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## **Google Classroom for Secondary School Students' Engagement and Achievement in Mathematics**

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### **Abstract**

The study investigates the effect of google classroom on secondary school students' performance in mathematics. Two research questions and two hypotheses guided the study which adopted pretest posttest non-equivalent group quasi-experimental design. The sample comprised 67 SS2 students in two intact classes drawn using purposive sampling technique. Data were gathered using 'Students' Learning Engagement Questionnaire' (SLEQ) and 'Mathematics Achievement Test' (MAT) whose reliability indices were 0.76 and 0.74 obtained using Cronbach Alpha and Kuder-Richardson20 methods respectively. Mean and standard deviation were used to answer the research questions while ANCOVA was used to test the hypotheses at .05 level of significance. Results showed that face-to-face method had a significantly positive effect on students' engagement in mathematics than google classroom while google classroom had a significant positive effect on students' achievement in Mathematics than face-to face. It was recommended that google classroom should be used in the teaching mathematics in schools.

**Keywords:** Google classroom, Students; Engagement, Performance, Mathematics

### **INTRODUCTION**

Online learning emphasizes the importance of digital learning in ensuring learning continuity and protecting students' educational rights. Along this line of thought many countries of the world such as China, Bulgaria, Finland, the USA, Britain and Nigeria among others recommended a migration from the traditional face-to-face teaching and learning to online learning (Patrick, et al. 2021). Online learning according to Senad (2021), has become an option for schools as substitute to classroom teaching. Online learning as defined by Oguguo, et al. (2021) is the process of employing technology to give education and training applications electronically, observe learners' performances, and provide feedback on learners' progress. One of the recent additions to virtual and online learning platforms is the Google classroom.

Google Apps for Education was introduced in 2014 with Google Classroom is a new component. This classroom allows teachers to easily create and manage assignments, provide timely feedback, and communicate with their students (Shaharane, et al. 2018). Abidin and

Saputro (2020), posit that Google classroom is a useful tool for supporting learning activities because of its flexibility and numerous features. Google classroom has features that can be used in the learning process like class preparation, display student assignments, storing data on Google Drive and developing learning material, namely creating questions, creating assignments, and creating topics will be discussed in virtual classes (Ulum, 2020). Teachers can use Google Classroom to give online assignments, promote collaboration among their colleagues, students, and students, and maintain constant communication with students. Furthermore, teachers can establish virtual courses, offer tasks, send feedback, and view all of this information in one place. Google Classroom features communication and discussion tools such as online debates, forums, reviews, brief messages, and emails, allowing students to engage in collaborative learning which can be used for teaching and learning of mathematics. Besides, Google classroom may be considered one of the inquiry-based learning media since it can fully engage students' talents in finding, understanding, exploring, analyzing, and formulating learning outcomes (Ghofur, 2018).

By this, it helps the students to find out information for themselves which may help increase their level of learning engagement and consequently achievement in school subjects like mathematics. Learning engagement was described by Wiseman, et al. (2016) as students' active participation or conscious investment of effort in their educational activities. Students' engagement, Bender (2017), defines it as students' cognitive investment in, active participation in, and emotional commitment to learning specific information. In this study, learning engagement is the extent to which students participate in a teaching and learning activities, when students are actively engaged in an activity, it is most likely that they could gain useful insights and knowledge on how to solve problems for themselves. This in turn may enhance their academic achievement in mathematics.

