



## GOOGLE CLASSROOM AIDED INSTRUCTION ON STUDENT TEACHERS' MATHEMATICS ACHIEVEMENT IN OWERRI, NIGERIA

Uzoma Alwell\*, Joy Ijeoma Uwakwe, Iheanacho Chukwudi Ike, Isaac Adekunle Ogunleke

Alvan Ikoku University of Education, Owerri, Nigeria  
Email: uzoma.alwell@alvanikoku.edu.ng

### Abstract

The study investigated the effect of Google Classroom aided instruction on students' achievement on Mathematics Courses of 2019-2021 academic sessions in Alvan Ikoku University of Education, Owerri. Guided with three research questions and three null hypotheses to establish significant difference in the mathematics achievement scores of students with Google Classroom aided instruction compared with those taught without the platform. Quasi-experimental design of non-randomised control group design was adopted. The population of the study comprises of all students of the university, offering Mathematics courses in Department of Mathematics with a population size of 331 students with a sample of 127 students. The instrument for data collection were moderated examination question papers and course lecturer made test questions. Data collected were analysed using mean, standard deviation and *t*-test of equality of mean. Major results showed that male students achieved significantly than the female students in the mathematics courses, students taught without the aid of Google classroom platform achieved significantly than those in the Google classroom aided instruction class. Also, the use of Google classroom aided instruction does not result to gender disparity in Mathematics achievement. Hence, it was recommended for further research on factors affecting effective utilization of Google classroom and remedies.

**Keywords:** Achievement, Classroom, Google, Instruction, Mathematics.

### Abstrak

Penelitian ini menyelidiki pengaruh pengajaran berbantu Google Classroom terhadap capaian siswa dalam mata pelajaran matematika pada sesi akademik 2019-2021 di Alvan Ikoku University of Education, Owerri. Dipandu dengan tiga pertanyaan penelitian dan tiga hipotesis nol untuk menetapkan perbedaan signifikan dalam skor capaian matematika siswa dengan pengajaran berbantu Google Classroom dibandingkan dengan yang diajarkan tanpa platform tersebut. Desain quasi-eksperimental dari desain kelompok kontrol non-random dipilih. Populasi penelitian melibatkan semua mahasiswa universitas yang mengambil mata pelajaran Matematika di Departemen Matematika sebanyak 331 mahasiswa dan sampel sebanyak 127 mahasiswa. Instrumen untuk pengumpulan data adalah kumpulan soal ujian yang dimoderasi dan pertanyaan ujian yang dibuat oleh dosen mata pelajaran. Data yang dikumpulkan dianalisis menggunakan mean, deviasi standar, dan uji-t untuk kesetaraan ratan. Hasil utama menunjukkan bahwa mahasiswa pria mencapai prestasi yang signifikan dibandingkan mahasiswa perempuan dalam mata pelajaran matematika, mahasiswa yang diajarkan tanpa bantuan platform Google Classroom mencapai prestasi yang signifikan dibandingkan dengan mereka yang diajarkan dengan bantuan Google Classroom. Selain itu, penggunaan pengajaran berbantu Google Classroom tidak menghasilkan disparitas gender dalam capaian matematika. Oleh karena itu, disarankan untuk melakukan penelitian lebih lanjut tentang faktor-faktor yang mempengaruhi pemanfaatan efektif Google Classroom dan solusinya.

**Kata kunci:** Capaian, Kelas, Google, Matematika, Pengajaran.

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## **INTRODUCTION**

In line with sustainable Developmental Goals (SDGs) number 4 geared towards providing quality education, teaching and learning of Mathematics from basic to tertiary education is to be given high premium. Mathematics and its applications are found virtually in all areas of man's endeavour. It is important in science and technology, displayed in different forms including computational application in business, programming, artificial intelligence, manufacturing, food production, ecosystem, prediction of diseases such as Ebola, COVID-19, diabetes, cholera, malaria, HIV/AIDS etc. Through modelling for controls, treatment and management (Alwell et al., 2022).

The weakness displayed by students in Mathematics topics and resultant poor performance in the core subject has remain topic of interest to Mathematics and Science educators in the last two decades in Nigeria. This below expectation performance of course is in spite of the various improved instructional materials and strategies well advocated of. Also, the Chief examiners report (WAEC, 2022) highlighted students' weakness in 2020 (COVID-19 social restriction affected academic year that called for online teaching and learning) West Africa Senior School Certificate Examination (WASSCE) to include: graphs, trigonometry, premature approximations, skipping of vital steps because of over dependent on the use of calculator, construction and circle Geometry. In remedies to students' weakness, the chief suggested teacher's improvement on use of appropriate instructional materials and teaching methods/strategies. Improving teaching and learning of Mathematics from basic education to tertiary education in teacher training programmes calls for the interest to use possible ways to improve teaching and learning.

