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Effect of Quizziz Method on Mathematics Test Performance of Junior Secondary School Students in Port Harcourt Metropolis

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Abstract: *The study focused on effect of Quizziz method on mathematics test performance of junior secondary school students in Port Harcourt metropolis. The study used quasi-experimental study to sample. The population of the study consisted of over 3,250 junior secondary school students in Port Harcourt metropolis. Participants in the study included 100 junior secondary school students from two lower UBE schools in the metropolis. Participants were randomly assigned to experimental (Quizizz group) and control groups. The instrument used in the study was the Mathematics Achievement Test (MAT). The instrument was validated by test experts while Cronbach Alpha method was used in determining a reliability index of 0.87. Experimental procedures involved a pre-test assessment which was administered to both the experimental and control. The experimental group received mathematics instruction using Quizizz for a period of three weeks. After the treatment, a post-test assessment was administered to both groups. Ethical Considerations included an informed consent from participants and parents or guardians. They were also ensured of confidentiality and anonymity while the study was also approved by an independent Research and Ethics expert. As stated earlier, the study lasted for a period of three weeks. The researchers collaborated with the classroom teachers which used the computer lab setting. After the posttest, data collected were analized using paired sample t-test and independent t-test. result showed that*
Keywords: Quizziz, Test, Performance, Mathematics

INTRODUCTION

Mathematics is a critical subject in the academic curriculum, serving as a foundation for numerous fields of study and career paths. It is a compulsory subject at both primary and secondary level of

education in Nigeria because of its preparatory roles in the development of mankind. Apart from being a compulsory subject at primary and secondary level, it is also compulsory to pass mathematics at credit level before one can be offered admission into any science or technology based courses in any tertiary institutions in Nigeria. The use and application of mathematics is visible in almost every aspect of our living such as buying and selling, measurement, tailoring, cooking, walking, running, engineering, building etc. The importance and use of mathematics and its applications are in-exhaustible and cannot be over emphasized. It implies that one who is mathematically ill-equipped will not strive well in businesses. This could be the reason why many businesses close down after a period of operations. According to Adedeji (2007), in the contemporary Nigeria, greater emphasis is being placed on industrial and technological development and as a result, students are been encouraged to take up science related subjects and one subject that cut across all the sciences is mathematics. Today, mathematical methods pervade literally in every field of human endeavour and play a fundamental role in economic development of a country and that in our match towards scientific and technological advancement, we need nothing short of good performance in mathematics at all levels of schooling. Mathematics like any others is assessed with the use of a test.

A test in its broader sense is a systematic procedure for observing a person's behaviour and describing it by means of numerical scale or a category system. Opara (2014) also noted that a test is an instrument or procedure designed to measure the knowledge, intelligence, ability, traits, skills, aptitude, interest, attitude an individual or thing exhibits. Hopkins and Antes (cited in Orluwene, (2012) also noted that a test is an instrument, device or procedure which proposes a sequence of task to which a student is to respond and the result are used as measures of specified traits. Similarly, a test is an instrument which can be utilized in detecting some qualities, traits, characteristics, attributes and the likes possessed by a person, an object or thing. According to Opara and Uwah (2022), it could as well be seen as an instrument or device used to quantify behaviour or aid in understanding and predicting behaviour. In view of these definitions, one could see that a "spelling" test for instance measures how well someone has learned to spell or the extent to which someone has learned to spell a specific list of words. Same connotes for mathematical test, which seeks to determine how well students can manipulate mathematical formulas to arrive at the desired answers.

When students are tested, the test administrator or classroom teacher desires that the test scores reflect as possible the student's true performance. Kpolovie (2010) opined that "not until the test reflects the true attributes, characteristics and ability of a students, then such test is invalid". But quite often, test scores as obtained by students on a subject with the same content items do vary significantly. There are several reasons why students test scores vary. Most often, when students underperform in a test, mutterings are heard about how nervous they were, how they have to guess their way to arrive at answers especially that of essay questions. However, some of the comments may be accurate while others may just be an excuse for poor performance.

A lot of scholars have been documented on the various determinants of students in mathematics. Bayaga and Wadesongo (2014) opined that student with negative perceptions towards mathematics learning often form negative attitudes towards mathematics, which in turns could affect their learning and achievements. According to Gurganus (2010), mathematics achievement problems are usually due to combination of teaching and student factors including language, cognitive, meta-cognitive, motor, social and emotional factors, habits of learning and previous experiences.
Most researchers posits that the cognitive ability of students are sole responsible for their performance in mathematics without looking at the non-cognitive factors which may in one way or the other facilitates learning.

A lot of factors may play significant roles in students' performance in mathematics and when they are overlooked, the performance of students will be very low. According to Gal and Ginsberg (1994) mathematics educators have primarily focused on cognitive skills and knowledge paying much less thought to non-cognitive factors.

