective of gender. Despite this, this study reveals that both male and female teachers still lag behind on some key digital literacy skills that are necessary for effective instruction and enhancement of inclusive and special education. Therefore, there is a need for adequate exposure of teachers in the study area to such digital literacy skills for effective content delivery in the classroom.

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