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Comparative Analysis Of Learning Platforms On Students' Motivation In Algebra Concepts In Port Harcourt Metropolis, Rivers State

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ABSTRACT

This study investigated the effect of Gamified Quizizz and Google Classroom Platforms on students' motivation in understanding algebraic concepts in Private Junior Secondary Schools in Port Harcourt Metropolis, Rivers State. Adopting a pretest-posttest quasi-experimental design, the study population consisted of Junior Secondary School III Mathematics students from 743 fully accredited private junior secondary schools in the Port Harcourt Metropolis. The sample size of the study comprised 251 Junior Secondary School III Mathematics students drawn from intact classes in selected private junior secondary schools. The purposive sampling procedure was adopted to select the sample for this study. The instrument for data collection was the Algebra Motivation Scale. The instrument was validated by three experts. The reliability of the instruments was determined using Cronbach Alpha, which yielded reliability coefficients of 0.79. Data collected were analysed using descriptive statistics of mean and standard deviation to answer the research questions, while Analysis of Covariance were used to test the hypotheses at 0.05 level of significance. Findings revealed that the motivation of the students taught Algebra concepts using Gamified Quizizz Platform was higher, followed by students taught Algebra concepts using the face-to-face method. Lastly, students were taught Algebra concepts using Google Classroom platform. Also, findings showed that the motivation level of the female students taught Algebra concepts was higher than their male counterparts. The study concluded that gamified platforms, especially Quizizz, are effective tools for increasing motivation in Algebra learning, regardless of gender. These insights support the integration of gamified strategies in mathematics education to foster better engagement and outcomes. Hence, it was recommended amongst others that school administrators incorporate gamified learning platforms like Quizizz into the school curriculum for teaching mathematics and other STEM subjects, as these tools have been shown to significantly enhance students' motivation in Algebra concepts compared to traditional methods.

Keywords: Comparative analysis, learning platforms, students' motivation, algebra concepts, gamification.

INTRODUCTION

Mathematics is the study of numbers, quantity, structure, space, and change. It is a versatile and fundamental discipline that has evolved from basic practices such as counting, measuring, and describing the shapes of objects. Over centuries, it has grown into a vast and intricate field, encompassing a variety of branches that delve into different aspects of logical reasoning and abstract thinking. According to

Dunne and Hulek (2020), Mathematics is often described as the science of structure, order, and relation. It provides a framework for understanding our world's patterns and relationships.

Mathematics is divided into several branches, such as arithmetic, geometry, trigonometry, calculus, statistics, probability, and algebra. Algebra is one of the fundamental branches of Mathematics that focuses on the study of symbols and the rules for manipulating these symbols to solve equations and understand relationships between quantities. Unlike arithmetic, which deals with specific numbers, algebra introduces variables that represent unknown values. This allows for the formulation of general principles and the solving of problems involving these variables. Algebraic techniques are essential for solving complex mathematical problems and form the foundation for many other areas of Mathematics, including calculus and discrete Mathematics (Shane, 2022).

Mathematics education generally plays a crucial role in shaping students' cognitive development and future academic and professional success. The teaching and learning process in the classroom focuses on helping students acquire new knowledge and skills while retaining what they already know. Mathematics, often referred to as the “Queen of the Sciences” (Kashmir, 2021), is used for proofs in scientific fields, serving as a tool that reinforces scientific theories and discoveries. It is the primary language in which scientific principles and calculations are expressed. Mathematics is an essential tool in many fields such as medicine, engineering, natural sciences, and social sciences.

A basic knowledge of Mathematics is necessary for an individual to function effectively in society. Students with little or no knowledge of Mathematics may not be able to function as effectively as those with a sound understanding of the subject. Mathematics is essential in the natural sciences, engineering, medicine, finance, computer science and the social sciences. Although Mathematics is extensively used for modelling phenomena, the fundamental truths of Mathematics are independent of any scientific experimentation. Some areas of Mathematics, such as statistics and game theory, are developed in close correlation with their applications and are often grouped under applied Mathematics.

Other areas are developed independently from any application (and are therefore called pure Mathematics), but they often later find practical applications. Integrating information and communication technology (ICT) in teaching and learning Mathematics in a thoughtful, planned and appropriate manner is important to increase the efficiency and effectiveness of the subject. The progress of Mathematics affects the development of science and technology, which supports the development of the culture of human life. One of the abilities needed in designing learning content for Mathematics in the classroom, so that students get an interesting and enjoyable learning experience, is the incorporation of ICT, especially at the secondary education level.