It is obvious that high academic performance in Mathematics is one of the top expectations of most parents, schools and the government. Regrettably, there have been continuous poor academic achievements in Mathematics among secondary school students nationwide in the West African Senior School Certificate Examination (WASSCE) indicating that the achievement as expected in Mathematics for global competitiveness looks illusive (Ekuri & Offiah, 2018). As stated, various factors may contribute to the performance of students in mathematics. One of such factors is the use of Quizizz application in learning.

In line with this, Annisa and Susanti (2024) argued that one creative method that can increase student interest, motivation and performance in the digital era is using Quizizz as an educational application that offers a comprehensive learning and assessment approach, effectively overcoming the barriers caused by limited vocabulary, limited learning tools, and declining interest in reading. Quizizz is a gamified educational tool that can encourage students. Fadhilawati (2021) stated that an educational game-based program called Quizizz might design interactive lessons for students in the classroom and make learning enjoyable for them. Furthermore, Zuhriyah & Pratolo (2020) claim that Quizizz could make exercising for the students exciting and fun, especially while they are answering questions. Students can practice questions on the material they have

Quizizz as a teaching tool as argued by Annisa and Susanti (2024) can address many educational issues because it is a popular, accessible, interactive media platform incorporating gamification in learning. It includes avatars, music, leaderboards, and themes, giving students the impression that they are playing a game (Namara & Murphy, 2017). With the features offered by Quizizz, students can better understand quizzes, get more motivated to learn, put more effort into them, and achieve higher academic achievement. Using Quizizz in learning activities increases students' motivation and enjoyment while improving their overall reading comprehension (Pahamzah, Syafrizal & Sukaenah, 2020). Quizizz's interactivity replaces traditional paper-and-pencil assessments, thereby

increasing student engagement. It is also noted that using the online platform Quizizz promotes innovative and inventive teaching, which ICT supports. According to Annisa and Susanti (2024), action research conducted by Fatimah (2022) demonstrated that Quizizz improved ninth-grade students' reading comprehension skills. Again, Chandra Yuniarto (2021) discovered that using Quizizz as a learning tool increased eighth-grade students' reading interest and learning outcomes.

The academic performance of students in mathematics, particularly at the junior secondary level, has been a significant concern in Rivers State and particularly, in Port Harcourt metropolis. Despite the vital role that mathematics plays in cognitive development and its importance in various professional fields, students often struggle with the subject, resulting in poor academic outcomes. This issue has prompted educators, policymakers, and researchers to investigate the underlying factors contributing to students' performance in mathematics.
Report from examining bodies uncovered that high number of students in secondary schools perform poorly in mathematics examinations, therefore the required credit needed in mathematics which is a compulsory prerequisite to gain admission into any science or technology based courses in Nigeria tertiary institutions is not achieved by the students. The failure in mathematics could be attributed to the concept one has about him or herself, habits in studying and motivation and attitude of students. One unfortunate thing is that, the negative attitude towards the subject is passed down from one generation of students to another and therefore the cycle keeps enlarging.

This has made some of them to either abandon mathematically related courses or seek for alternative and unconventional method of passing mathematics. The problem has been identified that not all the students are motivated enough through their teaching and learning method to like mathematics. Thus, many of them have developed mindset of helplessness even when there are good opportunities to grasp in order to perform better. When a student fails repeatedly in mathematics, he begins to doubt his abilities. Learned helpless set in and they begin to thinks “no matter how hard I study, I will always get bad grades’’. This feeling always result to decreased effort, poor grades and underachievement in mathematics. Consequently, the student decreases their achievement efforts, which in turn result to more school failure. The researchers have observed how the problem of poor performance in mathematics among senior secondary school students has metamorphosed into learned helplessness. Hence, decided to study the various learning techniques that can improve the performance of these students in mathematics especially among junior secondary schools students in Port Harcourt Metropolis.

Based on this, the aim of the study is to investigate the effect of quizziz method on mathematics test performance of junior secondary school students in Port Harcourt Metropolis. Specifically, the study investigated;

1. The effect of quizizz method on performance of students as compared between the pretest and posttest scores.

2. The effect of quizizz method on performance of students in mathematics as compared between the treatment and control group
3. The effect of quizizz method on mathematics performance of male and female students.

The following research question were also posed in the study;

1. What is the effect of quizizz method on mathematics performance of student in Port Harcourt metropolis as compared between the pretest and posttest scores?
2. What is the effect of quizizz method on mathematics performance of students in mathematics as compared between the treatment and control group in Port Harcourt metropolis?
3. What is the effect of quizizz method on mathematics performance of male and female students in Port Harcourt metropolis?

