The Effect of Google Classroom as a Learning Platform in the Performance of Students in Mathematics

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ABSTRACT

This research aimed to test the effect of Google Classroom as a learning platform on students' performance in Mathematics. A quasi-experimental study of two Grade 11 sections was conducted on functions and rational functions during a lesson. The respondents were selected through purposive sampling. The study was conducted during the first quarter of the first semester of 2021-2022. The study implemented three phases: pre-experimentation, experimentation, and post experimentation. A pre-test was given to both groups. Group A (control group) received modular instruction, while Group B (experimental group) received the treatment using Google Classroom. Afterward, a post-test was given to both groups. The data gathered were tabulated, computed, and analyzed using appropriate statistical tools, such as Mean, T-test, and ANCOVA. The pre-test results indicated that the control group had the edge over the experimental group at the start of the experiment. Results in the post-test demonstrated that the two groups performed well equally in Mathematics. However, comparing the mean gain scores between the two groups revealed that the experimental group was higher than the control group. This pointed out that using Google Classroom as a learning platform in teaching Mathematics was better than the modular way of teaching.

Keywords: google classroom, performance in mathematics, action research

INTRODUCTION

Mathematics has been viewed as an essential subject because numbers and logical reasoning are in almost all disciplines. But learning math is challenging for many people. Mathematical concepts can be abstract and difficult to visualize and sometimes can be frustrating for students to the point where they lose interest in the subject, resulting in low performance.

It can be seen in the 2019 result of the Trends in International Mathematics and Science Study (TIMSS) that Filipino students lagged other countries in the international assessment. The Philippines scored 297 in mathematics which is significantly lower than any other participating country. It is also revealed in the Program for International Student Assessment (PISA) that Filipinos fared second lowest in mathematical literacy (Philippine Daily Inquirer, 5 December 2019).

Locally, despite the continuing school efforts in enhancing performance in this learning area, the achievement rates of Tagum City National High School remain far below 75% passing rate in the National Achievement Test (NAT) in the previous years.

However, online media technology such as google classroom has been a new phenomenon to help motivate, differentiate, and allow students to achieve and excel in many ways. In the study conducted by Gunawan and Sunarman (2018), google classroom can enhance students' problem-solving skills. In contrast, technology has transformed teaching and learning dynamics over the last years. Whether integrating technology into the teaching and learning process significantly affects teaching quality and enhances learners' performance and experience, especially in this pandemic.

For these reasons, this research has been designed to examine whether google classroom would address the need to raise the interest of the students at School A, Tagum City Division in learning Mathematics since no known studies have

been conducted in recent years in the locale.

METHODS

Research Design

This study used the quasi-experimental design of Campbell and Stanley (1963) called pre-test and post-test non-equivalent control group design. This study used two intact groups–the experimental and control groups. The experimental group was taught using Google Classroom as the learning platform, while the control group was taught using a modular teaching approach.

Research Participants

The participants of the study were the Grade 11 students coming from the two sections of the K-12 Enhanced Basic Education Curriculum of School A, Tagum City Division, for the school year 2020-2021. They were selected through purposive sampling because the researcher assumes that they fit a particular profile. The control group was composed of forty-five students, while the experimental group was composed of fifty-three students.

Table 1

Distribution of the Respondents

Section	Number	Percentage
G11 - Einstein	45	45.92%
G11 - Euclid	53	54.08%
TOTAL	98	100%

Data Gathering Methods

Necessary permission was secured from the office of the principal. After the permit was granted, the researcher asked another Math teacher to conduct the study to avoid biases in the study.

Data needed for this research was gathered using researcher-made multiple types of test that consists of 30 items. Validation, reliability, and pilot testing were all done during the development of the test. Exporting, encoding, analyzing, and interpreting scores were all done. Table 2 shows the parameter that was used in identifying the level of the pretest and posttest results:

Table 2

Parameter of the Study

Range of Scores	Qualitative Rating	Remarks
25 – 30	Outstanding	Passed
20 – 24	Very Satisfactory	Passed
15 – 19	Satisfactory	Passed
10 – 14	Fair	Failed
Below 9	Poor	Failed

Data Analysis

The researcher used the Mean, T-test for correlated samples, T-test for uncorrelated samples, and ANCOVA to analyze the data.