Students' academic achievement has been a major source of concern to educationist and researchers. Academic achievement according to Steinmayr, et al. (2015) is the performance outcomes which shows the extent individuals, students, teachers and the school have accomplished specific goals that were the focus of instruction especially in school settings. Academic achievement involves what a student had achieved in several disciplines during the course of their career which includes progress in core academic subjects such as mathematics, science, language, arts, and social studies and performance in areas such as athletics, music and art among others (Andortan, et al.2022). The above definitions imply that academic achievement covers all aspects of what a student is expected to cover during the course of schooling. This may reflect why much attention is paid on students' achievement. Despite the importance of high students' achievement in mathematics and school subjects generally, the problem of mass failure across the different levels of education is a common knowledge (Afolabi, et al.2020). This has been attributed to many factors including teaching methods and as such researchers are interested in finding methods that may be effective in improving students' achievement especially post COVID 19 era. One of such methods the present researchers feel could be efficient in promoting student's achievement and engagement is the google classroom. This is because google classroom makes learning student-centered, motivated, creative and improve problem-solving

skills (Cook & Sonnenberg, 2014). It is imperative for the present study to investigate the effect of google classroom on students' engagement and achievement in mathematics.

Literature evidence revealed that google classroom and other online learning platforms may be effective in improving students' interest, participation and achievement in school subjects including mathematics. Cacace (2019) study revealed that, student achievement did not show much improvement and that students were not very passionate about using Google Classroom to complete assignments but preferred it for keeping track of assignments. However, Oyarinde and Komolafe (2020) showed that Google classroom platform positively affected students' academic achievement, attitudes and their perception. Senad (2021) study revealed that students have positive perceptions on using Google Classroom in mathematics. More so, Sari and Yin (2021) revealed that the group of students who were exposed to the google classroom using collaborative approach showed a better interest in economics learning than the group of students who were not exposed to it. In a similar vein, Sri Sasmita, et al. (2021) revealed that students' learning achievement taught by online learning of the Google Classroom was better than that of the WhatsApp group.

The above literature shows that the result of the effect of google classroom on students' engagement and achievement is mixed and contradictory. More so, in the case of mathematics, there were fears that learning mathematics outside of the classroom could impede students' engagement to learning mathematics in a variety of ways. This is due to the fact that face-to-face learning may allow students to learn from one another's tactics (Russo & Hopkins, 2017). A synchronous in-class facilitator is likely to be required for such a discourse-intensive approach to learning mathematics. Also, mathematics is a practical subject that requires active participation of students on activities. The teacher in the face-to-face learning situation may be able to assign activities to students and follow up such activities to a reasonable conclusion. Furthermore, teachers may anticipate or respond to negative attitudes toward mathematics and mathematics learning held by some students (Clarke, Roche, Cheeseman, & Sullivan, 2014). This means that more research is required on the effect of google classroom on students' learning outcomes so as to inform policies and programmes that may lead to the digital switch from face-to-face learning to google classroom. Google Classroom is a program for teachers to create a digital classroom for students to communicate with their teachers and peers (Phan, 2015). It is a free application that integrates e-mails and documents to save into storages. Teachers can upload files, videos, links, announcements and assignments for students to retrieve and view. Document files can be edited in class and shared with peers to learn collaborative skills. When students complete an assignment, they can submit by posting on the teacher's board or on the classroom board. This program can be accessed using any device at any place, which is convenient for both teachers and students. Google platform allows learners to chat and discuss topics learned in class, and allows teachers to view student discussion, and post comments. Different assignments can be posted such as video segments, PowerPoint presentations, documents and web quests.

Google classroom is considered as one of the best platforms for enhancing teachers' workflow. It provides a set of powerful features that make it an ideal tool to use with students. Google classroom helps teachers save time, keep classes organized, and improve communication with students. It is available to anyone with Google Apps for education, a free suite for productivity tools including Gmail, Drive and Docs (2015). The Google classroom application depends on Google documents and cloud storage and Gmail service in order to accomplish the required functions research and follow-up with students. On the other hand, the service also provides tools for teachers to continue and to allow them to publish the assignments, homework, questionnaires and tests for students and get answers to students in real time.

