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GENDER ASSOCIATED JUNIOR SECONDARY MATHEMATICS TEACHER ICT COMPETENCE IN PORT HARCOURT LOCAL GOVERNMENT AREA

[1]Nwoko, O.O. & *[2]Wonu, N.
[1]Department of Curriculum Studies and Instructional Technology, Ignatius Ajuru University of Education, PMB 5047 Port Harcourt, NIGERIA
[2]Department of Mathematics/Statistics, Ignatius Ajuru University of Education, PMB 5047 Port Harcourt, NIGERIA

***Corresponding email:** ndukawonu@gmail.com

Abstract
This study investigated gender influence on the Information and Communication Technology (ICT) competencies of Mathematics teachers in Junior Secondary Schools in Port Harcourt Local Government Area (LGA) of Rivers State, Nigeria. The study adopted the comparative research design. The population was all the public Junior Secondary School Mathematics Teachers in Port-Harcourt LGA. A sample of 60 Mathematics teachers took part in the study. The instrument titled Teachers ICT Competency Inventory (TICI) used for data collection measured the teachers' ICT Competency. The Cronbach Alpha (r_a) formula was applied to compute the reliability of TICI and it resulted in an index of 0.80. Mean and Standard Deviation (SD) were used to answer all the research questions whereas an independent sample t-test was used to test all the hypotheses. The results among others established low mathematics teacher ICT competency for all the variables measured. There were statistically significant gender differences in ICT competencies between male and female Mathematics teachers in terms of ICT use for curriculum, pedagogy, and organizing and management of the teaching and learning process. However, no significant gender differences were found in ICT competencies regarding national/institutional policies and assessments to provide students with feedback. The study recommended that the government have all the in-service Mathematics teachers trained to become highly competent in the use of ICT.

Keywords: Gender, Mathematics Teacher, ICT Competence, Junior, Secondary School

Introduction

The German mathematician, Carl Friedrich Gauss referred to Mathematics as the queen of Sciences (Hussain & Howard, 2013). Marcus du Sautoy opined that Mathematics is the dynamic force propelling scientific discovery. It is the gate of Science. Mathematics is linked to daily life and is essential for the smooth operation of the business. The backbone of our society would crumble when Mathematics is ignored. Therefore, all scientific education that does not commence with Mathematics is said to be defective at its foundation. Discountenance of Mathematics wrought blemish to all knowledge. Principally two things are of great importance in the pedagogy study of Mathematics; the way the subject matter is organized, and how the subject is taught. This is because teaching and learning is a systematic instructional process aimed at transforming and growing students' intellectual abilities, skills, ethics, and values so that they can operate efficiently, become self-sufficient, and contribute constructively to social progress. Ede (2009) sees teaching as a form of active, purposeful, and motivational learning, as well as a social process of knowledge production and meaning-making. Through active engagement of learners in learning activities, the learning process comprises the origination, modification, and change of perceptual order (Nurmi & Jaakkola, 2006). According to the Federal Ministry of Education (2011), quality learning outcomes are dependent on the quality of teaching and learning inputs as well as the qualitative processing of those inputs, which includes, among other things, the use of ICT resources for Mathematics teaching and learning. Teaching is enhanced when it is done with the use of ICT tools (Wonu, et al., 2010; Didi & Wonu, 2010; Wonu & Domaka, 2013; Wonu, & Ojimba, 2015; Wonu et al., 2017; Kumah, & Wonu, 2020).

Information and Communications Technology (ICT) is a broad term for Information Technology (IT) that stresses the role of unified communications, and the integration of telecommunications (telephone lines and wireless signals) and computers, as well as necessary enterprise software, middleware, storage, and audiovisual systems, that enable users to access, store, transmit and manipulate information (Murray, 2011). ICT is a wide term that

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includes any communication device, encompassing radio, television, cell phones, computer and network hardware, satellite systems, etc., as well as the various services and appliance with them such as video conferencing and distance learning. It covers any product that will store, retrieve, manipulate, transmit, or receive information electronically in a digital form (e.g., personal computers, digital television, email, or robots). ICTs have become one of the main building elements of modern civilization in a relatively short time (Daniels, 2002). Mastering basic ICT skills and ideas, along with reading, writing, and numeracy is part of the core of education in many nations. However, there appears to be a misunderstanding that ICTs only pertain to computers and computing-related activities. Even though computers and their applications play a significant role in today's information management and technologies, this is not the case.

In the late 1980s, the term 'computers' was replaced with 'IT' (information technology) to indicate a shift in focus from computing technology to the ability to store and retrieve information, and later 'ICT' (information and communication technology).around 1992 with the advent of e-mail (Pelgrum, 2001). Across the past twenty years, the use of ICT has fundamentally changed the practices and procedures of practically all facets of endeavour within businesses and governance. Gabare et al. (2014) and Daud and Khalid (2014) opined that it is an empowering tool for the advancement of a more proactive teaching and learning milieu. Since the 1960s, ICT is used as an educational improvement in Sub-Saharan Africa. With the invention of television and the radio; education was expanded from the classroom to the living room, as well as to geographical locations previously unreachable by traditional classrooms. In Sub-Saharan Africa, the use of ICT in the classroom, known as Mobile-Learning (M-Learning), has increased instructors' reach and enhanced their capacity to track student development. The cell phone, in particular, has played a critical role in this endeavour. Mobile phone usage is common, and mobile networks in the region cover a larger area than internet networks. Students, teachers, and parents are all familiar with the devices, which allow for more communication and access to instructional content. M-learning not only benefits students but also allows for better teacher training, resulting in a more unified curriculum across the educational service area.

