

ICT IMPACT ON STRUGGLING STUDENTS' ACQUISITION OF MATHEMATICS LEARNING SKILLS IN RIVERS STATE, NIGERIA

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Abstract

This study investigated ICT impact on struggling students' acquisition of Mathematics learning skills in Rivers State, Nigeria. The study adopted the correlational research design. Two research questions and two hypotheses guided the study. The population for the study consists of all the senior secondary two schools (SS2) in the public schools in Port Harcourt Local Government Area. The sample size of the study consists of 901 students drawn from 12 public schools. Two instruments were used by the researchers for the study. Social Media Questionnaire (SMQ), and Mathematics Quantitative Reasoning Test (MQRT). SMQ had a reliability index of 0.92 using Cronbach Alpha, while MQRT reliability index was 0.78 using Kuder Richarchard-20 Formula. The collected data was analyzed using the Pearson Product Moment Correlation Coefficient to test the null hypotheses at the 0.05 level of significance. Findings of the study revealed that there is no significant difference in the correlation between the use of YouTube, nor the use of WhatsApp and the acquisition of Mathematics learning skills of struggling students in Mathematics ($p = .000 < .05$). In conclusion, the use of ICT packages such as YouTube and WhatsApp reduces Mathematics phobia and enhances the acquisition of Mathematics learning skills for struggling students' in Mathematics. The study recommended among others, that Mathematics teachers should expose students to ICT and the internet as a multi-purpose way of learning Mathematics and acquiring Mathematics learning skills among struggling students in Port Harcourt Local Government Area of Rivers State, Nigeria.

Keywords: ICT, Learning Skills, Struggling Students and Mathematics

Introduction

Mathematics is essential in developing students' reasoning skills and enhancing their cognitive ability to learn Mathematics. In Nigeria, Mathematics has been made a compulsory subject in the secondary school and an entry requirement into high institutions in courses such as science, social sciences and also management. Mathematics enables humans to understand and engage in their world. It enables the development of pupils' natural ability to think logically, solve puzzles and apply these skills to real-life problems. Shimizu and Vithal (2023) posits that Mathematics specifications provides

students with access to important mathematical ideas to develop mathematical learning skills and problem solving skills. Mathematical skills could include; the ability to think critically, analytically, creatively, problem-solving, managing time, quantitative reasoning skills, ability to choose the right mathematical method and formulas to solve a problem. According to Kolmar (2023) mathematical skills are time management, mental arithmetic, critical and abstract thinking, data analysis, research, visualization, creativity, forecasting and attention to details. Mathematics helps strengthen reasoning skills and critical thinking. It helps us think analytically about the world and reason logically.

Students are all equal to the situations in the classroom and at the school, though the students' learning experiences and their ability to solve problems are different, they need different challenges, which inclusive teaching and learning can provide for struggling students in Mathematics learning skills if possible. Students struggle in identifying the right steps to use in solving one Mathematics problem from the other, they also struggle with phobia in Mathematics. The use of communication technology within educational milieus could assist in sustaining the learning environment with a view of supporting students in attaining their learning goals (Yau et al. 2015). According to Drigas, et al (2014) Information and communications technology (ICT) is a useful phrase for summarizing the ways in which microchip technology has permeated many aspects of everyday life, in education, leisure, work and the home. They explained that the term "special educational needs" covers problems, related to particular impairments or related to learning and behavioral difficulties experienced by some learners compared with other similar learners. Struggling students in learning Mathematics skills could learn using ICT packages such as joining WhatsApp groups where students interact and learn from each other. Also watching Mathematics tutorials on YouTube to learn step-by-step how to solve Mathematics problems analytically and logically could enable struggling students to learn and discover knowledge which they can apply in their daily living.

Mathematics learning skills acquisition can be enhanced through the use of ICT Packages. Crompton and Burke's (2015) survey of mobile learning in Mathematics showed that there is a growing interest in mobile technology effectiveness, with 75% of 48 studies reporting positive learning outcomes. ICT could be seen as one of the main agents of development and socialization that affect learners in the 21st century. According to Basri et al (2018) ICT has become an important source of innovation and improvement of efficiency for many sectors across the globe. They asserted that in the education sector, particularly, the application of ICT packages has become a critical part of the learning process for students both outside and inside the classroom setting.