There are many synonyms for the term virtual classrooms such as electronic classrooms, smart classrooms, online learning, distance learning classrooms, live classrooms, and digital classrooms. Indeed e-learning plays a major role in promoting virtual learning through modern electronic media, since both e-learning and virtual learning are two terms with one goal that is the possibility for anyone to get access to education through Internet resources without having to go to any educational institution. Rion and Hasan (2015, p. 7) stated that *"many developed countries are using virtual classroom to provide online education to the students"*. Sayed (2017) defined virtual classrooms as *"An interactive teaching and learning environment that allows live online interaction between the teacher and students, and works simultaneously and asynchronously as traditional classrooms, where the teacher and students work together at the same time regardless of the places they are at"* (p. 373). In the same context Khleif (2011) defined virtual classrooms as *"one of the main means of providing direct lessons and lectures on the Internet, in addition to distance training where the basic elements needed by both teacher and student are based on the interactive learning method"* (p. 12). Rizq (2009) indicated that virtual classrooms are similar to traditional ones in terms of teacher and students' presence, *"yet they are available online, where teachers and students do not adhere to time or place, and can create virtual environments where students access through different networks to participate in collaborative learning"*. Also, Al-Salem (2004) defined virtual classrooms as *"tools and software on the Internet that enable the teacher to share lessons, homework and tasks, and communicate with students through multiple techniques"* (p. 21). In the meantime, these tools and software enable the students to read the lessons and do the homework and tasks, as well as *"participate in discussion forums and follow up on their academic achievement and the degrees obtained"* (*ibid*). Regardless of the definition, virtual classroom is surely an exceptional part of the learning systems in online education (Rion & Hasan, 2015). Indeed, virtual classrooms are getting commended for providing students with quality education. Abdulrazeq (2010) mentioned a number of elements and components that characterize the structure of the virtual classrooms on the Internet including: Home page, log in tool, learning content pages, communication tools (synchronous and non-synchronous) including e-mail, chat rooms and forums, self-test tool, timetable of the content, tools to communicate to search engines, activities and assignments tools, educational resources, setting control panel, and organizational map.

In order to make full use of the advantages of virtual classrooms, there must be a connection to the Internet or a local information network (Intranet), in addition to the availability of an electronic management system and a follow-up system by both the teacher and the school or university to ensure the virtual classrooms objectives are being achieved. Also, students should have good computer skills, while teachers should have good deal of knowledge about virtual classrooms and how to interact with students through them. Al-Salem (2004) states several important advantages of virtual classrooms, which are: (i) achieve application sharing, (ii) provide immediate feedback to the learner, (iii) direct interaction between teacher and learner, (iv) interactive content with all its elements, (v) direct verbal chat, (vi) interacting with a large number of participants from different places, (vii) supporting scientific content with multimedia, (viii) navigating different educational sites online in class, and (ix) provide direct assessment.

Abu Alia (2013) on the other hand mentions other advantages of virtual classrooms including, teacher's role in the virtual classroom, students prefer the engagement in GC where teachers have passive roles, rather than being engaged in a class where teachers have the main role (Maroof & Emran, 2018). A proper virtual classroom must be flexible and allows the teacher to explain the educational content in more than one language, use multimedia, include an efficient control panel that allows ease of use, and include the main functions of electronic classrooms (Mwanza, 2005). This requires new roles from the teacher in the virtual classrooms as mentioned by Mwanza as follows: 1. The teacher transforms from a simply a teacher providing information to an instructor providing students with educational resources guiding them on exchanging knowledge. 2. The teacher encourages students to work in groups to increase their learning experiences and to share these experiences. 3. The teacher seeks to achieve quality teaching through competition with his colleagues. 4. The teacher encourages students to deal with educational subjects with multiple perspectives. 5. The teacher inspires students to become self-independent, and manage time and learning process.

Furthermore, Al-Talwaty (2014) enlists the following tasks for the teacher in the virtual classroom: 1. Define the objectives and outcomes of the lessons and the courses that he seeks to achieve. 2. Select or prepare assessment methods to measure the extent of achieving these objectives. 3. Follow up on students' attendance and academic progress and attainment. 4. Organize the learning environment by making it comfortable, cooperative, and interactive. 5. Instruct students to do assignments, activities and projects and conduct discussions. 6. Ask questions that provoke understanding and critical thinking and accept different answers. 7. Provide academic assistance and guidance to students and solve their academic problems.