The incorporation of technology in Mathematics education serves as a crucial support system, enhancing both teaching and learning processes in traditional classroom settings. It also plays a pivotal role in distance learning and online instruction programmes, equipping learners with the necessary skills to thrive in a rapidly evolving technological landscape. Computers, in particular, have become an indispensable tool in shaping the world; their importance cannot be overstated as they contribute significantly to global standards.

Technology's integration has profoundly impacted education, particularly in Mathematics. Platforms like Quizizz allow educators to create quizzes with multimedia elements, fostering a game-like learning environment. The features of Quizizz include lively music and visual cues, which promote a fun and competitive atmosphere. Students engage in real-time participation, earning points and tracking progress through leaderboards. Post-quiz, teachers can analyze performance data to assess both individual and class performance.

Quizizz.com provides a highly engaging learning platform, reducing test-related anxiety and enhancing student enthusiasm. It supports educators in creating quizzes or accessing existing ones, enriching the learning experience and fostering a lively, competitive environment. Another innovative platform utilized to foster students' engagement and collaboration is Google Classroom, which is an online learning platform for virtual learning environments. Introduced in 2014, Google Classroom is a component of Google Apps for Education (GAFE) that enables teachers to effortlessly create and manage assignments, provide proAPT feedback, and communicate with their students. According to Abidin and Saputro (2020),

Google Classroom is a beneficial tool for facilitating learning activities due to its flexibility and multitude of features. Google Classroom incorporates features that aid in the learning process, such as class preparation, assignment display, data storage on Google Drive, and development of learning materials like creating questions, assignments, and topics for discussion in virtual classes (Ulum, 2020). Teachers can leverage Google Classroom to assign online tasks, foster collaboration among colleagues and students, and maintain regular communication with students. Additionally, teachers can create virtual courses, assign tasks, provide feedback, and access all this information in one centralised location.

Motivation represents a pivotal element in the teaching and learning process, closely intertwined with learning itself. In parallel, engagement denotes an individual's enthusiasm and emotional commitment to learning activities (Alsawaier, 2018). These two components often converge, particularly in the realms of intrinsic motivation and cognitive engagement. A key facet of engagement in learning contexts is cognitive engagement, characterised by students' earnest efforts to comprehend a subject matter and their sustained dedication to studying over extended periods. Alsawaier (2018) also argued that a combination of robust motivation and high levels of cognitive engagement results in an effective learning experience. This not only enhances academic performance but also fosters a lifelong love for learning. In essence, technology plays a pivotal role in modern education by promoting collaboration, stimulating motivation, enhancing comprehension of complex concepts, and providing widespread access to knowledge.

Statement of the Problem

The increasing integration of technology in education has not resolved the persistent issue of low student motivation in learning Algebra, a cornerstone of mathematics. Conventional instructional approaches frequently fail to capture student interest, leading to disengagement, poor knowledge retention, and lower academic achievement. The emergence of diverse learning platforms, including gamified applications, digital classrooms, and traditional face-to-face instruction, creates a pressing need to identify which environment most effectively supports student motivation. However, a scarcity of empirical research compares the motivational outcomes of these platforms within Algebra education. This lack of clarity may lead educators to adopt suboptimal methods, foregoing chances to boost student engagement and performance. This study strives to address this research gap by conducting a comparative analysis of a Gamified Quizizz Platform (GQP), a Gamified Classroom Platform (GCP), and a Face-to-Face Method (FFM) to assess their impact on student motivation in Algebra, while also examining gender differences and interactive effects.

Aim and Objectives of the Study

This study aimed to investigate the effect of Gamified Quizizz and Google Classroom Platforms on students' motivation in understanding algebraic concepts in Private Junior Secondary Schools in Port Harcourt Metropolis, Rivers State. The objectives of the study were;

1. determine the effect of Gamified Quizizz Platform (GQP), Google Classroom Platform (GCP) and Face-to-Face Method (FFM) on students' motivation for Algebra concepts.
2. ascertain the influence of gender on students' motivation in Algebra concepts.
3. determine the joint effect of learning platform (GQP, GCP, FFM) and gender on students' motivation in Algebra concepts

Research Questions

The following research questions guided this study.