In 2011, UNESCO launched Mobile Learning Week, a yearly symposium aimed at bringing together stakeholders to debate the M-learning concept. The implementation process is not without its difficulties. Using different ICT facilities play a crucial role in students learning (Lei & Zhao, 2006). This allows students to explore and reach an understanding of mathematical concepts even as ICT supports constructivist pedagogy (Ittigson & Zewe, 2003). It assists with keeping with the most recent improvements with the assistance of different developments embedded in it. Ultimately, the efforts become more fruitful, achievable and down to earth for practice if combined with the efforts of educators, local leaders and entrepreneurs. In other words, ICT has tremendous potential to change the way of life of students and prepare them for workplaces, improvement of educational systems and attainment along with how people assess and process information if integrated astutely into a curriculum (Tedla, 2012).). Therefore, teachers are encouraged to grab it wholeheartedly. The studies by Pelgrum, (2001) and Al-Oteawi, (2002) showed that teachers who do not use computers in classrooms alleged that “lack of skills” was a constraining factor that impeded their utilization of ICT for teaching. However, it is important to note that above all limitations and barriers to the implementation of ICT in teaching and learning, the benefits surely outweigh it.

Having competence in ICT use does not mean the teacher can deploy this in the classroom, as time may be a limiting factor (Schoepp, 2005; Al-Alwani, 2005). This implies that the use of ICT requires more time, like time required to locate the ICT devices, set up internet devices, prepare the lessons in line with the device to be used, practice and resolve technical issues among others. ICT competence is deemed as having the aptitude to operate a wide array of ICT applications (Ilomaki, et al., 2011). Several studies revealed that teachers’ ICT competence together with their attitudes determines both their initial use of ICT and future behaviour towards technology (Chun-Mei, et al., 2018; Japhet & Usman, 2018). Teachers who are competent in the use of ICT habitually assimilate the technology into their lessons (Sipila, 2014). Cakir and Yildirim (2013) averred in their study that teachers’ perceptions and competencies are the critical determinants for their professional advancement Finally; Pelgrum (2001) asserted that the success of ICT implementation in schools is largely dependent on teacher competency levels. However, Drent and Meelissen (2008) discovered that ICT expertise has a minor impact on innovative ICT use. Effective training is needed to maximize the use of ICT infrastructures by teachers, and where this is lacking, the teachers would continue to rely on the now ineffective tools of traditional instructional delivery. The opportunity for training in the deployment of ICTs in the classroom may be limited for many teachers (Özden, 2007). Lack of training in digital literacy is a major obstacle to using new technologies in the classroom (Mulhim, 2013).

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To apply this technology does not effectively also require that pedagogical training be given to teachers (Becta, 2004). Indeed, training is the strongest determinant of teachers' technology use in schools (Chen, 2010) and is required anytime there is the introduction of new technology. Thus, training in ICT will build teacher competence and make them more willing to adopt it in the classroom. Other technological skills acquired by teachers are also necessary, but ICT training skills are important requirements for ICT integration into the educational process, as evidenced by the literature. Experience shows that training improves the confidence/self-efficacy and competence of teachers in teachers in the use of ICT in the classroom. Self-efficacy is the certainty that a person has as regards the ability to get things done (Wong, et al., 2012). The confidence of teachers relates to their deployment of ICT in teaching. There is a link between teachers' ICT self-confidence and their readiness to use it in the classroom. When a teacher is self-assured, he or she will have good views about ICT and be interested in incorporating it into teaching (Tezci, 2011; Player-Koro, 2012; Brun & Hinostroza, 2014; Hassan, et al., 2016). Wikan and Molster (2011) on the other hand, found that despite taking ICT courses, teachers lacked confidence in implementing ICT in their classrooms. That is, where the ICT facilities are accessible.

ICT infrastructure must be accessible as a precondition for integrating ICT in education (Japhet & Usman, 2018). The availability and accessibility of ICT resources are crucial for the deployment and integration of ICT into teaching in schools. As a result, having access to computers, as well as having up-to-date software and hardware, is essential for efficient ICT integration in schools. According to a comparable survey undertaken by the European Commission (2013), access is the most significant barrier to teachers' use of ICT in the classroom. For the purchase of ICT resources and the integration of ICT into the educational system, leadership support is required (Shin, 2015; Boulton, 2017; Japhet &Usman, 2018). Costley (2014), as cited in Fomsi and Orduah (2017) established that deploying technology had a favourable impact on Mathematics learning among students, as they were more engaged during sessions when technology was used. As a result, the study concluded that technology may be leveraged to provide engaging and relevant Mathematics education. Similarly, Blanskat, et al. (2006), as cited in EdTechReview February (2014) discovered that ICT has a favourable impact on student performance. In an ICT-integrated classroom, students become more eager to learn and their retention improves. Mathematics is widely taught using software packages such as DERIVE, MATHEMATICA, Microsoft Excel, and MAPLE (Keong et al., 2005; Neurath & Stephens, 2006). The use of ICT among teachers could be linked to their gender.

Gender variations in ICT skills have yielded conflicting findings in research investigations. Some researchers found significant variations in ICT skill between men and women (Sadik, 2005; Samak, 2006; Orji, 2010), while others (Ritzhaupt, et al., 2013; Tarhini, et al., 2014) found no such differences. Gender and ICT have been hot topics since the mid-twentieth century, gender inequality, or as it is more commonly known, gender differences, has been seen in a variety of fields, including business and politics. Sanda and Kurfi (2013) cited in Fomsi and Orduah (2017) stated that despite the importance placed on the usage of ICTs in Nigeria, women are under-represented when it comes to access and use. Gender disparities in access to and chances to learn using ICT persist, according to Fenwick (2004) in Mahmood and Bokhari (2012). Furthermore, it is widely acknowledged that, in comparison to their male counterparts, women in many countries face discrimination in areas such as education and politics. Furthermore, when it comes to socio-cultural, technological, and educational obstacles, women face more challenges than men when it comes to completing their tasks (Mayoux, 2001). Orji (2010) discovered that gender differences have been researched in a variety of domains, including electronic mail, data recovery, e-learning, and internet-based buying behaviour, with the majority of studies revealing a more favourable outlook for males than for women. Kirk and Zander (2004) identified gender as a major determinant of ICT use, claiming that there is a gender digital divide as a result of high literacy versus low literacy, high versus low income, and a rural-urban split. Men are more receptive to ICT use than women, which may translate to male teachers being more open to ICT use than their female counterparts are, which could be because women are often preoccupied with other issues that prevent them from taking advantage of ICT resources. Female teachers use ICT differently than male instructors, according to a consensus of research findings on gender disparity (Mitra, 2001). Since ICT is gaining traction as an alternative for conventional teacher-centred teaching and learning environments in education, and the focus has shifted from the instructor to the learner, ICT use is now required of all teachers, regardless of gender. Perhaps in acknowledgement of this, the Rivers State Government in Nigeria developed and outfitted model primary schools with ICT facilities, as well as training male and female teachers to be ICT-savvy. The study explored whether the training has resulted in gender equity in the use of ICT in teaching by the mathematics teachers at the JSS in Port Harcourt or not. This is why this research was necessary.