Information Communication and Technology (ICT) allows its users to have conversations, share information, and create web content. Crompton and Burke (2015) asserted that the introduction and advancement of ICT (information, communication, and technology) in education has brought a lot of innovative learning processes that cover the training of children from early childhood, cutting across pupils, in the lower and higher basic, students' in secondary schools, and undergraduates in higher institutions of learning. The International Telecommunication Union (2016) opined that four rationales inform the use of ICT in school teaching and learning: social, vocational, pedagogic, and catalytic. Students have to be aware of how ICT works, they should learn to operate ICT and develop vocational skills, ICT can be used to learn other subjects like Mathematics and computer programming; and ICT tools are able to change education for the better. The use of ICT could enable teachers to place more emphasis on important problem solving approaches rather than tedious rote learning and calculation.

ICT packages such as WhatsApp, and YouTube could enhance struggling students learning skills in Mathematics. The present generation has been exposed to ICT through social media packages such as Facebook, WhatsApp, YouTube, among others using mobile devices such as phones, and laptops. Most students are able to use the internet, phones, and other gadgets for the purposes of gaming, chatting, and other social networking purposes (International Telecommunication Union, 2016). There are numerous benefits to the use of technology in the classroom in the 21st century, which could enhance struggling students learning skills in Mathematics. Equipped with miniature computers, students could develop digital literacy and research skills earlier than previous generations also by the use of video games, smartphones, smart televisions, TV cables, iPads, and iPods.

The Media Richness Theory (MRT) presented by Daft and Lengel (1986) gives anchorage to this study. MRT Proposes that technology based channels of information are rich text sources than the other mediums. This theory by richness means the ability of the medium to transmit the information from sender to receiver. It can be described as; the use of telephone calls are less rich than video calling or the use of ICT packages such as WhatsApp and YouTube. This is because, while a person can also hear the tone at a telephone call and the video call; the video call on WhatsApp and YouTube videos are richer as they also show the gestures and expressions of the other person while saying those words. Media richness theory is about that “richness in communication” and that the communication process should involve a rich source for “effective communication, which could enhance struggling students” learning skills in Mathematics”.

The use of various technology devices in the classroom could yield benefits in mathematical skills such as the ability to think critically, analytically, creatively, problem-solving, managing time, and quantitative reasoning skills. This could also enable struggling students' ability to choose the right mathematical method and formulas to solve a problem as well as develop other skills such as self-sufficiency, digital literacy, and access to emergency services. ICT packages such as WhatsApp and YouTube could help expose students' to other people's views of solving problems, reasoning mathematically and could further enable struggling students' acquire Mathematics learning skills.

In teaching and learning, YouTube could be used as a video repository to help teachers and students in classroom learning as well as distant learning. This initiated distance learning according to the conditions of the students, for which social media packages such as YouTube were used by teachers to produce Mathematics distance learning designs during Covid 19 pandemic (Subhi & Kosasih, 2023). According to Nabayra (2022) with the abrupt shift of learning modalities from face-to-face to online learning; institutions, teachers, and students have to rethink and recalibrate their previous instructional approaches as a response to the educational limitations brought by the pandemic. YouTube, as a platform combining video, audio, and text, aligns seamlessly with this theory and it is a popular social media platform used globally including in Nigeria Incorporating YouTube videos into classroom instruction allows educators to tap into the cognitive benefits of multimedia learning (Maziriri et al., 2020). This approach could promote meaningful connections between concepts and enhances students' retention in Mathematics which is a result of acquisition of learning skills. A substantial 98% of students use YouTube as an information resource (Abbas & Qassim 2020). Gyeltshen and Dorji (2023) related the need for teachers to consider integrating YouTube videos into their teaching methods, as it seems to be well-received by students. Reporting that

children insist teachers use multimedia in their teaching the Mathematics class and in other disciplines too.

YouTube could be used to reduce student learning difficulties and help develop their learning skills. YouTube can be used for accessing and sharing videos with various internet quota-saving features and as a substitute for face-to-face learning, which students need the most for explanations (Subhi & Kosasih, 2023). These explanations could help struggling students develop learning skills in Mathematics. The use of social media packages could be helpful to the challenged (struggling) students in mastering the course content. The study of “Impact of YouTube tutorials for skill development by Iftikhar, et al (2019) revealed that YouTube tutorials do have a significant impact on students’ cognitive needs and in learning skills to develop understanding. Buzzetto (2014) and Duvenger (2012) declared YouTube has been found to capture the attention of students.