1. What difference exists among students taught using Gamified Quizizz Platform (GQP), Google Classroom Platform (GCP) and Face-to-Face Method (FFM) in their motivation for Algebra concepts?
2. What difference exists between the motivation of male and female students in Algebra concepts?
3. What is the joint effect of learning platforms (GQP, GCP and FFM) and gender on students' motivation in Algebra concepts?

Hypotheses

For this study to establish and determine the stated objectives, research hypotheses that are testable and analyzable based on data collected, therefore, need to be formulated. The following research hypotheses were formulated to guide the study.

1. No significant difference exists among students taught using GQP, students taught using GCP, and students taught using FFM in students' motivation in Algebra concepts.
2. No significant difference exists between the motivation of male and female students in Algebra concepts.
3. There is no significant joint effect of learning platform and gender on students' motivation in Algebra concepts.

METHOD AND MATERIALS

This study employed a quasi-experimental, nonequivalent pretest-posttest control group design to assess the effect of Gamified Quizizz and Google Classroom Platforms on students' motivation in understanding algebraic concepts in Private Junior Secondary Schools in Port Harcourt Metropolis, Rivers State. This research design is employed because secondary schools operate in intact classes, and randomising students into groups for the experiment would not be feasible without risking class disintegration and introducing bias. The population of this study consisted of Junior Secondary School III Mathematics students (JSS III) in 743 fully accredited private junior secondary schools in Port Harcourt Metropolis. The sample consisted of 251 Junior Secondary School III Mathematics students. The purposive sampling technique was used to select two schools that are mixed and have at least two streams. The three schools selected were randomly assigned into three intact groups, out of which there were two experimental groups and one control group. This sample comprised 83 students (50 males and 33 females) for experimental group I, 86 students (46 males and 40 females) for experimental group II and 82 students (42 males and 40 females) for the control group. The instrument used for data collection was a researcher-made scale titled Algebra Motivation Scale (AMS). The Algebra Motivation Scale (AMS) was developed based on the affective domain of Bloom's Taxonomy of Educational Objectives. The AMS comprised inputs from those educational objectives that were concerned with one's emotional state, feelings, degree of acceptance or rejection of some materials taught and the modes of personal or social adjustment. The AMS involved questions that probe students' curiosity, values, motivation, interests, appreciation and attitudes. Also, there were inputs from Gamified Quizizz and Google Classroom Learning Management Systems, as well as the social learning theories. Furthermore, there were inputs from research pieces of literature that stress the relevance of Mathematics in Nigeria, specifically and globally at large. The Development of Algebra Motivation Scale (AMS) was validated by one expert in Measurement and Evaluation in the Department of Educational Psychology, Guidance and Counselling and the researchers' supervisors, all at the University of Port Harcourt. Comments from the validation indicated whether AMS items were clear, readable and free from ambiguity for the level of students they were proposed to be tested; if they conformed to the subject matter that they sought to test; and that the items tested the basic ideas and concepts of the study. The validators also gave further suggestions, including creating some sort of balance between positive and negative items, deleting repeated ideas, and rephrasing some items. All corrections were effected appropriately, thus reducing the number of items. The test-retest method was used to generate two sets of scores from students outside the sample of this study and the scores were correlated using the PPMC to determine its internal consistency. The reliability coefficient of the instrument was 0.79. The researcher carried out the data collection procedure in stages for three weeks. The researcher visited the selected school for permission to use the students and some of the school facilities. Afterwards, the Algebra Motivation Scale (AMS) was administered as a pretest to both the experiment and control groups to ascertain their equivalence in ability. In the second stage, the experimental groups were taught algebra concepts using Gamified Quizizz and Google Classroom Platforms, taking cognisance of the students' previous knowledge on the concept, while the control groups were also taught algebra using the conventional face-to-face method. One period of 40 minutes was allocated for each group three times a week. In the final stage, the AMS was rearranged and administered to the two groups as a post-test. The post-test was scored and used to generate quantitative data, which was analysed using mean and standard deviation to answer research questions, while z-test and ANCOVA were used to test null hypotheses. The significance level of 0.05 was used to test the null hypotheses.