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Problem specification

The implementation of ICT is gradually setting up a technological culture in schools such that there is an expanded enthusiasm for how ICT contrivances can be best utilised to improve effectiveness in the teaching and learning of mathematical concepts. While the commitment to fully integrating ICT will lead to a critical turning point, scores of studies into the implementation of ICT in schools which has been narrowed down to different variables such as competencies, attitude, knowledge, etc. of teachers in secondary schools. It is obvious that the male gender seems to be more receptive to ICT and its educative tools than the females and this poses threat to the rapid rise in the implementation of ICT in education. This study investigated the competence of Mathematics teachers in the utilisation of ICT tools for the application of national/institutional policy, assessment, curriculum, pedagogy and tools in the organization and management of teaching and learning processes. Hence, this study seeks to research the gender influence on Mathematics teachers' ICT competence in Junior Secondary Schools in Port Harcourt LGA.

Purpose of the study

The purpose of this study is to investigate the gender influence on Mathematics Teacher ICT competence in Junior Secondary Schools in Port Harcourt LGA of Rivers State. Specifically, the study intends to:

1. Investigate the gender influence on the competency level of Mathematics teachers in terms of the application of national/institutional policy in Junior Secondary Schools (JSS) in Port Harcourt Local Government of Rivers State.
2. determine the influence of gender on Mathematics teacher utilization of ICT for assessing JSS students in Port Harcourt Local Government of Rivers State.
3. investigate the usage of ICT tools by the Mathematics teachers to achieve the Mathematics curriculum objectives for JSS in Port Harcourt Local Government of Rivers State.
4. find out the influence of gender on Mathematics teacher ICT utilization with regards to pedagogy in JSS in Port Harcourt Local Government of Rivers State.
5. determine the influence of gender on Mathematics teacher utilization of ICT in the organization and management of teaching and learning processes.

Research Questions

The following research questions guided the investigation.

1. How might we determine the Mathematics teachers' ICT competence in terms of the application of national/institutional policy in the classroom based on gender?
2. What is the difference based on gender in the Mathematics teacher utilisation of ICT for assessment to provide students with feedback?
3. How might we describe the disparity between male and female Mathematics teacher competence over the utilisation of ICT for curriculum?
4. What is the gender difference in Mathematics teacher utilisation of ICT concerning pedagogy?
5. How might we describe the difference in the use of ICT by Mathematics teachers in organizing and management of teaching and learning processes based on gender?

Hypotheses

The following null hypotheses were tested at a 0.05 level of significance to guide this study:

H_{01}: There is no significant difference in Mathematics teacher ICT competence in terms of the application of national/institutional policy in the classroom based on gender.

H_{02}: There is no significant difference in the Mathematics teacher utilisation of ICT for assessment to provide students with feedback based on gender.

H_{03}: There is no significant difference in the achievement of Mathematics curriculum objectives between the male and female teachers in Junior Secondary Schools in Port Harcourt.

H_{04}: There is no significant difference in the utilization of ICT between male and female Mathematics teachers concerning pedagogy in Junior Secondary Schools in Port Harcourt.

H_{05}: There is no significant difference in the utilisation of ICT by Mathematics teachers in organizing and managing of teaching and learning process based on gender.

Materials and Methods

Research Design: The comparative research design was used for this study. It was used to determine the differences in the ICT utilization competence between the male and the female Mathematics teachers in junior Secondary Schools in Port Harcourt LGA.

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Participants: A total of 60 Mathematics teachers took part in the study. The sampling technique used was the Census technique. This entails all of the Mathematics teachers in Junior Secondary School (JSS 1-3) of Port Harcourt LGA, Rivers State.

Instrumentation: The instrument for data collection was a 20-item instrument titled Teachers ICT Competency Inventory (TICI) adopted from UNESCO (2008). The instrument had two parts (Section A & Section B), measuring the demographic variables and the competencies of Mathematics Teachers in Junior Secondary Schools in Port Harcourt LGA. Section A measured the Bio-data of the participants (Age; Gender & Educational Qualification). Section B measured the Mathematics teachers' ICT Competency which consists of five (5) measures. Items 1-2 measured ICT for national/institutional policy; Item 3-4 measured data on ICT for assessment to provide feedback; items 5-8 measured data on ICT for curriculum objectives; Item 9-14 measured data on ICT for pedagogy; and items 15-20 measured data on ICT for organizing and management of teaching and learning. The reliability of the instrument was determined using the Cronbach Alpha formula, which gave an index of 0.80.

Data Collection: Firstly, a letter of introduction was sent to the principals of the schools to seek approval regarding the involvement of the Mathematics teachers in the study. After the approval, the researchers administered 60 copies of the instrument to the participants and guided them in filling out questionnaires. After responding appropriately, the copies of the instrument (TICI) were retrieved from the respondents. They were scored and transferred to the data editor of the Statistical Package for Social Sciences (SPSS) version 22 for analysis.

Data Analysis: The data collected were analyzed with descriptive and inferential statistics. Specifically, Mean and Standard Deviation were used to answer the research questions whereas the independent sample t-test was used to test the hypotheses at a .05 level of significance.