Google Apps for Education (GAFE) is an influential cloud-computing solution that works to connect and engage with every student no matter where they are and what tools are used (Google, 2013). The GAFE suite includes Gmail, Google Drive, Google Groups, Google Calendar, Google Docs, Google Sites, and Google+ (Google, 2013). The integration of GAFE tools have been used to overcome barriers that students have in communicating with their teachers within classroom settings (Sviridova, Sviridova, & Tymoshenko, 2011) and increase

productivity and learning gains in the classroom. Google Classroom is a free application that is part of GAFE. Its purpose is to facilitate communication and interaction between teachers and students and streamline educational workflow (Catapano, 2019). It was launched in May 2014 (Beaumont, 2018) and is currently available in 42 languages. GC provides a unique experience for students and teachers in managing the daily tasks and activities. GC *“uses Google Cloud to save and share files between students and teachers with the possibility of keeping track of students’ progress in performing the daily tasks and it is free”* (Amour & Alimat, 2016, p. 156). In order to use GC, an e-mail account should be created for each student. Teachers can add students to classrooms, where they can post students’ e-mail addresses. GC can also upload the student’s Gmail contacts, or export members of Google Groups. Teachers can create classes, post assignments, organize folders, and view work in real-time (Beaumont, 2018; Catapano, 2019). The app also allows teachers to *“constantly control their observations, surveys, and analyses of student’s demography”* (Maroof & Emran, 2018, p. 3). Another important characteristic of the application is that the way students are added to the classroom by coding is obtained from the application and sent by the teacher, which enables the students to join the class, and there is ability to reset or disable the encoding by clicking on the encoding itself. Further, the teacher can create the desired number of classrooms, and students can join the classes they want.

Once the invitation has been sent, the teacher can follow up the status of each invited person. The teacher can also give permission to students, and read any comments and messages written by students. Google has stated the following characteristics of its GC application (Lujvato, Vesan & Angorino 2015): 1. Prepare and collect assignments: GCs combine Google Docs, Google Drive, and Gmail to help teachers prepare and collect paperless assignments, know who did or did not submit the assignment, and provide direct feedback to each student. 2. Improve class interaction: Teachers can make announcements, ask questions and comment on students’ performance instantly, and improve interaction inside or outside the classroom. 3. Maintain the organization: The classrooms may have folders for each assignment and each student, and students can follow up on the results and feedback provided by teachers. Many students prefer using GC in their learning process due to its usefulness, ease of use, and practicality in accomplishing the intended tasks (Maroof & Emran, 2018). They can begin working with just one click by viewing the assignment, and then when opening a Google Doc teacher will have a real-time view into their students’ progress which allows them to offer feedback and comments along the way (Catapano, 2019).

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### **Statement of the Problem**

Teaching programmes implementation in Nigerian educational institutions have been affected by the Petrol subsidy removal. Teaching programme is one of the most cardinal programmes of educational institutions (Ogunode, 2021) Teaching programme is the act of imparting knowledge to the learners. Teaching involves physically or virtually delivering a lesson or instruction that has the capacity to modify behavior. Teaching in most Nigerian educational institutions is mostly done with the traditional teaching model of physical presences. Physical teaching method is a system that involve the teachers to deliver the lesson or lecture physically in the school environment. Physical teaching method is characterized with movement from teachers' abode to school environment. It involves the use of school buses, cars, or motorcycles to move from the teachers' homes to school facilities. The removal of Petrol subsidy in Nigeria has led to increment in price of fuel. The increment in fuel price has led to increment in transportation fare which directly and indirectly affects teachers' movement to schools. Many teachers are now missing classes due to their inability to be in schools, while in tertiary institutions many lecturers have decided to compress their lectures to one or twice in a week, while other lecturers have changed to virtual model of teaching. The post-subsidy removal in Nigeria has affected implementation of teaching programme in Nigeria educational institutions. Petrol Subsidy removal has impacted negatively on the entire educational system leading to reduction in the teaching hours in schools because teachers cannot cope with the increment of transportation fare. Okonkwo (2023) observed that teachers are also affected by the removal of the fuel subsidy, as they have to pay more for transportation to and from work. Many teachers rely on public