Ethical Considerations

Permission to conduct the study in school was sought beforehand from the principal of School A, Tagum City Division. The researcher took concrete measures to ensure that respect, beneficence, and fairness are upheld according to the criteria established by the Tagum City Division Schools Division Research Committee.

During the data collection and analysis, voluntary participation, privacy and confidentiality, risk assessment and reduction, and identification of possible advantages were all used to achieve this. Other ethical concerns such as plagiarism, exaggeration, falsification, conflict of interest, deception, observation permission from an agency or site, and authorship were monitored throughout the study.

RESULTS

Level of Performance of the Students in Mathematics in the Control and Experimental Groups in Terms of Their Pre-test and Post-test Scores

Table 3.1 presents students' level of performance in Mathematics in the control group. Based on the data presented, the control group had a mean score of 10.87 and 19.51 in the pre-test and post-test, respectively, gaining a qualitative rating of fair and very satisfactory. The table also

shows that 42 students, or 93.33% in the control group, did not meet the passing score in the pre-test. However, all students or 100% in the control group passed the post-test.

Table 3.2 presents students' level of performance in Mathematics in the experimental group. Based on the data presented, the experimental group had a mean score of 9.09 and 22.72 in the pre-test and post-test, respectively, gaining a qualitative rating of fair and very satisfactory. It also shows that 51 students, or 96.23 percent, in the control group did not meet the passing score on the pre-test. However, all students in the experimental group passed the post-test, wherein 30.19% of them outstandingly passed the test.

Table 3.1

Level of Performance of Students in Mathematics in the Control Group in Their Pre-test and Post-test Scores

Range of Scores[c/]	Qualitative Rating	Frequency	Percent
Pre-test[a/]			
15 – 19	Satisfactory, Passed	3	6.67%
10 – 14	Fair, Failed	28	62.22%
< 9	Poor, Failed	14	31.11%
Post-test[b/]			
25 – 30	Outstanding, Passed	2	4.44%
20 – 24	Very Satisfactory, Passed	23	51.11%
15 – 19	Satisfactory, Passed	20	44.45%

a/ The mean was 10.87 with a qualitative rating of fair.
b/ The mean was 19.51 with a qualitative rating of very satisfactory.
c/

Table 3.2

Level of Performance of Students in Mathematics in the Experimental Group in Their Pre-test and Post-test Scores

Range of Scores[c/]	Qualitative Rating	Frequency	Percent
Pre-test[a/]			
15 – 19	Satisfactory, Passed	2	3.77%
10 – 14	Fair, Failed	23	43.40%
< 9	Poor, Failed	28	52.83%
Post-test[b/]			
25 – 30	Outstanding, Passed	16	30.19%
20 – 24	Very Satisfactory, Passed	31	58.49%
15 – 19	Satisfactory, Passed	6	11.32%

a/ The mean was 9.09 with a qualitative rating of fair.
b/ The mean was 22.72 with a qualitative rating of very satisfactory.
c/

Test on the Significant Difference Between Pre-test Mean Scores of the Students in the Experimental and the Control Group

Table 4 presents the pre-test mean scores of the students in the control group and the experimental group. The table shows that the computed value was 3.12 at a p-value of 0.002. At 0.05 level of significance, the null hypothesis is rejected. This indicated a significant difference in the pre-test mean scores obtained by the experimental and control groups. Put simply, the students in the control group have the edge over the students in the experimental group in terms of prior knowledge on some topics in Mathematics.

Table 4

T-test on the Significant Difference Between the Pre-test Mean Scores of the Students in the Experimental Group and Control Group

Group	Mean	SD	t-value	p-value	Decision
Control	10.87	2.75	3.12	0.002	Rejected
Experimental	9.09	2.84			

Test on the Significant Difference Between the Pre-test and the Post-test Scores of the Control Group

Presented in Table 5 is the t-test on the significant difference between the pre-test and post-test mean scores of the control group. The control group, exposed to a modular approach of teaching Mathematics, had a significant increase in their post-test scores, as shown in the t-test computed value of 30.751 with a p-value of 0.000 at a 0.05 level of significance. In this sense, the modular approach effectively increased students' performance in Mathematics.