Results

Table 1: Summary of descriptive statistics and independent-sample t-test on Mathematics teacher's ICT competence in terms of the application of national/institutional policy in the classroom based on gender

SN	*ICT for application in national/institutional policy in the classroom*	**Male, n=24**		**Female, n=36**	
		Mean	**SD**	**Mean**	**SD**
1	Awareness of national/institutional ICT education policy.	1.79	0.51	1.61	0.49
2	Applying national/institutional ICT policy in the classroom.	1.33	0.48	1.28	0.45
	Grand mean: *t=1.10, df=58, p=.27*	**1.56**	**0.40**	**1.44**	**0.41**

Table 1 above shows the mean rating of Mathematics teacher ICT competence in terms of the application of national/institutional policy in classrooms based on gender in Public Junior Secondary Schools in Port Harcourt LGA. The grand mean rating on Mathematics teacher ICT competence in terms of the application of national/institutional policy in the classroom based on gender revealed a mean rating of 1.56, SD=0.40 for males and 1.44, SD=0.41 for females. Specifically, the male and the female respectively had distinct mean ratings on the awareness of national/institutional ICT education policy as 1.79, SD=0.51; mean=1.61, SD=0.49 respectively. It was followed by applying national/institutional ICT policy in the classroom with a mean rating of 1.33, SD=0.48 and mean =1.28, SD=0.45 for male and female teachers respectively. Furthermore, the result of the independent sample t-test showed that there was no difference in Mathematics teachers ICT competence in terms of application of national/institutional policy in the classroom in Public Junior Secondary Schools of Port Harcourt LGA based on gender(t=1.10, p=.27), hence the null hypothesis one was retained at .05 level of significance.

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Table 2: Summary of descriptive statistic and independent-sample t-test on the Mathematics teacher's use of ICT for assessment to provide students with feedback based on gender

SN	*Use of ICT for assessment to provide students with feedback*	Male, n=24		Female, n=36	
		Mean	**SD**	**Mean**	**SD**
3	Using ICT for formative and summative assessment and to provide students with feedback or progress	1.17	0.38	1.33	0.53
4	Using ICT communication and collaboration tools to access and source information and to connect students to the world outside the classroom	1.08	0.28	1.25	0.60
	Grand mean: *t=1.78, df=58, p=.08*	**1.13**	**0.27**	**1.29**	**0.40**

Table 2 above showed the mean rating on the difference in the Mathematics teachers' use of ICT for assessment to provide students with feedback based on gender in Public Junior Secondary Schools in Port Harcourt LGA. The grand mean rating of the male and the female Mathematics teachers over utilisation of ICT for assessment to provide students with feedback were 1.13, SD=0.27 and 1.29, SD=0.40 respectively. Specifically, the result showed that the mean ratings of the male and female teachers over ICT for formative and summative assessment and to provide students with feedback or progress were 1.17, SD=0.38 and 1.33, SD=0.53 respectively. The result also showed that the mean rating of the male and the female Mathematics teachers on using ICT communication and collaboration tools to access and source information and to connect students to the world outside the classroom were respectively 1.08, SD=0.28 and 1.25, SD=0.60. The result of the independent sample t-test showed that there is no difference in Mathematics teacher utilisation of ICT for assessment to provide students with feedback based on gender in Public Junior Secondary Schools of Port Harcourt LGA(t=1.78, p=.08), hence the null hypothesis two was retained at .05 level of significance.

Table 3: Summary of descriptive statistics and independent-sample t-test on the description of the difference between male and female Mathematics teacher competence over the use of ICT for curriculum

SN	*Teacher competency over the use of ICT for curriculum*	Male, n=24		Female, n=36	
		Mean	**SD**	**Mean**	**SD**
5	Using ICT tool for course design and lesson planning.	1.00	0.00	1.00	0.00
6	Using ICT tools in designing teaching and learning activities.	1.21	0.41	1.28	0.57
7	Using ICT tools to support students understanding of the subject concept and its application.	1.13	0.34	1.19	0.40
8	Using ICT resources and assistive technologies to address special education needs.	1.71	1.12	3.69	0.58
	Grand mean: *t=7.56, df=58, p=.000*	**1.26**	**0.33**	**1.79**	**0.22**

Table 3 above showed the mean rating on the disparity between the male and the female Mathematics teacher competence over the utilisation of ICT for curriculum in Public Junior Secondary Schools in Port Harcourt LGA. Overall, the result showed that the grand mean ratings of the male and the female Mathematics Teachers over Teacher competency over the use of ICT for curriculum were respectively 1.26, SD=0.33 and 1.79, SD=0.22. Specifically, the result showed that the male and the female teachers had equivalent mean ratings on using the ICT tool for course design and lesson planning (M=1.00, SD=.00). The result showed that the male and the female Mathematics teachers respectively had mean ratings of 1.71, SD=1.12 and 3.69, SD=0.58 on using ICT resources and assistive technologies to address special education needs. On using ICT tools to support students understanding of the subject concept and their application, the male and the female Mathematics teachers respectively had mean ratings of 1.13, SD=0.34 and 1.19, SD=0.40, whereas on using ICT tools in designing teaching and learning activities, the male and the female Mathematics teachers respectively had mean ratings of 1.21, SD=0.41 and 1.28, SD=0.57. The independent sample t-test revealed that there is a significant difference

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between the male and female Mathematics teachers in the achievement of Mathematics curriculum objectives in Junior Secondary Schools in Port Harcourt LGA (t=7.56, p=.00) hence the null hypothesis three was rejected at the .05 level of significance.

Table 4: Summary of descriptive statistics and independent sample t-test on the difference in the use of ICT for pedagogy between male and female Mathematics teachers

SN	*Use of ICT with regards to pedagogy*	Male, n=24		Female, n=36	
		Mean	SD	Mean	SD
9	Using ICT design in teaching and learning unit plans and activities.	1.08	0.28	1.11	0.32
10	Using ICT to identify complex, real-world problems and structure them in a way that incorporates key support matter concepts and services as the basis of the student project.	1.29	0.46	1.14	0.35
11	Using ICT to design and implement a collaborative project-based unit plan and classroom activities.	1.29	0.55	1.14	0.35
12	Using project-based learning and ICT tools to support student thinking and social interaction.	1.29	0.55	1.19	0.40
13	Using open-minded software packages appropriate to subject matter areas.	1.13	0.34	1.08	0.28
14	Using web resources in support of project/problem-based learning.	1.29	0.46	1.14	0.35
	Grand mean: *t=2.21, df=58. p=.03*	**1.23**	**0.15**	**1.13**	**0.17**

