IMPACT OF RESEARCHER-DEVELOPED YOUTUBE TUTORIALS UTILIZING THE 5C'S LEARNING STRATEGY ON STUDENTS' MATHEMATICS PERFORMANCE

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ABSTRACT: *The purpose of this study is to determine whether the Researcher-Developed YouTube Tutorial as learning support enhanced the math performance of the BSEd Mathematics I students in Bohol Island State University-Main Campus (BISU-MC) for the Academic Year 2022-2023. Specifically, it aimed to determine the difference between the pretest and posttest performance of the controlled and experimental group. This study used both the descriptive survey research design to assess the acceptability level of the researcher-developed YouTube tutorial as teaching material and the quasi-experimental design (pretest-posttest design), to determine the researcher-developed YouTube tutorial's effects on students' Mathematics performance. Two questionnaires were used, the Assessment of Researcher-developed YouTube Material (ARYM) and Mathematics Performance Test (MPT), which were validated thru pilot testing and employing Cronbach Alpha Analysis and Krippendorf Alpha Analysis, respectively. This study had the BSEd Mathematics I-1 and I-2 students of BISU-MC as respondents, classified as controlled and experimental group, respectively, and formed 20 pairs through the obtained scores during the pretest. The result revealed that there was a significant difference between the posttest performance of the students exposed to the different learning support. Furthermore, the controlled group described the material strongly agree, interpreted as 100% acceptable. In addition, the researcher-developed YouTube tutorial is a good learning support.*

Keywords: mathematics performance, YouTube tutorials, learning support, researcher developed

1.0 INTRODUCTION

World situation in terms of Mathematics' performance is a significant concern in the educational system. Various efforts have been exerted among researchers to know how to address this concern. According to the Program for International Student Assessment, math proficiency among US students dropped again in 2015 for the second time on an important international benchmark (PISA) [1].

In Asia, mathematics is one of the disciplines that is most important, and students are encouraged to study the subject [2]. Moreover, problems related to Mathematics achievement are still evident not only in the Philippine setting but also in other countries [3]. The Filipino students perform well in subjects demanding higher-order cognitive skills, but they perform much worse overall [4]. Even in college, there are still issues with learning and comprehending mathematics [5]. Some articles and papers presented lists of general teaching techniques, while others described content-specific applications of YouTube in the classroom [6]. The empirical studies about YouTube have garnered more attention on topics like politics, information quality, technical attributes of YouTube but not on specific academic fields like its integration on Mathematics education [6].

In order to make online learning effective for students, structured efforts are required to use a range of engagement methods and collaboration tools [7]. Hence, this study determines the assessment of the Mathematics experts and Information technology exerts to the researcher-developed YouTube tutorial as learning support. The learning support is accessible to anyone, anytime and anywhere. The management of the lessons in the researcher-developed YouTube tutorial follows a teaching strategy generated by the researchers which they refer to as the 5C's Learning Strategy.

The 5C learning strategy starts with **commencement** where demonstrator introduced himself with the topic and learning objectives. **Compliance** follows where the demonstrator gave a set of slides where it presented different types of motivational activities related to the lesson. Right after is **conferral** where the exposure of virtual discussion to the viewers take place; they were rewarded with explanations as concept tutorial, supplementary, and enhancement examples of the given topic. Next is c**omputation** where the demonstrator presented a set of computational activity; this served as the viewers' self-inspection if they understood the presented topic. Last is **comment**, since the researchers used the YouTube platform, this served as an opportunity for a researcher-respondent interaction. This is the part where respondents shared their reflections of the lesson learned.

2.0 METHODOLOGY

2.1 Research Design

This study employed both descriptive survey research design and quasi-experimental design. A survey was used to assess the acceptability level of the researcher-developed YouTube tutorial as a teaching material. Moreover, a quasi-experimental design, specifically a pretest-posttest control group design, was used to determine the researcher-developed YouTube tutorials' effect on students' Mathematics performance.

2.2 Research Respondents

The research respondents were 40 BSEd Mathematics I students of Bohol Island State University-Main Campus students during the Academic Year 2022- 2023. They were selected through simple random sampling. Two sections were selected as respondents for this study; twenty (20) BSEd Mathematics I-1 had the modular learning (control group), while twenty (20) BSEd Mathematics I-2 had the researcher-developed YouTube tutorial (experimental group). Each participant was paired with one from the separate group with the same level of knowledge using the results from the pretest of both groups.