transport, such as buses, taxis and motorcycles, which have also increased their fares due to the higher cost of fuel. Some teachers may have to spend more than half of their salaries on transportation alone, leaving little for other expenses such as food, rent and health care.

Learning programme as implemented in educational institutions are planned programmes for students or learners. Studies by (Ogunode, et al. 2021; Ogunode, et al. 2020) observed that students are learners in educational institutions, their studentship starts from the early child education to basic education to secondary school education and ends in the higher institutions. Higher institutions students are matured learners from 18 years and above. Learning programme in most Nigerian educational institutions are anchored on movement of students from their homes to schools specially in the junior basic schools and senior secondary schools, this movement is done mostly by buses, motorcycles or cars that use fuel. The subsidy removal has led to an increase in the fuel price which have also led to increase in transportation fare. The removal of subsidies has led to a hike in the price of fuel, which automatically leads to inflation in the country, it is evident that this hike in the price of fuel making it difficult for student's movement to schools. Okonkwo (2023) asserted that students are another group that is affected by the removal of the fuel subsidy, as they must pay more for transportation to and from school. Many students depend on public transport or private vehicles to get to school, which have become more expensive due to the higher cost of fuel. Some students may have to drop out of school or defer their studies if they cannot afford the transportation costs. Some students may also have to cope with poor learning conditions, such as inadequate facilities, overcrowded classrooms and frequent power outages, as schools struggle to provide quality education with limited resources. Consequently, the introduction of virtual learning in form of Google Classroom will go a long way in addressing the issue of absenteeism of teachers and students in teaching and learning. Based on the problem of the study, the study will investigate the effect of google classroom on secondary school students' engagement and achievement in mathematics.

### **Research Questions**

In line with the purpose of the study, the following research questions that guide the study

- (i) What are the mean engagement scores of students taught mathematics using google classroom and those taught using face-to-face method?
- (ii) What are the mean achievement scores of students taught mathematics using google classroom and those taught using face-to-face method?

### **Research Hypotheses**

The following hypotheses will also be tested at 0.05 level of significance in line with the research questions

- (i) There is no significant difference in the mean engagement scores of students taught mathematics using google classroom and those taught using face-to-face method
- (ii) There is no significant difference in the mean achievement scores of students taught mathematics using google classroom and those taught using face-to-face method

## **RESEARCH METHODOLOGY**

### **Description of Study Area**

The study will be conducted in Ikot Ekpene Education Zone of Akwa Ibom State, Nigeria. Three local government areas namely, Ikot Ekpene, Obot Akara and Essien Udim. The study area was used because it has schools with facilities that could facilitate the conduct of the study in the area. Besides, the area has students with iPad and laptops that could be used for google classrooms.

### **Research Design**

A non-equivalent control group, pretest and posttest quasi-experimental research design was adopted in the study with a population that consisted 4,528 SS11 students in 24 private secondary schools in the area for 2021/2022 academic session. Two schools were selected using purposive sampling technique where two intact classes were used for the study. To avoid disrupting the schools' usual teaching and learning operations, intact classrooms option was employed. The two intact classrooms were divided into two groups, one for google classroom (experimental) and the other for face-to-face method (control). There were 31 students in the experimental group and 36 in the control group.