There have been several advocates for use of innovative teaching methods, skills, strategies and appropriate instructional materials to enhance teaching and learning. To deplore any teaching strategy to ensure effective teaching, it is pertinent to establish the effective use of such strategy. Among the strategies advocated, computer aided instruction was seen among the most useful amidst of COVID-19 that created anxiety, economic hardship, lockdown, restriction of movements and social gathering to prevent and control of the pandemic. Many online communication platforms where in use of which WhatsApp, telegram, twitter, zoom, Google meet, Google classroom where among the well pronounced. For teaching and learning, Google classroom was used by schools

based on its perceived advantages over other platforms. The AIUE, Owerri Imo state previously an affiliate of University of Nigeria, Nsukka (UNN) as a college of Education queued into the online teaching and learning in line with Nigeria Federal Ministry of Education directive to keep teaching ongoing amidst of social gathering restrictions. Using Google Classroom platform as the main teaching platform. Sequel to the lockdown experiences amidst COVID-19 and use of Google classroom platform on teaching and learning of Mathematics courses, this study is on the effect of Google classroom aided instruction on AIUE, Owerri students' achievement in Mathematics Courses.

Sustainable Developmental Goals (SDGs) number five is to enforce and ensure gender equality by 2030 (United Nations, 2023). Which is in support of gender-friendly approach to teaching by Gender Schema Theory (Bem, 1981). This makes it necessary to ensure that teaching methods and strategies for teaching core subjects should not lead to gender disparity. Also, gender remains a social issue in teaching so, gender interaction with this skill is of concern since Alwell et al. (2018) as well Ogunleke et al. (2017) in findings on different teaching skills stated that poor performance of students in Mathematics is attributed to method and skills of teaching used by Mathematics teachers rather than learner's gender. To establish gender equality in the use of this strategy, it calls to establish gender equality in mathematics achievement of the groups. Sequel to these, what could be the effect of the use of Google Classroom aided instruction on students' achievement in Mathematics?

Google Classroom is an online education platform, has been described a user-friendly educational application that enables online teaching and learning (Abidin & Saputro, 2020). The features of the classroom include; provision for teachers to create classes, assign works to learners, grade learners work, provide feedback, and teachers access to learners works in real-time. The advantages of the platform over other social platforms include; opportunity to assign work to students either as a group or individually, provides the teacher with the opportunity to grading students work, set duration for learners to return work and quick feedback opportunity. It is ideal for team teaching strategy and enables cooperative learning in classroom. Also, the platform allows for asynchronization of teaching and learning, organizes and keep records of works and other class activities in cloud-base Google services, enables teaching activities to be paperless and is ad-free. Also, there has been advocacy for technology-based learning and

mathematics teachers can use the platform virtually to provide online interactions, control learners, create and compile worksheets and enhance learning and collaboration (Sapp et al., 2020).

On the use of the platform in teaching Mathematics, Abidin and Saputro (2020) studied Google classroom as a Mathematics learning space: potentials and challenges. The result stated that Google Classroom platform has high possibility to support expected learning outcome. It further stated that the learner's accessibility of the instructor's provided learning materials can occur anytime irrespective of location. Problems associated to the use of the platform mentioned are access to devices, technical issues and students' ability to use Google Classroom's features.

Also, Okeke et al. (2022) investigated the expected outcome of Google classroom on post primary school learners' achievement in mathematics. The study was guided by two posed questions and corresponding hypotheses, adopted pretest posttest non-equivalent group quasi-experimental design with a sample of 67 SS 2 students of two intact classes purposively sampled. Using Students' Learning Engagement Questionnaire and Mathematics Achievement Test Mean, standard deviation and ANCOVA was used to test the hypotheses. The study concluded that physical class had a significantly positive effect on students' engagement in Mathematics than google classroom platform though that platform had significant positive effect on students' achievement in Mathematics compared to physical class. However, this study was carried out at secondary school and did not cover gender interaction with the use of Google classroom.