RESULTS

Research Question One: *What difference exists among students taught using Gamified Quizizz Platform (GQP), Google Classroom Platform (GCP) and Face-to-Face Method (FFM) in their motivation for Algebra concepts?*

Table 1: Mean and standard deviation of the pretest difference that exists among students taught using GQP, GCP and FFM in their motivation in Algebra concepts

Instructional Strategy	n	Pretest		Posttest		Mean Gain
		\bar{x}	SD	\bar{x}	SD	
GQP	83	43.23	4.87	62.40	4.18	19.17
GCP	86	46.49	5.75	62.15	5.73	15.66
FFM	82	47.68	7.48	64.28	4.69	16.60

Table 1 shows the pretest difference that exists among students taught using GQP, GCP and FFM in their motivation for Algebra concepts. The result revealed that the motivation of the students taught Algebra concepts using GQP was higher (Pretest: Mean = 43.23, SD = 4.87, Posttest: Mean = 62.40, SD = 4.18, Mean Gain = 19.17). Followed by students taught Algebra concepts using FFM (Pretest: Mean = 47.68, SD = 7.48, Posttest: Mean = 64.28, SD = 4.69, Mean Gain = 16.60). Lastly, students taught Algebra concepts using GCP (Pretest: Mean = 46.49, SD = 5.75, Posttest: Mean = 62.15, SD = 5.73, Mean Gain = 15.66). Consequently, the difference in the mean gain showed that the motivation of students taught Algebra concepts using GQP was higher than their counterparts taught using FFM, followed by the students taught using the GCP.

Research Question Four: *What difference exists between the motivation of male and female students in Algebra concepts?*

Table 2: Mean score and standard deviation of the difference in motivation among students taught using GQP, GCP and FFM in their motivation in Algebra concepts

Gender	n	Pretest		Posttest		Mean Gain
		\bar{x}	SD	\bar{x}	SD	
Male	138	46.34	6.03	63.27	4.20	16.30
Female	113	45.14	6.75	62.91	5.80	17.77

Table 2 shows the difference that exists between the motivation of male and female students in Algebra concepts. The result revealed that the motivation level of the female students taught Algebra concepts was higher (Pretest: Mean = 45.14, SD = 6.75, Posttest: Mean = 62.91, SD = 5.80, Mean Gain = 17.77) than their male counterparts (Pretest: Mean = 46.34, SD = 6.03, Posttest: Mean = 63.27, SD = 4.20, Mean Gain = 16.30). The difference in the mean gain motivation showed that female students taught an Algebra concept was higher than their male counterparts.

Research Question Three: *What is the joint effect of learning platforms (GQP, GCP and FFM) and gender on students' motivation in Algebra concepts?*

Table 3: Mean score and standard deviation of the joint effect of Gamified Quizizz Platform (GQP), Google Classroom Platform (GCP) and Face-to-Face Method (FFM) and gender on students' motivation in Algebra concepts.

Instructional Strategy	Gender	n	Pretest		Posttest		Mean Gain
			\bar{x}	SD	\bar{x}	SD	
GQP	Male	50	41.98	4.86	62.42	3.15	20.44
	Female	33	45.12	4.31	63.73	5.33	18.61
GCP	Male	46	46.61	5.25	62.35	5.42	15.74
	Female	40	46.35	6.34	61.93	6.12	15.58
FFM	Male	42	51.24	3.89	65.29	2.96	14.05
	Female	40	43.95	8.51	63.22	5.85	19.27

Table 3 shows the joint effect of Gamified Quizizz Platform (GQP), Google Classroom Platform (GCP) and Face-to-Face Method (FFM) and gender on students' motivation in Algebra concepts. The result revealed that the motivation in Algebra concepts of the male students taught Algebra concepts using GQP was higher (Pretest: Mean = 41.98, SD = 4.86, Posttest: Mean = 62.42, SD = 3.15, Mean Gain = 20.44) than their female counterparts (Pretest: 45.12, SD = 4.31, Posttest: Mean = 63.73, SD = 5.33, Mean Gain = 18.61).

The result also revealed that the motivation in Algebra concepts of the male students taught Algebra concepts using GCP was slightly higher (Pretest: Mean = 46.61, SD = 5.25, Posttest: Mean = 62.35, SD = 5.42, Mean Gain = 15.74) than their female counterparts (Pretest: 46.35, SD = 6.34, Posttest: Mean = 61.93, SD = 6.12, Mean Gain = 15.58).