2.3 Research Instruments

The study utilized two sets of researchers' formulated questionnaires. The first questionnaire is the Assessment of Researcher-developed YouTube Material (ARYM) which served as a satisfactory survey for the experimental group and this was validated through pilot testing and has an alpha = 0.95, which means higher reliability. The other questionnaire is the Mathematics Performance Test (MPT) which served as a pretest-posttest questionnaire of the both group of respondents. A test-retest approach was carried out to determine the reliability of the research instrument. Kuder-Richardson 20 test analysis was employed and obtained alpha = 0.8193, a higher level of reliability.

2.4 Data Gathering Procedure

The researchers secured a permission from the Dean of the College of Teacher Education. The researchers then handed out the approved letter to the respondents. The researchers gave pretest (MPT) to both group of respondents and made an exact pairing through their pretest scores. Materials were exposed to the respondents after pairing, the RDYT to the experimental group and traditional printed handouts to the controlled group. Posttest was done to the both group of respondents after the exposure. Lastly, the ARYM was given to the experimental group to assess the RDYT.

3.0 RESULTS AND DISCUSSION

Table 1. Pretest Performance of Both Groups in Special Products and Multiplying Polynomials

Range	Interpretation	Control		Experimental	
		Frequency	%	Frequency	%
21-25	Excellent	0	0	0	0
16-20	Proficient	9	45	9	45
11-15	Approaching Proficiency	8	40	8	40
6-10	Developing	2	10	2	10
0-5	Beginning	1	5	1	5
Average Score		14.5		14.5	
Description		**APPROACHING PROFICIENCY**		**APPROACHING PROFICIENCY**	

Table 1 shows the pretest performance BSEd Mathematics 1-1 (control group) and BSEd Mathematics 1-2 (experimental group) before their exposure to the treatment.

Since the researchers did an exact pairing for both groups of respondents, there is no difference between their average scores. Both groups achieved an average score of 14.5 described as "Approaching Proficiency". This is a guarantee that, before the actual application of the treatment, the two groups have similar levels of background knowledge about the subject. This supports the claim of [8] that test-takers with the same prior knowledge end up with the same scores when they based their answers to knowledge and not on penalizing errors.

Figure 1 and Figure 2 show each student's answer in the controlled and experimental group, respectively. It can be observed that both respondents were not able to get the correct answer.

Only one student per group of respondents was labeled as "Beginning" while two were "Developing". In addition, the students' performance is supported by Thorndike's Law of Recency which states that things learned last will be best remembered. Since virtual discussions were already administered to the respondents, this result is highly expected.

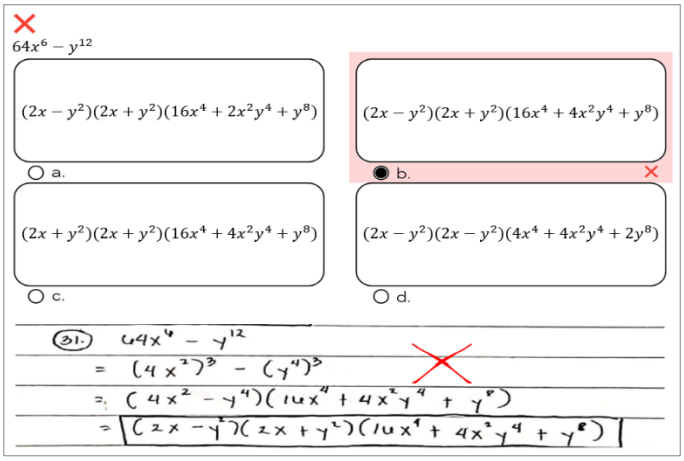

Figure 1. Sample student answer (Control Group – Pretest)

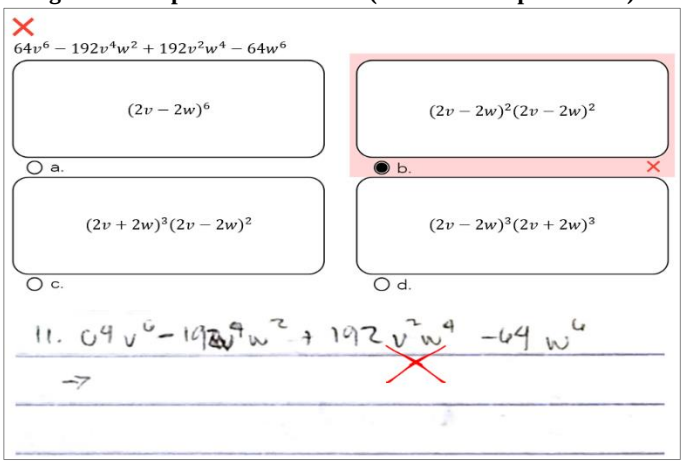

Figure 2. Sample student answer (Experimental Group – Pretest)

The study [9] where "there is no significant difference between the pretests of both groups" supports the result of the pretest.