WhatsApp is a free download message application for smart phones. It uses the internet to send messages, images, audio or video. It is popular with teenagers because of features like group chatting, voice messages and location sharing (Ehibudu, & Sira, 2017). To use WhatsApp, you need a compatible smart phone tablet with SIM card, an internet connection and a phone number. Yeboah and Ewur (2014) collaborate this in their claim that the use of WhatsApp increases the provisions and access to learning materials, anywhere, anytime and in various formats. Though there are many advantages of using WhatsApp, Gaya, Bala, et al (2020) posits that WhatsApp can also affects students’ academic performance adversely.

Problem Statement

Many scholars have now noted that social media packages are among the most interesting topic of research in academia. According to Crompton and Burke’s (2015) survey of mobile learning in Mathematics showed that there is a growing interest in mobile technology effectiveness. The use of ICT cuts across age, gender, race, religion and geographical location. It provides the fastest ways of communication and news sharing as opposed to traditional media. Several studies have tried to investigate what really motivates users to use YouTube and WhatsApp noting that those users take part in a wide range of activities to share information. Nabayra (2022) asserted that the abrupt shift of learning modalities from face-to-face to online learning as a result of the Covid-19 pandemic has motivated the use of ICT in learning after the pandemic.

However, some of the studies reviewed above neglected to handle the crucial inquiry of whether YouTube and WhatsApp can be utilized for legitimate academic purposes. These purposes are the gaps found in the works reviewed such as the acquisition of Mathematical learning skills which are; the ability to think critically, analytically, creatively, problem-solving, ability to choose the right mathematical method and formulas to solve a problem, ability to manage time, and acquisition of quantitative reasoning skills. Gyeltshen and Dorji’s (2023) research on YouTube though generally well-received and considered effective by many students, had the challenge of time management while using ICT packages to learn.

The trend of poor performance and Mathematics phobia as well as the desire to avoid Mathematics inclined courses in the higher institution by students, has left parents, teachers, educational bodies as well as students in a state of worry. Though Gaya, Bala, et al (2020) posits that the use of social media packages can adversely affect students’

academic performance, there is need to verify if the decline in academic performance is as a result of inadequate acquisition of Mathematics learning skills to solve Mathematics problems. Daft and Lengel (1986) theory on Media Richness emphasizes that richness in communication ensures effective comprehensive communication skills, which could enhance struggling students' learning skills in Mathematics but it does not elaborate on how this can be used. There is need to have more research carried out on how secondary school students' struggling with Mathematics can efficiently be able to learn Mathematics skills, which can help them solve Mathematics problems. It is on these premises that this research was based, to establish ICT impact on struggling students' acquisition of Mathematics learning skills in Rivers State, Nigeria.

Objectives of the Study

The main purpose of this study is to investigate ICT impact on struggling students' acquisition of Mathematics learning skills in Port Harcourt Local Government Area of Rivers State, Nigeria. The objectives of this study are:

- I. Investigate the correlation between the use of YouTube and the acquisition of Mathematics learning skills of struggling students in Mathematics in Port Harcourt Local Government Area of Rivers State.
- II. Examine the correlation between the use of WhatsApp and the acquisition of Mathematics learning skills of struggling students in Mathematics in Port Harcourt Local Government Area of Rivers State.

Research Questions

- I. What is the correlation between the use of YouTube and the acquisition of Mathematics learning skills of struggling students in Mathematics in Port Harcourt Local Government Area of Rivers State?
- II. What is the correlation between the use of WhatsApp and the acquisition of Mathematics learning skills of struggling students in Mathematics in Port Harcourt Local Government Area of Rivers State?

Hypotheses

- I. There is no significant difference in the correlation between the use of YouTube and the acquisition of Mathematics learning skills of struggling students in Mathematics in Port Harcourt Local Government Area of Rivers State.
- II. There is no significant difference in the correlation between the use of WhatsApp and the acquisition of Mathematics learning skills of struggling students in Mathematics in Port Harcourt Local Government Area of Rivers State.

Methodology

The study adopted the correlational research design in the work. According to Kpolovie (2010), correlational research design is that design where the researcher seeks for the relationship existing between two or more variables as well as ascertaining the direction, magnitude and the degree of such a relationship. The researchers used this design because they sought to find the relationship that exists between struggling students' use of

YouTube and WhatsApp and their acquisition of Mathematics learning skills. The population for the study consists of all the senior secondary two schools (SS2) in the public schools which are 12 schools in Port Harcourt Local Government Area. The sample size of the study consists of 901 students drawn from 12 public schools in Port Harcourt Local Government Area. This sample size was drawn using the simple random sampling technique as well as the non- proportionate sampling technique. The researchers used the simple random sampling by balloting to select the 12 schools.