Table 5

T-test on the Significant Difference Between the Pre-test and Post-test Mean Scores of the Students in the Control Group

	Mean	SD	t-value	p-value	Decision
Pre-test	10.87	2.75	30.751	0.000	Rejected
Post-test	19.51	2.78			

Test on the Significant Difference Between Post-test and Pre-test Mean Scores of the Experimental Group

Presented in Table 6 is the t-test on the significant difference between the pre-test and post-test mean scores of the experimental group in Mathematics. As shown in the table, the experimental group increased their mean scores from pretest to post-test. Using the T-test for correlated samples, the computed value of 40.853 with a p-value of 0.000 shows a significant difference in their pre-test and post-test scores. The result implies that the method of teaching using Google Classroom

helped the students improve their cognitive skills and achieve better in the post-test.

Table 6

T-test on the Significant Difference Between the Post-test and Pre-test Mean Scores of the Experimental Group

	Mean	SD	t-value	p-value	Decision
Pre-test	9.09	2.84	40.853	0.000	Rejected
Post-test	22.72	2.57			

Test on the Significant Difference Between the Mean Gain Scores of the Experimental and Control Group

The presentation of data in Table 7 proves that the teacher raised the low performance of students during the pre-test to significant results during the post-test, as shown by their mean gain scores. The computed F-value of 107.303 at 0.000 p-value determines a significant difference in the mean gain scores of the students between the experimental and the control group in Mathematics. This result shows that the Google Classroom instruction was more effective than the modular method, as shown in the mean gain scores.

Table 7

Test on the Significant Difference of the Mean Gain Scores of the Experimental and Control Group

Group	Pre-Test Mean Score	Posttest Mean Score	Mean Gain Score	F-Value (ANCOVA)	p-value	Decision
Control	10.87	19.51	8. 64	107.303	0.000	Rejected
Experimental	9.09	22.72	13.63			

DISCUSSION

Level of Performance of the Students in Mathematics in the Control and Experimental Groups in Terms of Their Pre-test and Post-test Scores

The respondents exhibited fairly in the pre-test. It can be concluded that the students from the experimental and control groups had a slight background of the course at the start of the experiment. This can be linked to the students' exposure to grade 10 math in the spiral setting of the curriculum, where all learners, regardless of their groupings, had the same learning experience.

On the other hand, the respondents displayed very satisfactorily in the post-test. Although students from both groups passed the test, it was evident that the students in the experimental group performed better than the students in the control group. This can be attributed to the exposure of these students to the intervention. In the study conducted by Azisah et al. (2020), students' learning is significantly impacted by technology. It can sustain fundamental changes. Technology adoption is essential, especially for improving student performance. Multiple studies show that using an e-learning platform in the classroom to engage with students in math provides opportunities for students to gain access to and understand different demonstrations of mathematical concepts (Forster, 2006, as cited in Msomi & Bansilal, 2018).

Test on the Significant Difference Between Pre-test Mean Scores of the Students in the Experimental and the Control Group

The null hypothesis that “there is no significant difference in the pretest mean scores between the experimental and control groups” was rejected since the computed t-value was greater than the p-value. This result implied that at the start of the experiment, the students in the control group had the edge over the students in the experimental group in terms of prior knowledge of some Mathematics topics. This can be associated with the way the respondents were selected.

According to Dudovskiy (2021), purposive sampling, also known as judgment sampling, can be unfavorable to a study. He pointed out that this kind of sampling is vulnerable to errors in judgment by researchers, leading to a low level of reliability and inability to generalize research findings.

Test on the Significant Difference Between the Pre-test and the Post-test Scores of the Control Group

The t-test on the significant difference in the pre-test and post-test mean scores of the control group in Mathematics showed that the computed t-value was greater than the tabular p-value.

The null hypothesis "there is no significant difference between the pre-test and the post-test score of the control group" was rejected. The control group did show significant changes in their scores from their pre-test and post-test results. This outcome indicated that the modular approach had impacted the students' performance in Mathematics.

According to the study by Dangle and Sumaoang (2020), the usage of modules fosters self-directed learning. One of the advantages of employing modules for instruction is that pupils develop greater self-study or learning skills. Students actively participate in understanding the concepts provided in the module.

Test on the Significant Difference Between Post-test and Pre-test Mean Scores of the Experimental Group

The t-test for correlated samples determined the significant difference in the pre-test and the post-test mean scores of the students within the experimental group in Mathematics. The computed t-value was greater than the p-value. This result showed a significant difference in the pre-test and post-test scores of the students in the experimental group. The results also implied that instruction using Google Classroom has helped the students improve their cognitive skills because they achieved better in the post-test.