Table 2. Posttest Performance of Both Groups in Special Products and Multiplying Polynomials

Range	Interpretation	Control		Experimental	
		Frequency	%	Frequency	%
21-25	Excellent	5	25	10	50
16-20	Proficient	7	35	9	45
11-15	Approaching Proficiency	7	35	1	5
6-10	Developing	1	5	0	0
0-5	Beginning	0	0	0	0
Average Score		17.25		19.85	
Description		**PROFICIENT**		**PROFICIENT**	

Table 2 shows the posttest performance of both the controlled and experimental groups in special products and multiplying polynomials. As reflected in the table, 25% of the controlled group had an excellent performance with scores ranging from 21-25, while in the experimental group, 50% performed excellently. In addition, 5% of the controlled group performed in the developing stage, while 0% of the experimental group. This means that the experimental group which was exposed to the treatment that was the researcher-developed YouTube tutorial as learning support performed much better with an average score of 19.85 than the

controlled group which was only given a learning module with an average score of 17.25. Moreover, there is a noticeable increase of 2.75 and 5.35 to the test score of controlled and experimental group, respectively. As such, it also implies that Researcher-developed YouTube tutorials are good indicator to support and enhance students' mathematics performance.

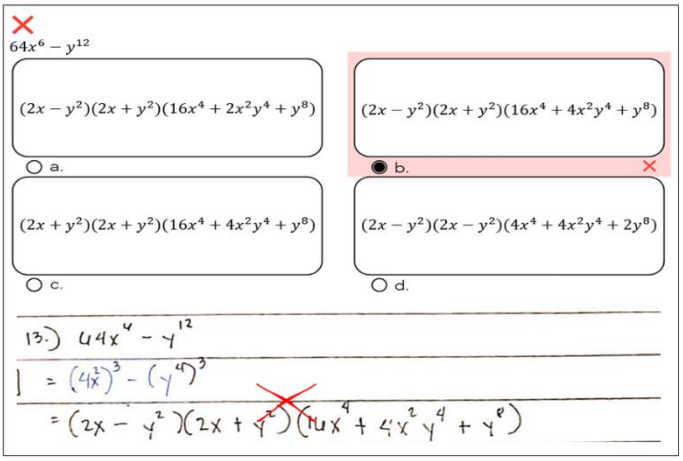

Figure 3. Sample student answer (Control Group – Posttest)

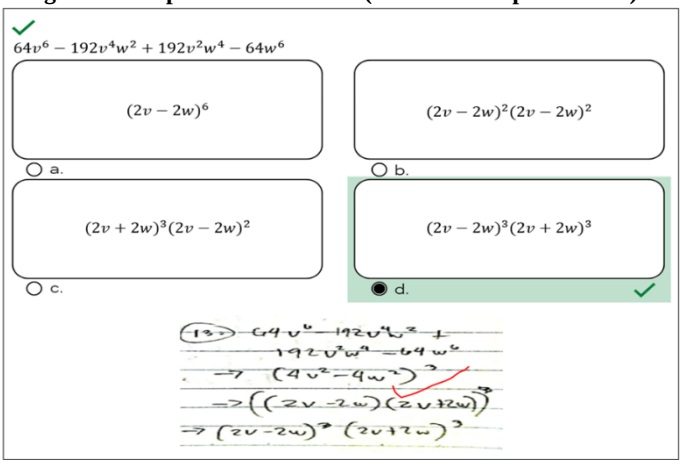

Figure 4. Sample student answer (Experimental Group – Posttest)

Figure 3 and 4 show the answer of each student in the posttest of the controlled group and experimental group, respectively. It can be observed that both were able to provide solutions for the given problem yet the respondent under experimental group was able to arrive at the correct answer. This adapts the increase of scores in the posttest of both groups with experimental group having the edge.

The posttest results of the researcher-developed YouTube tutorials in controlled and experimental are quite similar to the study of [10], students who were taught with instructional materials fared much better than students who were not, and using these materials improved students' grasp of ideas that led to high academic accomplishment. In addition, [11] stated that all learning materials such as this YouTube tutorials can help learners attain greater success by facilitating and supporting learning.