Lastly, the result revealed that the motivation in Algebra concepts of the female students taught Algebra concepts using FFM was higher (Pretest: Mean = 43.95, SD = 8.51, Posttest: Mean = 63.22, SD = 5.85, Mean Gain = 19.27) than their male counterparts (Pretest: 51.24, SD = 3.89, Posttest: Mean = 65.29, SD = 2.96, Mean Gain = 14.05).

The difference in the mean gain showed that male students taught Algebra concepts using GQP were more motivated than their female counterparts. Also, male students taught using GCP were more motivated than their female counterparts. Lastly, female students taught using FFM were more motivated than their male counterparts.

Hypothesis One: No significant difference exists among students taught using GQP, those taught using GCP and those taught using FFM in their motivation for Algebra concepts.

Table 4: Summary of ANOVA on the differences that exist among students taught using GQP, those taught using GCP and those taught using FFM in their motivation in Algebra concepts

ANOVA					
Sources	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	193.81	2	96.91	4.01	0.02
Within Groups	5996.28	248	24.18		
Total	6190.10	250			

Table 4 shows that significant difference exists among students taught using GQP, those taught using GCP and those taught using FFM in their motivation in Algebra concepts ($F_{2,248} = 4.01, p = 0.02 < 0.05$), hence null hypothesis one is rejected at the 0.05 level of significance indicating that a significant difference exists among the students taught using Gamified Quizizz Platform, those taught using Google Classroom Platform and those taught using Face-to-Face Method in their motivation in Algebra concepts.

Hypothesis Two: No significant difference exists between the motivation of male and female students in Algebra concepts

Table 5: Summary of ANOVA on the difference that exists between the motivation of male and female students in Algebra concepts

ANOVA					
Sources	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.90	1	7.90	0.32	0.57
Within Groups	6182.20	249	24.83		
Total	6190.10	250			

Table 5 shows that a significant difference does not exist between the motivation of male and female students in Algebra concepts ($F_1, 249 = 0.32, p = 0.57 > 0.05$), hence null hypothesis four is retained at the 0.05 level of significance. This result indicates that no significant difference exists between the motivation of male and female students in Algebra concepts.

Hypothesis Three: There is no significant joint effect of learning platform and gender on students' motivation in Algebra concepts.

Table 6: Summary of ANCOVA on the joint effect of learning platform (GQP, GCP and FFM) and gender on students' motivation in Algebra concepts

Dependent Variable: Posttest Motivation

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	354.71 ^a	6	59.12	2.47	0.02	0.06
Intercept	13514.30	1	13514.30	565.09	0.00	0.70
Pretest Motivation	36.09	1	36.09	1.51	0.22	0.01
Group	175.32	2	87.66	3.67	0.03	0.03
Gender	5.23	1	5.23	0.22	0.64	0.00
Group * Gender	63.73	2	31.86	1.33	0.27	0.01
Error	5835.39	244	23.92			
Total	1005814.00	251				
Corrected Total	6190.10	250				

a. R Squared = .057 (Adjusted R Squared = .034)

Table 6 shows that there is no significant joint effect of learning platforms (GQP, GCP and FFM) and gender on students' motivation in Algebra concepts ($F_2 = 1.33$, $df = 244$, $P > 0.05$). Hence, null hypothesis seven was retained at the 0.05 alpha level, indicating that there was no significant joint effect of learning platform and gender on students' motivation in Algebra concepts. The partial eta squared value of 0.01 indicates a small effect size, demonstrating that the difference in the means does not differ across the groups.