### **Data Collection**

Two instruments titled; Students' Learning Engagement Questionnaire (SLEQ) and Mathematics Achievement Test (MAT) developed by the researchers were used for data collection. The SLEQ consisted of 20 items that elicited data on students' learning engagement in mathematics. The ratings for each were on a four-point scale of strongly agree (SA), agree (A), disagree (D) and strongly disagree (SD) respectively. The MAT contains 20 dichotomously scored multiple choice items with four response options of A, B, C and D that elicits data with respect to students' achievement in mathematics. Students' achievement was drawn using Bloom's taxonomy of educational objectives. The test covered Geometry because this topic is one of the areas of mathematics in which students continue to perform poorly (WAEC, 2019). The SLEQ and MAT was pilot tested on 20 SS2 students in a school that were not part of the study. Cronbach alpha reliability coefficient of 0.76 was established. The reliability coefficient of the MAT employed Kuder-Richardson 20 method as the items had to be dichotomously scored and the reliability coefficient of 0.74 was established.

### **Methods of Data Analysis**

Data collected was analyzed using mean and standard deviations to answer the research questions while the null hypotheses will be tested using analysis of covariance (ANCOVA) at 0.05 level of significance.

### **Presentation**

Permission was sort before commencement of the study, the researchers recruited the services of regular mathematics teachers as research assistants. The reasons for using regular mathematics teachers were to ensure that the students are not aware they were involved in an experiment. The research assistants were very well informed about the objective of the research. The research assistant for the experimental group was trained for four days on the use of google classroom while the one of the control group was asked to use the traditional face-to-face lecture method.

The experiment lasted for a period of five weeks. In the first week, the research assistants were trained for four days. The instruments were administered on both groups on the fifth day as pretest. The normal lesson periods on the school’s timetables were used to conduct the experiment which lasted for 40 minutes per lesson for four times a week. The control group were taught in the class while the experimental group were taught in a computer laboratory were Google Apps for Education (GAFE) was downloaded into the computers and the teacher made an online class for physical classes using programmes such as Google Docs, Google Forms and Google Presentation. There was one teacher computer that was connected to an overhead projector and interactive Smart Board from where the teachers created virtual classes, distributed assignments, sent feedback, and observed all activity within one media. Two sets of lesson plan, with the same content, specific objectives, duration and evaluation were developed for the two groups, except that the lesson plan for the experimental group was electronically prepared for online learning with google classroom app while that for the control group was prepared for lecture method. At the fifth week, items in the same SLEQ and the MAT were reshuffled and re-administered to the students as posttest in order to determine the effect of the treatments on the students’ engagement and achievement in mathematics. The students in both groups manually rated the SLEQ and manually answered questions in the MAT and were scored by the teachers. Each correct option in the MAT was scored one point whereas each wrong option attracted zero point.

Table 1: Mean and standard deviation of mean engagement scores of students taught Mathematics using Google classroom and those taught using face to face method

Groups	Pretest			Posttest		Mean Difference
	N	X	SD	X	SD	
Experimental (google classroom)	31	48.77	8,04	59.97	7.02	11.20
Control (face to face method)	36	47.27	3.66	61.86	6.08	14.59

Result in Table 1 shows that the mean differences of 11.20 and 14.59 for the experimental and control groups respectively depicts that face-to-face teaching method had positive effect on students’ engagement in mathematics than Google classroom.

Table 2: Analysis of Covariance (ANCOVA) of the effect of google classroom on students' engagement in Mathematics

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squares	Dec.
Corrected Model	164.561	2	82.280	1.972	.148	.058	
Intercept	2671.039	1	2671.039	64.015	.000	.500	
Pretest	104.849	1	104.849	2.513	.118	.038	
Groups	79.767	1	79.767	1.912	.172	.029	NS
Error	2670.424	64	41.725				
Total	252020.000	67					
Corrected Total	2834.985	66					

a. R Squared = .058 (Adjusted R Squared = .029)

The result in Table 2 shows that the effect of google classroom on students' engagement in mathematics was not significant ( $F(1, 66) = 1.92, p > .05, \eta^2 p = .029$ ), thus the hypothesis is not rejected. This is because the exact probability value of 0.172 is greater than 0.05 set as level of significance. The effect size of ( $\eta^2 p = .029$ ), moreover, indicates that 2.9 percent changes in students' engagement in mathematics is due to the use of google classroom. Thus, inference drawn is that google classroom has no significantly positive effect on students' engagement in mathematics