Table 4 above showed the mean ratings on the usage of ICT for pedagogy between male and female Mathematics teachers in Public Junior Secondary Schools in Port Harcourt LGA. The grand mean ratings of the male and the female Mathematics teachers on the use of ICT with regard to pedagogy were 1.23, SD=0.15 and 1.13, SD=0.17 respectively. Specifically, the result showed that the mean ratings of the male and the female Mathematics teachers on using ICT design in teaching and learning unit plans and activities were 1.08, SD=0.28 and 1.11, SD=0.32 respectively. Using ICT to identify complex, real-world problems and structure them in a way that incorporates key support matter concepts and services as the basis of the student project had mean ratings of 1.29, SD=0.46 and 1.14, SD=0.35 for male and the female Mathematics teachers respectively. Similar results were found for using ICT to design and implement a collaborative project-based unit plan and classroom activities and using web resources in support of project/problem-based learning respectively. Using project-based learning and ICT tools to support student thinking and social interaction had mean ratings of 1.29, SD=0.55 and 1.19, SD=0.40 for the male and the female Mathematics teachers respectively and using open-minded software packages appropriate to subject matter areas had mean ratings of 1.13, SD=0.34 and 1.08, SD=0.28 for the male and the female Mathematics teachers respectively. The result of the independent sample t-test showed that there exists a significant difference in the use of ICT between the male and the female Mathematics teachers concerning pedagogy in Junior Secondary Schools in Port Harcourt LGA. The null hypothesis four was rejected at .05 level of significance.

Table 5: Summary of descriptive statistics and independent sample t-test on the of the difference in the use of ICT by Mathematics teachers in organizing and management of teaching and learning process based on gender

SN	*Use of ICT in organizing and management of teaching and learning process*	Male, n=24		Female, n=36	
		Mean	SD	Mean	SD
15	Using search engines, social media websites and emails to find people and resources for collaborative projects.	1.00	0.00	1.00	0.00
16	Using ICT to manage, monitor and access progress of student projects and progress.	1.21	0.51	1.14	0.35
17	Using ICT to enable student communication and collaboration with students, peers and the wider community.	1.29	0.55	1.22	0.48
18	Using computers, raid, television, and other digital resources and/or the school so as to support and reinforce learning activities and social interaction.	1.33	0.48	1.67	0.50
19	Playing a leadership role in supporting innovation and continuous learning in the school community.	1.13	0.34	1.11	0.32

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20	Identify the appropriate social arrangement (whole class, small groups and individual activities) to use with various technologies.	1.33	0.64	1.06	0.23
	Grand mean: *t=2.41, df=58, p=.02*	**1.22**	**0.22**	**1.11**	**0.13**

Table 5 revealed mean ratings on the difference in the use of ICT by Mathematics teachers in organizing and management of teaching and learning processes based on gender. In consideration of the grand representation of the mean rating of both genders, the male had a mean rating of 1.22, SD=0.22 and the females with a mean rating of 1.11, SD=0.13 respectively. Specifically, the identification of appropriate social arrangements (whole class, small groups and individual activities) to use with various technologies had a mean rating of 1.33, SD=0.64 for males and 1.06, SD=0.23 for females. The mean ratings for male and female teachers on using computers, raid, television, and other digital resources and/or the school to support and reinforce learning activities and social interaction were 1.33, SD=0.48 and 1.67, SD=0.50 respectively. Using ICT to enable student communication and collaboration with students, peers and the wider community had mean ratings of 1.29, SD=0.55 and 1.22, SD=0.48 for the male and female Mathematics teachers respectively. The male and the female Mathematics teachers had mean ratings of 1.21, SD=0.51 and 1.14, SD=0.35 respectively for using ICT to manage, monitor and access the progress of the students' projects and progress. However both genders had an equivalent mean ratings on using search engines, social media websites and emails to find people and resources for collaborative projects(M=1.00, SD=.00). The result of the independent sample t-test showed that there exists a significant disparity in the use of ICT between the male and female teachers in organizing and managing of teaching and learning process(t=2.41, p=.02), hence the null hypothesis five was rejected at a .05 level of significance.

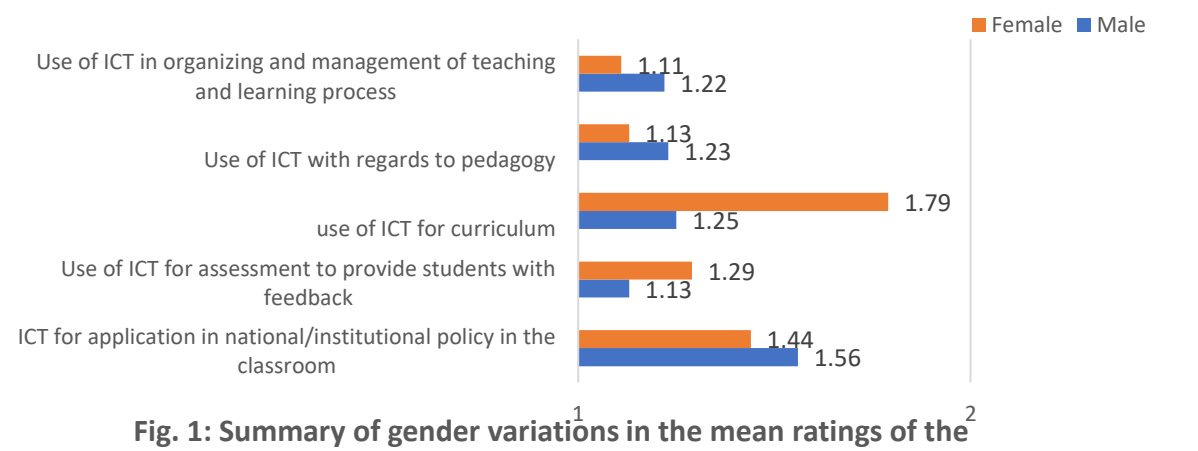

Fig. 1: Summary of gender variations in the mean ratings of the Mathematics teachers over ICT competency

Discussion of Findings

ICT competence in terms of application of national/institutional policy

The result from Table 1 showed that the grand mean ratings of the male and the female teachers on ITC competence in terms of application of national/institutional policy of JSS in Port Harcourt were 1.56, SD=0.40 and 1.44, SD=0.41 respectively. Since this mean is below the criterion mean score of 2.50, it implies that the teachers were very incompetent because it is below the criterion mean. This aligns with a study conducted by Li (2007) rightly indicating that one reason for the teachers not embracing technology, is the fear that, it might replace teachers in the school system (Li, 2007). This is an inevitable fear inhibiting the application of national and institutional policy. More so, the hypothesis that sought to seek a difference between male and female teachers in terms of application of national/institutional policy revealed a t-value of 1.10 and a p-value of 0.27. This signifies that there is no significant difference in Mathematics teachers' application of national/institutional policy based on gender. Ritzhaupt, et al., (2013) found no significant variations in ICT skill between men and women.