Cacace (2019) with learners of special need of learning disabilities examined the effects of Google Classroom platform on the mathematics achievement. The platform was used to allocate and manage all tasks given to the learners. Homework and class work assignments were used to measure student organization while quiz and test grades were used to measure student achievement. The result reported improvement on students' organization when Google Classroom was used and student achievement did not show much improvement.

The current study differed with the existing literature because it was carried out at tertiary school level where Google classroom platform was considered for teaching due to restriction on social gathering amidst of COVID-19 lockdown.

### **Research question**

The study posed the following research questions: (RQ1) What is the mean difference between male and female students' achievement in degree Mathematics courses from 2019 to 2021 academic sessions of AIUE, Owerri?; (RQ2) What is the mean difference in achievement scores of students taught Mathematics courses with Google Classroom aided instruction and those taught without the aid of the platform?; (RQ3) What is the mean difference in the achievement scores of male and female students taught Mathematics courses with Google classroom aided instruction from 2019 to 2021 sessions?

### **Null hypothesis**

Based on the research question, at 0.05 level of significance, these null hypotheses were tested: (H1) There is no significant mean difference between the male and female students' achievement in degree Mathematics courses from 2019 to 2021 academic sessions of AIUE, Owerri; (H2) There is no significant difference in the mean achievement scores of students taught Mathematics courses with Google Classroom aided instruction and those taught without the aid of the platform from 2019 to 2021 sessions; (H3) There is no significant difference in the mean achievement scores of male and female students taught Mathematics courses with Google classroom aided instruction from 2019 to 2021 sessions in AIUE, Owerri.

### **RESEARCH METHODS**

The study is a quasi-experimental design of non-randomised control group. The population of the study comprises of all degree students of the AIUE, Owerri offering Mathematics courses in the department of Mathematics with an approximate population size of 331 students in 2019/2020 and 2020/2021 academic sessions. A sample size of 127 students who participated in MTH 122, MTH 211 and MTH 326 for the two sessions were used. The sample comprised 79 male and 48 female students. With a total of 65 students in 2019/2020 session which comprised 37 males and 25 females in the experimental group taught these courses with the Google Classroom instruction. The control group contained 62 students who were taught these courses in 2020/2021 academic session after ease of social gathering restriction and lockdown without the aid of the Google platform. The instruments for data collection were moderated essay format

examination question papers and teacher made test questions. Data collected were analysed using mean and standard deviation for research questions and the hypotheses were tested using *t*-test of equality of mean using Statistical Package for Social Sciences (SPSS 23) at confidence level of 95%.

## RESULTS AND DISCUSSION

The results of research data analysis were presented based on research question 1 (RQ1), research question 2 (RQ2), and research question 3 (RQ3) along the corresponding hypotheses.

### Research question 1

The mean and standard deviation of the scores of the sampled students were carried out in line with gender to investigate gender equality as presented on Table 1.

Table 1. Gender mean difference in students' mathematics courses from 2019 to 2021

	Gender	N	Mean	StDev	Std. Error Mean
Scores	Male	79	59.91	15.319	1.724
	Female	48	51.75	14.067	2.030
Mean Difference			8.16		

Research question one sought for the mean difference between male and female students' achievement in degree Mathematics courses in 2019-2021 academic sessions of AIUE, Owerri. The mean differences between male and female students' achievement in MTH 122, MTH 211 and MTH 326 in 2019/2020 and 2020/2021 academic session is given by Table 1, as 8.16. Which was obtained from the mean of 59.91 and 51.75 for male and female students respectively. The result indicated that the 79 male students obtained a higher mean score with a difference of 8.16 than 48 female counterparts.

Subsequently, H1 was tested at 0.05 level of significance to establish the significant of the 8.16 mean difference in Mathematics gender achievement as shown on Table 2.

Table 2. The *t*-test for equality of gender means

	<i>t</i>	<i>df</i>	<i>p</i> -value	Mean Difference	Confidence Interval
Total Scores	3.064	105.977	0.003	8.161	2.881--13.442

Table 2 indicated, the analysis results are based on the equal variances not assumed, that *p*-value=0.003 which is less than alpha level of 0.05. Hence, the null hypothesis is

rejected. This implies there is significant difference between the mean achievement of male and female students' achievement in the mathematics courses. The mean difference of 8.16 in favour of the male students implies that disparity exists in the gender achievement.

### Research question 2

The mean, standard deviation, and the resulted mean difference of the students taught with and without the aid of Google classroom platform were computed and presented on Table 3.