Two instruments were used by the researchers for the study. The students’ questionnaire was titled “Social Media Questionnaire (SMQ) measuring the utilization of the various social media platforms by students. And Mathematics Quantitative Reasoning Test (MQRT) was composed, to collect the respondents’ scores in showing skills in solving Mathematics problems. SMQ had 15-items and four-point-Likert scale of Strongly Agree, Agree, Disagree and Strongly. While MQRT had 20 multiple choice test items adopted from past WAEC question papers from the 2022–2023 session, each correct answer was given 5 marks, and incorrect answers were given a zero mark.

The reliability of the two instruments was determined by using the Cronbach Alpha as well as Kuder Richardson formula 20 method of reliability. The reliability coefficient of 0.92 was realized for the Social Media Questionnaire, and the Mathematics Quantitative Reasoning Test was 0.78 indicating that the instruments were reliable enough to be used for this study. Both the SMQ and MQRT were converted to 100 % to ensure that they were on the same scale of measurement before data analysis was done. The collected data was analyzed using the Pearson Product Moment Correlation Coefficient to test the null hypotheses at the 0.05 level of significance.

Results

The results of the study are presented below.

Research question one and hypothesis one are considered jointly. Data in Table 1 is used to answer research questions one and test hypothesis one.

Table 1. The Correlation between the use of YouTube and the Acquisition of Mathematics Learning Skills of Struggling Students in Mathematics.

	Group	N	YouTube	Learning skills
YouTube	901	Pearson Correlation	1	.398**
		Sig. (2-tailed)		.000
Learning skills	901	Pearson Correlation	.398**	1
		Sig. (2-tailed)	.000	

*Significant at $p \leq 0.05$

Table 1 shows a computed r of .398, indicating that there is a low positive correlation between YouTube and the learning skills of struggling students in Mathematics. Hypothesis one is tested using the result in Table 1 which showed that p-value (observed) = 0.000 is less than p-value of 0.05. Since the observed p-value = 0.000 < 0.05 then the null hypothesis (HO1) which states that: there is no significant difference in the correlation between the use of YouTube and the acquisition of Mathematics learning

skills of struggling students in Mathematics in Port Harcourt Local Government Area of Rivers State is rejected. This implies that there exists a significant positive correlation between YouTube and the acquisition of Mathematics learning skills in Mathematics by students who struggle in Mathematics in Port Harcourt Local Government Area of Rivers State.

Research question two and hypothesis two are considered jointly. Data in Table 2 is used to answer research questions two and test hypothesis two.

Table 2. The Correlation between the use of WhatsApp and the acquisition of Mathematics Learning Skills of Struggling Students in Mathematics.

	Group	N	WhatsApp	Learning skills
WhatsApp	901	Pearson Correlation	1	.145**
		Sig. (2-tailed)		.000
Learning skills	901	Pearson Correlation	.145**	1
		Sig. (2-tailed)	.000	

*Significant at $p \leq 0.05$

Table 2 showed a computed r of .145, indicating that there is a low positive correlation between WhatsApp and the acquisition of learning skills in Mathematics of students who struggle in Mathematics. Hypothesis two is tested using the result in Table 2 which showed that p-value (observed) = 0.000 is less than p-value of 0.05. Since the observed p-value = 0.000 < 0.05 then the null hypothesis (HO2) which states that: there is no significant difference in the correlation between the use of WhatsApp and the acquisition of Mathematics learning skills of struggling students in Mathematics in Port Harcourt Local Government Area of Rivers State is rejected. This implies that there exists a significant positive correlation between WhatsApp and the acquisition of Mathematics learning skills in Mathematics by students who struggle in Mathematics in Port Harcourt Local Government Area of Rivers State.

Discussion

Findings from this study reveals that there is a low positive correlation between YouTube and the acquisition of Mathematics learning skills of struggling students in Mathematics (r = .398, p = .000 < .05), and that there is a significant difference in the correlation between the use of YouTube and the acquisition of Mathematics learning skills of struggling students in Mathematics in the Port Harcourt Local Government Area of Rivers State.