ICT for assessment of students to provide feedbacks

The result from Table 2 showed that the grand mean ratings on use of ICT by the male (M=1.13, SD=0.27) and female(M=1.29, 0.40) mathematics teachers for assessment to provide students with feedback at JSS in Port Harcourt were very low and below the criterion mean of 2.50. The ICT is neither used for summative and formative assessments nor is it used to enhance their knowledge gain outside the classroom. Nonetheless, several studies have revealed that providing ICT resources in schools does not guarantee that they would be used by

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instructors automatically (Ertmer, 2005; Gulbahar, 2008). The result further showed that there is no significant gender disparity in the usage of ICT by Mathematics teachers of JSS at Port Harcourt LGA of Rivers State for assessment of students to provide feedbacks (t=1.78, p=0.08). The null hypothesis two was retained at .05 level of significance. This finding is inconsistent with an earlier finding of Sanda and Kurfi (2013) cited in Fomsi and Orduah (2017), who stated that despite the importance placed on the usage of ICTs in Nigeria, women are typically underrepresented when it comes to access and use.

Competency in the use of ICT for the achievement of curriculum objectives

The result from Table 3 showed the overall mean difference between the male and the female Mathematics teacher competency over the usage of ICT for curriculum revealed a mean rating of 1.26, SD=0.33 and 1.79, SD=0.22 respectively. This means that the ICT competency over the usage of ICT for the curriculum of both the female and male Mathematics teachers at Public JSS in Port Harcourt LGA, River State was very poor. Wikan and Molster (2011) found that despite taking ICT courses, teachers lacked confidence in implementing ICT in their classrooms. ICT competence is deemed as having aptitude to operate a wide array of ICT applications (Ilomaki, et al., 2011). Teachers who are competent in the use of ICT habitually assimilate the technology into their lessons (Sipila, 2014). However, the hypothesis test revealed a significant disparity between the male and female Mathematics teachers of public JSS in Port Harcourt, Rivers State over ICT utilization for curriculum (t=7.56, p=.000). The null hypothesis three was rejected at a 0.05 level of significance. Female teachers use ICT differently than male instructors, according to a consensus of research finding on gender disparity (Mitra, 2001)

ICT use and pedagogy

The result from Table 4 showed that the ICT competency of the male (M=1.23, SD=0.15) and the female (M=1.13, SD=0.17) Mathematics teachers of Public JSS in Port Harcourt in Rivers State in regards to pedagogy were below average. It revealed that the Mathematics teachers are incompetent in the use of ICT for pedagogy. More so, there was a difference between the male and female gender in the use of ICT in the teaching and learning of Mathematics. That is, both male and female teachers are incompetent. Several studies revealed that teachers' ICT competence together with their attitudes determines both their initial use of ICT and future behaviour towards technology (Chun-Mei, et al., 2018; Japhet & Usman, 2018). The hypothesis test revealed that there is a significant disparity in the usage of ICT between the male and female Mathematics teachers concerning pedagogy (t=2.21, p=.03). This lends credence to the rejection of the null hypothesis four at .05 level of significance. Kirk and Zander (2004) identified gender as a major determinant of ICT use, claiming that there is a gender digital divide as a result of high literacy versus low literacy, high versus low income, and a rural-urban split. Previous studies established that gender has a statistically significant impact on ICT use by instructors (Sadik, 2005; Samak, 2006).

Use of ICT in organizing and managing the teaching and learning process

The result from Table 5 showed the difference in the use of ICT by Mathematics teachers at JSS in Port Harcourt LGA regarding the organization and management of teaching and learning process based on gender revealed a mean rating of 1.22, SD=0.22 for the males and 1.11, SD=0.13 for the females. The mean ratings were below 2.50 indicating a poor ICT competency in terms of organizing and managing of teaching and learning process. Wikan and Molster (2011) found that despite taking ICT courses, teachers lacked confidence in implementing ICT in their classrooms. The finding is inconsistent with Keong et al. (2005) who stated that usage of ICT facilitates structuring of the teaching and learning process through constructivism thereby making the learning process driven by technology which provides student-centred learning tools, making the teacher a facilitator. However, the statistical test revealed a significant gender disparity in Mathematics teachers' utilization of ICT in organizing managing of teaching and learning process (t=2.41, p=.02). The null hypothesis five was rejected at .05 level of significance. Earlier findings indicated that gender has a statistically significant impact on ICT use by instructors (Sadik, 2005; Samak, 2006).

Conclusion

The study established that the ICT competence of the Mathematics teachers was generally poor or below average. The teachers ratings of the male and female Mathematics teachers were poorest in the use of ICT in organizing and management of teaching and learning process. This was followed by the use of ICT with regards pedagogy, then the use of ICT for assessment to provide students with feedback, ICT for application in national/institutional policy in the classroom and lastly ICT for the attainment of the curriculum objectives. Out of the five variables studied, the male teachers had higher mean ratings in three leaving only two for the females. This substantiates the literature regarding the dominance of the males in the field of ICT. Based on the findings of the study it can be concluded that gender influenced on Mathematics teacher ICT competence of Mathematics teachers in public

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junior secondary schools in terms of use of ICT for the achievement of curriculum objectives, pedagogy, organizing, managing the teaching, and learning process respectively. Gender however did not influence the Mathematics teacher ICT competence of Mathematics teachers in public junior secondary schools on terms of application of national/institutional policy and assessment of students to provide feedback respectively.