Table 3. Difference in Student's Mathematics Performance as Influenced by Different Learning Supports

Source	Adj Sum of Squares	df	Mean Square	F	P-value
Treatment (Learning Supports)	67.60	1	67.60	8.91	0.005
Error Within	280.80	37	7.59		
Total	348.80	38			

significant at 0.05

Table 3 shows the result of the analysis of covariance of pretest and posttest scores in Mathematics test. The analysis yielded a computed probability value of 0.005, which is lesser than a 0.05 level of significance. This leads to the rejection of null hypothesis. It can be concluded, therefore, that there is a significant difference between the Mathematics performance of the controlled group and the experimental group after the treatment. The data indicate that the mean scores in the experimental group are undeniably higher than the controlled group's mean scores. The integrated 5C teaching strategy to the YouTube tutorial has caused a significant increase to the Mathematics performance of the experimental group. This finding supports [12] and [13]. The significant difference between the Mathematics performance of the controlled group and the experimental group is concordant with the [9]. It only shows that the use of the Researcher-Developed YouTube Tutorial as Learning Support had achieved better improvement in students' math performance.

To support the enhancement of students' mathematics performance, the treatment follows a set of teaching strategies, 5Cs, imposed by the researchers. Commencement comes in the first stage where the demonstrator introduces the topic and so with the learning objectives. Right after is compliance where the viewers comply with their previous knowledge to answer the motivational activity. After the motivational stage, compliance, the demonstrator discusses the topic and provides related examples, which is conferral. For the viewers to assess whether they have fully understood the topic, computation right comes after. To complete the virtual classroom set-up, the interaction between the viewers and the researchers is done in the comment stage.

Table 4. Assessment of Respondents to the Researcher-Developed YouTube Tutorial

Statement	Mean	Description
1. Something in the beginning drew my attention.	3.25	Agree
2. I felt a sense of accomplishment after completing the exercises.	3.45	Strongly Agree
3. The demonstrator is highly skilled at explaining the topic.	3.45	Strongly Agree
4. The content of the material is relevant to my interests.	3.45	Strongly Agree
5. The variety of passages, exercises, illustrations, etc. helped keep my attention on the system.	2.95	Agree
6. The researcher's simulated learning strategy is effective.	3.20	Agree
7. The explanations or examples helped me understand the topic.	3.30	Strongly Agree

8. The color, size, and style of the text all contributed to keeping my attention.	2.85	Agree
9. The assessment is related to the presented topic.	3.60	Strongly Agree
10. The video is accessible to everyone.	3.60	Strongly Agree
SECTION MEAN	**3.31**	**Strongly Agree**

As shown in Table 4, the respondents exposed to the Researcher-Developed YouTube Tutorial assessed it with an overall mean of 3.31, described as strongly agree and interpreted as 100% acceptable. Specifically, 60% of the indicators were strongly agreed while the remaining 40% were agreed. Moreover, the items "I felt a sense of accomplishment after completing the exercises", "The demonstrator is highly skilled at explaining the topic", "The content of the material is relevant to my interests", "The explanations or examples helped me understand the topic", "The assessment is related to the presented topic", and "The video is accessible to everyone" were rated "Strongly Agree" by the respondents under the experimental group. On the other hand, the respondents rated "Agree" to the statements "Something in the beginning drew my attention", "The variety of passages, exercises, illustrations, etc. helped keep my attention on the system", "The researcher's simulated learning strategy is effective". Furthermore, the data also present that the content of the Researcher-Developed YouTube Tutorial is relevant to the interests of the viewers.

Moreover, table item 8 "The color, size, and style of the text all contributed to keeping my attention" were agreed by the respondents exposed to the material. This means that they were able to become fully attentive to the lesson due to contribution of text display on screens (See link: https://youtu.be/EmfABDOPztg). Correspondingly, the assessment is aligned with the topic demonstrated in the material (See Appendix C – 4). Furthermore, the video is also accessible to everyone (See link: https://youtu.be/EmfABDOPztg). The results revealed that the Researcher-Developed YouTube Tutorial is a good learning support for the improvement of students' Mathematics performance.

4.0 CONCLUSION

The researchers deduced that the Researcher-Developed YouTube tutorial is 100% acceptable by the exposed respondents. Thus, this also helps improved students' Mathematics performance. Hence, this tool can be used as a learning support to improve students' learning processes, widen their learning spectrum, and improve their performance in math, teachers may use researcher-developed YouTube tutorials as an alternative learning support. Moreover, this study can also be a reference for future researchers who will conduct similar studies to verify the study's findings.

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