DISCUSSION OF FINDINGS

From the data gathered and analysis carried out, the findings of research question one showed that the motivation of the students taught Algebra concepts using GQP was higher, followed by students taught Algebra concepts using FFM. Lastly, students taught Algebra concepts using GCP. Consequently, the difference in the mean gain showed that the motivation of students taught Algebra concepts using GQP was higher than their counterparts taught using FFM, followed by the students taught using the GCP. Furthermore, the result of hypothesis one showed that there is a significant difference exists among students taught using GQP, those taught using GCP and those taught using FFM in their motivation in Algebra concepts. The findings of this study are consistent with previous studies by Gulinna and Lee (2020) and Pitoyo et al. (2020) that also employed Quizizz in educational contexts. The intrinsic link between students' motivation and learning in the present study is well-established. This notion aligns with the conclusions drawn by Pitoyo et al. (2020) who identified motivation as a crucial determinant of successful learning. As a result of Quizizz integration, students exhibited heightened motivation and interest. Handoko et al. (2021) further affirmed that Quizizz fostered excitement for learning materials, driving focused attention during gamification sessions due to the aspiration to expand their knowledge for future assessments. Gamification elements present in Quizizz served as vigorous motivators for active participation in learning activities, corroborating earlier findings by Gulinna and Lee (2020). Furthermore, Quizizz's influence on promoting competitiveness within the classroom echoed previous observations and was affirmed in the present study's findings. The findings of this study are further supported by Ümit Karabıyık (2024), who investigated the effect of gamified learning on motivation and success in math class and discovered a significant impact of gamified learning in mathematics education on student motivation and achievement. This finding affirmed the findings of Linga et al. (2022), who found that using gamified assessment (GA) can affect students' engagement, motivation, and achievement in Mathematics.

The result of research question two showed that the motivation level of the female students taught Algebra concepts was higher than their male counterparts. The difference in the mean gain motivation

showed that female students taught an Algebra concept was higher than their male counterparts. Furthermore, the result of hypothesis two showed that there is no significant difference do not exist between the motivation of male and female students in Algebra concepts. This finding is consistent with the study of Rodríguez et al. (2019), who found that boys generally showed higher motivation and more positive attitudes towards mathematics compared to girls. However, these differences were small, and there were no significant gender differences in academic performance. Furthermore, the findings of Ajai and Imoko (2015) also revealed no significant differences between male and female students in terms of achievement and retention scores in mathematics, indicating that both genders can equally compete and collaborate in learning. Also, the study Sölpük Turhan (2020) concluded that gender had a low significance level on academic motivation, suggesting no substantial differences in motivation between male and female students.

The result of research question three showed the joint effect of GQP, GCP and FFM and gender on students' motivation in Algebra concepts. The result revealed that the mean gain showed that male students taught Algebra concepts using GQP were more motivated than their female counterparts. Also, male students taught using GCP were more motivated than their female counterparts. Lastly, female students taught using FFM were more motivated than their male counterparts. Furthermore, the result of hypothesis three showed that there is no significant joint effect of GQP, GCP, FFM and gender on students' motivation in Algebra concepts. This finding corroborates the study of Degol, Wang, Zhang and Allerton (2018) whose study explored pathways between gender, mindset, and motivation in mathematics. It found that female students with a growth mindset had higher task values and were more motivated in mathematics compared to their male counterparts. This finding did not, however, agree with Xie, Yang and Xiao (2023) whose research investigated the role of gender-math stereotypes and their impact on mathematical performance. The study revealed that gender stereotypes negatively affected female students' motivation and performance in mathematics, while male students were less influenced by these stereotypes.

CONCLUSION

This study compared the effects of three learning platforms, Gamified Quizizz Platform (GQP), Gamified Classroom Platform (GCP), and Face-to-Face Method (FFM), on students' motivation in Algebra. Findings showed that GQP significantly boosted student motivation more than FFM and GCP. Gamification elements in Quizizz, such as competition and engagement, played a key role in enhancing interest and participation. Gender analysis revealed that while female students showed slightly higher motivation, the difference was not statistically significant. Additionally, the combined effect of platform and gender on motivation was not significant. Overall, the study confirms that gamified platforms, especially Quizizz, are effective tools for increasing motivation in Algebra learning, regardless of gender. These insights support the integration of gamified strategies in mathematics education to foster better engagement and outcomes.

RECOMMENDATIONS

Based on the conclusion and findings of the study, the following recommendations are made:

1. School administrators incorporate gamified learning platforms like Quizizz into the school curriculum for teaching mathematics and other STEM subjects, as these tools have been shown to significantly enhance students' motivation in Algebra concepts compared to traditional methods.
2. Educational policy makers and stakeholders should design gender-inclusive educational policies, considering that male and female students showed no significant differences in their motivation for Algebra concepts.
3. Professional development programs should be organised to help teachers understand how to effectively implement platforms like Quizizz, GCP, and FFM. This includes designing engaging content, managing classroom dynamics, and using data to monitor student motivation and performance.

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