According to Anshari et al. (2017), Google classroom can be a means that makes learners become more active participants.

Test on the Significant Difference Between the Mean Gain Scores of the Experimental and Control Group

The mean gain scores of the students in the experimental group in Mathematics were higher than the control group. The null hypothesis "there is no significant difference in the mean gain scores between the experimental and control group" was rejected since the computed F-value was larger at a specific p-value. The result implied that the performance shown by the students in different groups increased distinctively. It can also be deduced that Google Classroom instruction provided benefits such as students being motivated to learn because Google Classroom has several features that make learning more enjoyable and engaging. It also allows\ed students to learn at their own pace because they can access Google Classroom from anywhere and at any time.

In the study conducted by Bray and Tangney (2017), digital tools can enhance students' mathematical learning experiences. It has been studied that, when combined with an effective pedagogy, these digital resources can potentially solve some of the problems commonly associated with mathematics education by facilitating practical, problem-solving, and collaborative approaches to teaching and learning, thereby providing coherency, and meaning for mathematics. (Hoyles, 2016).

Conclusion

Based on the results and findings, the researcher has made the conclusions for consideration.

The respondents exhibited fairly in the pre-test and very satisfactorily in the post-test. There is a significant difference in the pre-test scores between the experimental and control groups. There is a significant difference in the pre-test and post-test scores of the students in the control group. There is a significant difference in the pre-test and post-test scores of the students in the experimental group. There is a significant difference between the mean gain scores of the experimental group and the control group.

In the light of the results of the data analysis, it is concluded that the use of Google Classroom in teaching Mathematics is more effective in enhancing the performance of the students than the modular method of teaching based on the difference of the mean gain scores of the students under the experimental and control groups. Also, students who were taught using Google Classroom performed better in Mathematics, as reflected in the test result on the significant difference of the mean gain scores of the experimental and control groups.

Reflection

This study conducted on the effect of Google Classroom as a learning platform

in teaching Mathematics has demonstrated a positive impact on students' performance in learning Mathematics. The researcher suggests that teachers use Google Classroom to encourage students to learn. In addition, the researcher recommends that school administrators advise the IT experts in the school to educate some teachers in the field on how to utilize Google Classroom in the teaching-learning process.

Finally, the researcher recommended conducting an in-depth qualitative phase to explore the students' perceptions and views regarding their exposure to Google Classroom. This is to ensure how beneficial the platform is in learning Mathematics; further study is recommended using a larger population to confirm the findings and establish the study's external validity.

REFERENCES

Anshari, A. et al. (2017). *Education and Information Technologies* Volume **22**, pages3063 –3079(2017. Retrieved April 14, 2021, https://link.springer.com/article/10.1007/s10639-017-9572-7

.Azisah, S. et al. (2020). Students' response on the application of google classroom in the English education department at uin Alauddin Makassar. Proceeding of the 2nd International Conference on English Language Education. http://iconelepbi.uinalauddin.ac.id/index.php/iconele02/proceeding02/paper/viewFile/187/112

Bray, A., & Tangney, B. (2017). Technology usage in mathematics education research - A systematic review of recent trends. Computers & Education,114,255–273. https://dl.acm.org/doi/abs/10.1016/j.compedu.2017.07.004

Dangle, Y., & Sumaoang, J. (2020). The Implementation of Modular Distance Learning in the Philippine Secondary Public Schools. https://www.dpublication.com/wp-content/uploads/2020/11/27-427.pdf

Dudovskiy, J. (2021), Business Research Methodology. https://research-methodology.net/sampling-in-primary-data-collection/purposive-sampling/

Gunarman, A., et al. (2019). The effectiveness of google classroom as an instructional media: a case of state Islamic institute of kendari, Indonesia. https://www.researchgate.net/publication/333916331

Hoyles, C. (2016). Engaging with Mathematics in the Digital Age Cuadernos de Investigación y Formación en Educación Matemática 15: Trabajos de la XIV CIAEM (pp. 225-236). Costa Rica: Universidad di Costa Rica. https://revistas.ucr.ac.cr/index.php/cifem/article/view/23884

Msomi, A. M., & Bansilal, S. (2018). The experiences of first-year students in mathematics in using an e-learning platform at a university of technology. *South African Journal of Higher*