Table 3. Posttest mean scores of students in control and experimental groups

	Group	N	Mean	StDev	Std. Error Mean
Scores	Control	65	60.00	13.909	1.725
	Experimental	62	53.50	16.130	2.049
Mean Difference			6.50		

This research question sought the mean difference in achievement scores of students taught Mathematics courses with the aid of Google classroom platform (Experimental group) and those taught without the aid of the platform (Control Group). The result of the analysis indicated that the Control group obtained an average score of 60 in the mathematics courses, while the Experimental group obtained an average score of 53.50. This gave a slight mean difference of 6.50 in favour of the students taught without the aid of Google classroom platform. The mean score difference was further subjected to *t*-test of equality of mean.

Table 4 is the result of *t*-test for equality of means on group achievement among the Experimental and Control group to test if the mean difference 6.5 in Table 4 is significant.

Table 4. The *t*-test for equality of means on experimental and control group scores

	<i>t</i>	<i>df</i>	<i>p</i> -value	Mean Difference	Confidence Interval
Total Scores	2.427	120.459	0.017	6.500	1.197--11.803

Table 4 shows, the analysis results are based on the equal variances not assumed, that the *p*-value=0.017 while alpha ( $\alpha$ ) is 0.05, therefore *p*-value is less than the alpha ( $\alpha$ ) level. Hence, we rejected the null hypothesis (H<sub>2</sub>). There is a significant difference between the mean scores of students taught Mathematics Courses using Google classroom platform and those taught without the use of the platform at 0.05 level of significance.

This implies that at 0.05 level of significance, the experimental group achieved significantly lower than the Control group.

### Research question 3

The mean, standard deviation, and mean difference in achievement for students using the Google Classroom platform is presented in Table 5, categorized by gender.

Table 5. Mean differences between male and female students in experimental group

	Gender	N	Mean	StDev	Std. Error Mean
Google Classroom	Male	37	56.73	16.574	2.725
Student Scores	Female	25	48.72	14.470	2.894
Mean Difference			8.01		

The research question is to obtain mean difference in the achievement scores of male and female students taught Mathematics courses with Google classroom aided instruction in 2019-2021 sessions. The result of the analysis on gender in the Experimental group as shown on Table 5 indicates that the 37 male and 25 female students taught using the Google classroom aided instruction (Experimental group) have mean scores of 56.73 and 48.72 respectively. This shows that male students have an average of 8.01 scores higher than their female counterparts.

Table 6 is the result of *t*-test for equality of means on gender achievement in the Experimental group to test if the mean difference 8.01 in Table 5 is significant.

Table 6. The *t*-test on equality of means on gender difference in use of google classroom

	<i>t</i>	<i>df</i>	<i>p</i> -value	Mean Difference	Confidence Interval
Total Scores	2.015	56.048	0.049	8.010	0.047--15.972

Table 6 indicated, the analysis results are based on the equal variances not assumed, that the summary of *t*-test on Table 6 shows that *p*-value=0.049 while the result was tested at a 0.05 level of significance. Hence, we accept the null hypothesis (H<sub>3</sub>), since the *p*-value is greater than  $\alpha=0.05$ . We therefore, uphold that there is no significant difference between the mean scores of male and female students in terms of Mathematics achievement of students taught Mathematics courses in Google classroom aided instruction. This indicated that the mean difference between male and female students in the experimental group is not significant. Hence, this skill does not introduce gender disparity in student achievement.



Major results showed that male students achieved significantly than the female students in Mathematics courses when difference was conducted on the bases of gender. On the use Google classroom, students taught without the aid of Google classroom platform achieved significantly than those in the Google classroom aided instruction class. This result supported the findings of Cacace (2019) where the use of the platform did not lead to improvement for students with learning disability. As well as Okeke et al. (2022) which stated that face-to-face method had a significantly positive effect on students' engagement in Mathematics than google classroom. However, contradicted partly with the findings of Abidin and Saputro (2020) which stated that the use of platform has positive effect on Mathematics achievement.

## CONCLUSION

The male students achieved significantly than the female students. Secondly, use of Google classroom platform has significant effect on Mathematics achievement but not more effective when compared to physical classroom. On gender, the findings showed that the use of Google classroom aided instruction does not result to gender disparity in Mathematics achievement. Hence, it is recommended for further research on the causes of gender disparity in Mathematics achievement as well as factors affecting effective utilization of Google classroom platform in teaching and learning of Mathematics and possible remedies to enhance the use of the platform to improve Mathematics achievement.

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