Table 3: Mean and standard deviation of mean performance scores of students taught Mathematics using Google classroom and those taught using face to face method

Groups	Pretest			Posttest		Mean Difference
	N	x	SD	x	SD	
Experimental (google classroom)	31	10.00	1.71	14.35	2.56	4.35
Control (face to face method)	36	9.53	1.55	11.61	2.01	2.08

Result in Table 3 shows that the mean differences of 4.35 and 2.08 for the experimental and control groups respectively depicts that google classroom had positive effect on students' achievement in mathematics than face-to-face method.

Table 4: Analysis of Covariance (ANCOVA) of the effect of Google classroom on students' engagement in Mathematics

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta	Dec.
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						Squares	
Corrected Model	134.823	2	67.412	13.065	.000	.290	
Intercept	202.340	1	202.340	39.215	.000	.380	
Pretest	9.431	1	9.431	1.828	.181	.028	
Groups	113.088	1	113.088	21.918	.000	.255	S
Error	330.222	64	5.160				
Total	11581.000	67					
Corrected Total	465.045	66					

a. R Squared = .290 (Adjusted R Squared = .268)

The result in Table 4 shows that the effect of google classroom on students' achievement in mathematics was not significant ( $F(1, 66) = 21.918, p < .05, \eta^2 p = .255$ ), thus the hypothesis is rejected. This is because the exact probability value of 0.00 is less than 0.05 set as level of significance. The effect size of ( $\eta^2 p = .255$ ), moreover, indicates that 25.5 percent changes in students' achievement in mathematics is due to the use of google classroom. Thus, inference drawn is that google classroom has a significantly positive effect on students' achievement in mathematics.

## DISCUSSION

The findings of the study revealed that the face-to-face method had a positive effect on students' engagement in mathematics than the Google classroom. However, the effect was small and not significant. This means that the face-to-face method is better in engaging the students in mathematics activities than the Google classroom. The above findings are in line with previous findings by Cacace (2019) who indicated that students were not very passionate about using Google Classroom to complete assignments but preferred it for keeping track of assignments. These findings may be true because in the face-to-face classroom setting, students meet one another, collaborate and share ideas while engaging in class activities. More so, the teacher has the leisure of interacting with the students direct and getting them involved actively in the teaching and learning process.

Findings of the study also revealed that the google classroom had a significant positive effect on students' achievement in mathematics, thus impling that students' achievement in mathematics would improve if taught using google classroom. The above findings corroborate previous findings by Oyarinde and Komolafe (2020) and Sri Sasmita, et, al. (2021) who in their separate studies revealed that the Google classroom platform positively affected students' academic achievement, attitudes and their perception during the pandemic in Nigeria's secondary school. The above findings are true because young students enjoy teaching platforms that are technologically driven. Therefore, the use of google classroom may be captivating and interesting to the students who may enjoy the lesson because of its technological nature. By being interested, students may become more actively engross in the teaching and learning of mathematics. This may help in their retention of concepts taught and which would culminate to an improvement in their achievement.

## Recommendations

Based on the findings of the study, the researchers recommended that;

- (i) Google classroom should be used in teaching mathematics in schools
- (ii) Government should provide facilities in public schools that enhance the use of google classrooms in teaching.

## Conclusion

There is always the need to find alternative teaching methods that could be used for teaching and learning in times of economic meltdowns. Based on this, the present study investigated the effect of google classroom on secondary school students' engagement and achievement in mathematics. Based on the findings of the study, it was concluded that the face-to-face method is more effective in enhancing students' engagement than the google classroom. It was further concluded that the google classroom has a significant positive effect on students' achievement in mathematics. The findings provided information on the effectiveness on google classroom on students' achievement in mathematics.

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