The finding agrees with the Media Richness Theory (MRT) by Daft and Lengel (1986) which posits that richness in communication portrays a communication process with a rich source, having effective comprehensive communication skills, which could enhance struggling students' learning skills in Mathematics. This findings agree with Iftikhar, et al (2019) study results which revealed that YouTube tutorials do have a significant impact on students' cognitive needs and in learning skills to develop understanding.

This findings correlates with Buzzetto (2014) and Duvenger (2012) findings which revealed that YouTube captures the attention of students and it has the potential to captivate and motivate students in ways that traditional teaching methods may struggle to achieve. The dynamic visuals, enthusiastic educators, and interactive elements found in many YouTube math channels can increased struggling students' engagement in Mathematics and lead to improved Mathematics learning skills. The findings are also in line with Gyeltshen and Dorji's (2023) results which showed that the researchers realized the effectiveness of YouTube video strategy as one of the successful methods, which is helpful and constructive in learning Mathematics subject. Recommending that teachers should consider integrating YouTube videos into their teaching methods, as it seems to be well-received by students. And efforts should be made to address challenges such as time constraints (which is important to manage when solving Mathematics problems) and ensuring a stable internet connection to maximize the benefits of using YouTube in the classrooms. However, Gyeltshen and Dorji's (2023) results indicated that while YouTube is generally well-received and considered effective by many students, it's not without its challenges. The challenges mentioned include insufficient time and the need for a good internet connection if the strategy should be successful.

The findings also agree with Abbas and Qassim's (2020) report that 98% of students use YouTube as an information resource, with 86% acknowledging its positive impact on their learning skills. The present study is in agreement with Sharma's (2018) results, which revealed that the Mathematics achievement of the classes receiving consistent exposure to videos and real-life activities was greater than that of the classes receiving only some of the special instructional treatments.

However, the findings of this study disagrees with Gaya, Bala, et al (2020) research results, which have reported negative influences such as a decline in academic performance in Mathematics. These negative influences can be seen as inadequate acquisition of Mathematics learning skills to solve Mathematical problems by struggling students in Mathematics. Reporting that one of the major issues facing students' academic performance is as a result of their use of social media which lacks the ability to communicate Mathematics Learning skills effectively.

The present study findings reveals that there is a low positive correlation between WhatsApp and the acquisition of Mathematics learning skills of struggling students in Mathematics ($r = .145$, $p = .000 < .05$). Also, there is a significant difference in the correlation between the use of WhatsApp and the acquisition of Mathematics learning skills of struggling students in Mathematics in the Port Harcourt Local Government Area of Rivers State. The present study agrees with Yeboah and Ewur's (2014) results which claims that the use of WhatsApp has the potential to enhance students' capabilities. This mean WhatsApp can enable students' struggling in Mathematics to acquire Mathematics learning skills and can be seen in the way they reason, and solve mathematical problems. This study also agrees again with Gaya, et al (2020) result that the use of WhatsApp can also affects students' academic performance which means that there is a significant difference in the acquisition of Mathematics learning skills by struggling students' usage of WhatsApp.

Conclusion

Based on the findings of this study, to establish the impact of ICT on struggling students' acquisition of Mathematics learning skills in Rivers State, Nigeria, it can be concluded

that; YouTube correlates with the acquisition of Mathematics learning skills of struggling students' in Mathematics. Also, WhatsApp correlates with the acquisition of Mathematics learning skills of struggling students' in Mathematics revealing a low positive improvement in struggling students' ability to acquire Mathematics learning skills using social media packages in the likeness of YouTube and WhatsApp. The use of YouTube and WhatsApp reveals significant difference in their correlation with the acquisition of Mathematics learning skills of struggling students in Mathematics in the Port Harcourt Local Government Area of Rivers State. The use of YouTube and WhatsApp reduces the phobia of struggling students and enables improvement in their acquisition of Mathematics learning skills and enhances academic performance.

Recommendations

Based on the findings of this study, the researcher recommends that:

- I. Mathematics teachers should expose students to ICT and the internet as a multi-purpose way of learning Mathematics and acquiring Mathematics learning skills.
- II. Curriculum planners should incorporate the use of ICT in the curriculum to enable the teachers efficient use of ICT usage in the classroom during Mathematics lessons
- III. The Ministry of Education should consider undertaking programs to enhance students and Mathematics teachers' comprehension and use of ICT and social media packages. This will serve as an educational tool to create interactive learning outcomes which can aid in the acquisition of learning skills for struggling students in Mathematics.

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