Recommendations

Based on the findings of the study the following recommendations were made:

1. he Mathematics Teachers should be trained to become highly competent in the use of ICT. More so, in-coming Mathematics Teachers should be screened for ICT competency before acceptance for service.
2. Facilities should be setup in the various Public Junior Secondary Schools so that trained turned competent Mathematics teachers can use the ICT tools to facilitate pedagogical processes.
3. Mathematics teachers should strive to be acquainted and also improve their ICT knowledge so they can efficiently use it to achieve the Mathematics curriculum objectives.
4. Both male and female teachers should advance their knowledge on ICT to make easy the assessment of students to get feedbacks from lessons taught.
5. Mathematics teachers at Public Secondary Schools in Port-Harcourt, Rivers State should become competent in the usage of ICT by registering and learning with professional instructors on ICT.

References

Al-Alwani, A. E. S. (2005). *Barriers to integrating information technology in Saudi Arabia science education*. University of Kansas.

AlOteawi, S. M. (2002). The perceptions of administrators and teachers in utilizing information technology in in struction, administrative work, technology planning and staff development in Saudi Arabia. Doctoral di ssertation, Ohio University, Ohio.

Becta (2004), What the research says about using ICT in Geography. Coventry: Becta

Boulton, H. (2017). Exploring the effectiveness of new technologies: Improving literacy and engaging learners at risk of social exclusion in the UK.*Teaching and Teacher Education, 63*, 73–81.

Brun, M., & Hinostroza, J. E. (2014).Learning to become a teacher in the 21st century: ICT integration in initial teacher training education in Chile.*Educational Technology &Society, 17*(3), 222-238.

Cakir, R., &Yildirim, S. (2013). ICT teachers' professional growth viewed in terms of perceptions about teaching and competencies. *Journal of Information TechnologyEducation: Innovations in Practice, 12*, 221-237.

Chen, R.J. (2010). Investigating models for preservice teachers' use of technology to support student-centered learning.*Computers& Education, 55*(1), 32-42.

Chun-Mei, C., Chien-Hua, S., Hsi-Chi, H., &Tsu-Chuan, S. (2018). Factors influencing teachers' innovative teaching behaviour with information and communication technology (ICT): *the mediator role of organisational innovation climate. Educational Psychology, 39(1), 65-85.*

Costley, K.C. (2014). The Positive Effects of Technology on Teaching and Student Learning. retrieved 7th March, 2017 from http://files.eric.ed.gov/fulltext/ED554557.pdf

Daniels, J. S. (2002). Foreword. In *Information and Communication Technology in Education: A curriculum for schools and programme for teacher development*. Paris, France: UNESCO.

Daud, M. D., & Khalid, F. (2014).Nurturing the 21st Century Skills among Undergraduate Students through the Application and Development of Weblog.*International Education Studies, 7, 123-129.*

Didi, K.D & Wonu, N (2010). Assessment of teachers' computer literacy level for computer studies curriculum implementation in Gokana Local Government Area. *Journal of Vocational and Technical Education, 7(1&2),* 15-23.

Drent, M., & Meelissen, M. (2008). Which factors obstruct or stimulate teacher educators to use ICT innovatively? *Computers & Education, 51*, 187-199.

Ede, E.O. (2009). Hindrances to the implementation of information and communication technologies in the teaching and learning of technical drawing in Nigerian universities; *Nigerian Vocational Journal*, *14*(1), 60-70.

EdTechReview (2014) Advantages of using ICT in learning-teaching process . Retrieved 7th March, 2017 from http://edtechreview.in/trends-insights/insights/959-advantages-of-usingict-in-learning-teaching-processes

Ertmer, P. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration. *Educa tional Technology, Research and Development, 53(4) 25-40.*

European Commission. (2013). *Survey of schools: ICT in education*. Brussels: European.

Cite this article as:
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Federal Ministry of Education. (2011). *The state of education in Nigeria: beyond access*. Abuja: Federal Inspectorate Services.

Fomsi, E.F. &Orduah, S.E. (2017). Gender differences in the use of ICT among teachers in model primary schools in Rivers State, Nigeria. *British Journal of Education, 5(4), 88-94.*

Gabare, C., Gabarre, S., Din, R., Shah, P. M., &Karim, A. A. (2014). iPads in the Foreign Language Classroom?: A Learner's Perspective. The Southeast Asian Journal of English Language Studies, 20, 115-128. http://dx.doi.org/10.17576/3L-2014-2001-09

Gulbahar, Y. (2008). Improving the technology integration skills of prospective teachers. Through practice: A case study. *The Turkish Online Journal of Educational Technology*. *7*(4), 71-81.

Hassan, M., Rosnain, I. M., Ahmad, F. M. A., &Su, L. W. (2016).Teachers' acceptance of ICT and its integration in the classroom.*Quality Assurance in Education, 24*(1), 26-40.

Hussain, M.M.,& Howard, P.N. (2013). What Best Explains Successful Protest Cascades? ICTs and the Fuzzy Causes of the Arab Spring. *International Studies Review. 15 (1): 48–66. doi:10.1111/misr.12020. hdl:2027.42/97489.*

Ilomaki, L., Kantosalo, A., &Lakkala, M. (2011). *What is digital competence? In linked portal*. Brussels: European Schoolnet. Implementation. *International Journal of Language and Literature, 4*(2), 123-133.

Ittigson, R.J.. &Zewe, J.G. (2003). Technology in the Mathematics classroom.In Tomei, L.A. (Ed.).*Challenges of Teaching with Technology Across the Curriculum*: *Issues and Solutions. Hershey: Information Science Publishing,114-133.*

Japhet, E. L. &Usman A. T. (2018).Factors that influence teachers' adoption and integration of ICT in teaching/learning process.*Educational Media International, 55*(1), 79-105.

Keong, C., H. Sharaf, H., & Daniel, J. (2005).A Study on the Use of ICT in Mathematics Teaching. Malaysian Online Journal of Instuctional Technology (MOJIT), 2, 43-51.

Kirk, M., & Zander, C. (2004). Narrowing the digital divide: In search of a map to mend the gap. *Journal of Computing Sciences in Colleges*, *20*(2), 168-175.