The following hypotheses were also formulated and tested in the study;

1. There is no significant difference in the effect of quizizz method on mathematics performance of student in Port Harcourt metropolis as compared between their pretest and posttest scores.
2. The effect of quizizz method on mathematics performance of students in mathematics as compared between the treatment and control group does not differ significantly in Port Harcourt metropolis.
3. The effect of quizizz method on mathematics performance of male and female students in Port Harcourt metropolis does not differ significantly.

MATERIALS AND METHODS

The current study used the pre-test, post-test, control group quasi-experimental study to sample. The population of the study consisted of over 3,250 junior secondary school students in Port Harcourt metropolis. Participants in the study included 100 junior secondary school students (50 experimental group, 50 control group) from two lower UBE schools in the metropolis. Participants were randomly assigned to experimental (Quizizz group) and control groups. The instrument used in the study was the Mathematics Achievement Test (MAT). The instrument was validated by test experts while Cronbach Alpha method was used in determining a reliability index of 0.87. Experimental procedures involved a pre-test assessments which was administered to both the experimental and control. The experimental group received mathematics instruction using Quizizz for a period of three weeks. The Quizizz software/platform used was a free version. The process involved teachers creating mathematics quizzes using Quizizz. The students were asked to completed quizzes individually. These quizzes included multimedia elements like images, videos, sounds etc. that could motivate and make the learning process interested. After the response of the students, instant feedback and leaderboards were utilized while the control group received traditional mathematics instruction. After the treatment, a post-test assessment were administered to both groups. Ethical Considerations included an informed consent from participants and parents or guardians. They were also ensured of confidentiality and anonymity while the study was also

approved by an independent Research and Ethics expert. As stated earlier, the study lasted for a period of three weeks. The researchers collaborated with the classroom teachers which used the computer lab setting. After the posttest, data collected were analized using paired sample t-test and independent t-test.

RESULTS

Research Question One: What is the effect of quizizz method on mathematics performance of student in Port Harcourt metropolis as compared between the pretest and posttest scores?
Hypothesis One: There is no significant difference in the effect of quizizz method on mathematics performance of student in Port Harcourt metropolis as compared between their pretest and posttest scores.

Table 1: Paired sample test showing descriptive and inferential statistics of effect of quizizz on mathematics performance of student in Port Harcourt metropolis as compared between the pretest and posttest scores.

Test	Mean	N	Std. D	Df	r	T	Sig	Result
Pretest	14.22	50	2.93	49	0.10	19.61	0.000	Significant
Posttest	28.00	50	4.18					

From the analysis in table 1, mean score for the pretest was 14.22 while standard deviation was 2.92. The posttest had a mean value of 28.00 and a standard deviation of 4.18. From the mean values, it is seen that at the posttest level, the mean performance scores of the students rose from 14.22 to 28.00 revealing a mean difference of 13.78. This mean scores signifies that there is a positive effect of quizizz gamification on the performance of students in mathematics meaning that as students get to be more acquainted quizizz platform, their performance in mathematics performance will improve correspondingly. Again the relationship between the pretest and posttest scores showed 0.102.

The calculated t was 19.61 while sig value was 0.000. Hence, since sig ($p=0.000<0.05$) is less than 0.05 alpha at 57 degrees of freedom, the hypotheses was rejected meaning that there is a significant difference in the effect of quizizz method on mathematics performance of student in Port Harcourt metropolis as compared between their pretest and posttest scores.

Research Question One: What is the effect of quizizz method on mathematics performance of students in mathematics as compared between the treatment and control group in Port Harcourt metropolis?

Hypothesis One: The effect of quizizz method on mathematics performance of students in mathematics as compared between the treatment and control group does not differ significantly in Port Harcourt metropolis.

Table 2: Independent t-test analysis of effect of quizizz on mathematics performance of student in Port Harcourt metropolis as compared between the experimental and control group.

Groups	N	Mean	Std. D	t	Df	Sig	Result
Quizizz	50	28.00	4.189	16.24	98	0.000	Significant
Control	50	14.14	4.677				

The analysis in table 2 shows that 50 subjects were in the experimental group while 50 were in the control group. Their mean and standard deviation values were 28.00; 4.18 and 14.14; 4.67 respectively. This means values shows that those in the experimental group had higher mean scores compared to those in the control meaning that quizizz gamification had a positive effect on the performance of students in mathematics.

The table reveals t-value of 16.24 and a sig-value of 0.000. Hence, since sig ($p=0.000<0.050$ is less than 0.05 alpha at 98 degrees of freedom, the null hypothesis is rejected meaning that the effect of quizizz method on mathematics performance of students as compared between the treatment and control group differ significantly in Port Harcourt metropolis.

Research Question Three: What is the effect of quizizz method on mathematics performance of male and female students in Port Harcourt metropolis?
Hypothesis Three: The effect of quizizz method on mathematics performance of male and female students in Port Harcourt metropolis does not differ significantly.