Kumah, M.S., & Wonu, N. (2020). The effectiveness of Geogebra in the teaching of Elementary Algebra at St Theresa's college Ghana. *International Journal of Progressive Sciences and Technologies,* 23(2) 470-479

Lei, J., & Zhao, Y. (2006). Technology uses and student achievement: A longitudinal study. *Computers & Education, 49*(2), 284.

Li, Q. (2007). Student and Teacher Views about Technology: A Tale of Two Cities? *Journal*

Mahmood., A & Bokhari, N. H. (2012).Use of Information and Communication Technology: gender differences among students at tertiary level. *Journal of Educational and Instructional Studies in the world,* 2(4)

Mayoux, L. (2001) Jobs, Gender and Small Enterprises: Getting the Policy Environment Right. SEED Working Paper

Mitra, A. Lenzmeier, S., Steffensmeier, T., Avon, R. Qu, N & Hazen, M. (2001). Gender andcomputer use in academics institution.Report from a longitudinal study.*Journal Education computing Research* 23.1: 67-84.

Mulhim, E. (2013, December). The current use of ICT by novice female teachers in Saudi primary schools and their perceived training needs. *30th ASCILITE Conference.*Macquerie University, Sydney.

Murray, J. (2011). *Cloud network architecture and ICT - Modern Network Architecture.* Tech Target IT Knowledge Exchange.

Neurath, R. A., & Stephens, L. J. (2006). Classroom Notes the Effect of Using Microsoft Excel in a High School Algebra Class. *International Journal of Mathematical Education in Science and Technology, 37, 721-727.*

Nurmi.S., & Jakkola, T. (2006). Problem underlying the learning object approach. *International Journal of Instructional Technology and Distance Learning*, 2*(1),* 61-66.

Orji, R. (2010) Impact of Gender and Nationality on Acceptance of a Digital Library: An Empirical Validation of Nationality Based UTAUT Using SEM. *Journal of Emerging Trends in Computing and Information Sciences,* 1, 68-79.

Özden, M. (2007). Problems with science and technology education in Turkey. *Eurasia Journal of Mat hematics, Science & Technology Education,* 3(2), 157-161.

Pelgrum, W. J. (2001). Obstacles to the integration of ICT in education: results from a worldwide educational a ssessment. Computers & Education, 37, 163-178.

Player-Koro, C. (2012). Factors influencing teachers' use of ICT in education.*Education Inquiry, 3*(1), 93-108.

Cite this article as:
Nwoko, O.O., & Wonu, N. (2022). Gender associated junior secondary mathematics teacher ICT competence in Port Harcourt Local Government Area of Rivers State, *FNAS Journal of Mathematics and Science Education, 3*(2), 55-66.

Ritzhaupt, A. D., Liu, F., Dawson, K. & Barron, A. E. (2013) Differences in student information and communication technology literacy based on socio-economic status, ethnicity, and gender. *Journal of Research on Technology in Education*, *45* (4), 291-307.

Sadik, A. (2006). Factors influencing teachers attitude towards personal use and school use of computers in science teaching (ERIC Document Reproduction Service No. ED 418 869)

Samak, Z. A. (2006). An Exploration of Jordanian English Language Teachers'attitudes, Skills, and Access As Indicator of Information and Communication Technology Integration in Jordan.UnpublishedDoctoralThesis.Florida State University.

Sanda, H.U. &Kurfi, M.H. (2013) Gender and Information Communication Technologies (ICTs) in Nigeria: Challenges and Prospects. *Global Journal of Human Social Science, Sociology and Culture*. Vol. 13, issue 6. Available at https://globaljournals.org/GJHSS_Volume13/7Gender-and-Information.pdf

Schoepp, K. (2005). *Barriers to technology integration in a technologyrich environment. Learning and Teaching in Higher Education: Gulf Perspectives*, 2(1), 1-24. 56

Shin, W. S. (2015). Teachers' use of technology and its influencing factors in Korean elementary schools.*Technology, Pedagogy and Education, 24*(4), 461-476.

Sipila, K. (2014). Educational use of information and communications technology: teachers' perspective. *Technology, Pedagogy and Education, 23*(2), 225-241.

Tarhini, A., Hone, K., & Liu, X. (2014).Measuring the moderating effect of gender and age on elearning acceptance in England: a structural equation modeling approach for an extended technology acceptance model. *Journal of Educational Computing Research, 51*(2), 163-184.

Tedla, B.A.(2012). Understanding the importance, impacts and barriers of ICT on teaching and learning in East African Countries. *International Journal for e-Learning Security (IJeLS), 2*(2).199-207.

Tezci, E. (2011). Factors that influence pre-service teachers' ICT usage in education.*EuropeanJournal of Teacher Education, 34*(4), 483-499.

UNESCO. (2011). UNESCO ICT Competency Framework for Teachers. UNESCO.

Wikan, G., &Molster, T. (2011).Norwegian secondary school teachers and ICT.*EuropeanJournal of Teacher Education, 34(2)*, 209-218.

Wong, K, T., Teo, T., & Russo, S. (2012). Influence of gender and computer teaching efficacy on computer acceptance among Malyasian student teachers: An extended technology acceptance model. *Australiasian Journal of Educational Technology, 28*(7), 1190-1207.

Wonu, N., & Ojimba, D.P. (2015). Computer Assisted Instruction (CAI) and student achievement in mathematics in Rivers State, Nigeria. A paper presented at the 10th international conference (2015), organised by Society of Common Wealth Scholars in Research and Sustainable Development (SCWSSRSD). 13th-14th October 2015. Pages 112-123.

Wonu, N., Owhor, C., & Charles-Ogan, G. (2017). Familiarity, Attitudes, Utilisation of Emerging Educational Technologies (EET) and Student Learning Achievement in Mathematics. South African International conference on educational technologies (SAICET), 24th -26th April 2017

Wonu, N., & Domaka, N.N (2013). Applicability of Microsoft Math-tool (MSMT) in solving quadratic equations. *Journal of Science and Technology, 6(1), 93-102.*

Wonu, N., Umanah, E.U & Didi, K.D (2010). The effectiveness of computer assisted instruction (CAI) in the teaching of statistical measures of Location.(SML) at senior secondary (SSC3) level. *Journal of Vocational and Technical Education, 7*(1&2), 25-45.

Cite this article as:
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