Table 3: Independent t-test analysis of effect of quizizz on mathematics performance of student in Port Harcourt metropolis as compared between the experimental and control group.

Gender	N	Mean	Std. D	t	Df	Sig	Result
Male	43	24.01	2.49	1.84	98	2.37	Insignificant
Female	57	24.55	3.52				

The analysis in table 2 shows that 50 subjects were in the experimental group while 50 were in the control group. Their mean and standard deviation values were 24.01; 2.49 and 24.55; 3.52 respectively. This mean value shows that female students had higher mean scores compared to male students.

The table reveals t-value of 1.84 and a sig-value of 2.37. Hence, since sig (p=2.37>0.050 is greater than 0.05 alpha at 98 degrees of freedom, the null hypothesis is retained meaning that the effect of quizizz method on mathematics performance of male and female students in Port Harcourt metropolis does not differ significantly.

DISCUSSIONS

From research findings one, it is revealed that there is a significant difference in the effect of quizizz gamification on mathematics performance of students as compared between those in the pretest and post test scores. This finding means that students' mathematics performance improved significantly after using Quizizz and that quizizz gamification effectively enhanced students' understanding, retention, and application of mathematical concepts. It also means that the intervention (Quizizz) had a measurable, positive impact on mathematics achievement. The implication of this finding is that quizizz is an effective tool for improving mathematics performance. It also imply that gamification can increase student engagement, motivation, and interest in mathematics. This finding may come about because quizizz gamification is effective in engaging, interactive learning experience. It could also be that it provide personalized feedback and assessment, enhanced motivation and competition, improved understanding through repetition and practice and also help in better retention due to spaced repetition. The findings of the study is not surprising to the researcher because other resrecaher like Zuhriyah and Pratolo (2020) had reported significant positive effect of Quizizz on students' academic performance.

Findings two revealed that there is a significant difference in the effect of quizizz gamification on mathematics performance of students as compared between those in the experimental and control group. This findings means that those in the experimental group performed significantly better by showing improved understanding, retention, and application of mathematical concepts, demonstrated enhanced motivation, engagement, and interest in mathematics compared to those in the control group who were taught mathematics using the traditional instruction method. The findings means that the difference in mathematics performance between the two groups is statistically significant indicating that Quizizz gamification approach had a measurable impact on mathematics performance, distinguishing it from traditional instruction. This also means that Quizizz gamification enhancing mathematics performance suggest its effectiveness as a supplementary or primary instructional tool. It also implies that traditional instruction may not be as engaging or effective for certain students, highlighting the need for innovative approaches. As suggested above, this findings may be attributed to factors such as increased student motivation and engagement, improved understanding and retention through interactive learning, enhanced problem-solving skills and critical thinking as well as better teacher-student interaction and feedback. The finding is not surprising to the researcher because other findings like that of Annisa and Susanti (2024) has also reported findings supporting the fact that Quizizz gamification has significant positive effect on students' performance.

Finally, finding three showed that there is no significant difference in the effect of Quizizz gamification on the performance of male and female students. This finding means that Quizizz gamification benefits both male and female students equally. It also means that there is no gender-based differences in mathematics performance improvement and that the intervention's effectiveness is gender-neutral. The implication of this finding is that teachers can confidently use Quizizz without worrying about gender bias. It also implies that Quizizz can be an inclusive tool for diverse classrooms and that gender is not a determining factor in its effectiveness. This finding may come because Quizizz's engaging, interactive nature appeals to both genders. It could also be that gamification elements (e.g., competition, rewards) are equally motivating. The findings of the study however differences from that as reported by Yuniarto (2021) who reported significant difference in the influence of gender on the effect of Quizizz on student's academic performance.

Recommendation

Based on the findings, the following recommendations are made;

1. Since there is significant improvement in mathematics performance from pre-test to post-test scores, it is recommended that teachers should continue using Quizizz as a teaching tool. They should explore ways to increase student engagement and motivation. They should as well investigate optimal Quizizz implementation strategies.

2. Based on finding two that there significant difference in mathematics performance between experimental and control groups, it is recommended that teachers and school authorities should integrate Quizizz into mathematics curriculum as a supplementary tool. They should as well provide teachers with training and support for effective Quizizz implementation. Finally, they should monitor and evaluate long-term effects of Quizizz on mathematics performance.

3. Since there is significant difference in mathematics performance between male and female students, it is recommended that teachers should focus on individualized instruction and support rather than on gender basis.

CONCLUSION

It is concluded that Quizizz gamification has a positive impact on mathematics performance. In all, Quizizz gamification has shown promise in enhancing mathematics performance and promoting inclusive education. Its effectiveness, accessibility, and adaptability make it a valuable tool for educators seeking to innovate their teaching practices and integrating it in the educational system especially in the junior secondary school can help in enhancing the overall educational productivity.

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