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Blended Whiteboard Enhancement Activities as an Innovation to Improve Learners' Operational Problem Skills in Integers

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Abstract*: The effectiveness of blended whiteboard enhancement activities as an innovative method to develop learners' operational problem skills as an instructional material for grade 7 students was investigated in this study. This study evaluated the learners' operational skills in integers in terms of addition, subtraction, multiplication, division, and positive and negative numbers, as well as their attitude toward integers after using a blended whiteboard activity enhancement application. The study used a one-group pretest-posttest research design to see if the blended whiteboard enhancement activities helped improve learners' operational problem skills. It was done with grade 7 students for their improvement in operational skills including operational integers. The Department of Education's Curriculum Guide required the use of a table of specifications (TOS) to ensure its reliability and validity. The findings revealed that the learners showed closely towards excellent as exposed to blended whiteboard activities enhance positive effect on operational skills on the learners the significantly higher mean in the posttest compared to the pretest indicates that the blended whiteboard activity enhancement application strategy was effective in teaching operational problem skills in integers. The Department of Education's Curriculum Guide required the use of a table of specifications (TOS) to ensure its reliability and validity. The results revealed that whenever learners were exposed to blended whiteboard activities, they improved their operational skills significantly. The significantly higher mean in the posttest compared to the pretest indicates that the blended whiteboard activity enhancement application strategy was effective in teaching operational problem skills in integers. Finally, the results of this study will benefit Math teachers by providing evidence on the efficiency of employing the Whiteboard enhancement application as an innovation in teaching integers to grade 7 learners.*

Keywords: blended learning, whiteboard application, innovation

1. INTRODUCTION

Whiteboard app is used as a shared visual workspace where learners are allowed to collaborate in real-time from anywhere. It's a virtual whiteboard where learners can jot down observations, ideas, and suggestions that are relevant for them. Learners can visualize thoughts with their co-learners as part of creative and collaborative learning. The blended whiteboard app gives access to online and offline learners.

Blended learning approaches using whiteboard apps can be effective and valuable strategies that benefit learners and teachers. It provides a safer learning environment by having learners accomplish much of their work at home. Increases student engagement, studies have shown that blended learning raises the participation of learners by providing different opportunities for student engagement using digital engagement such as whiteboard applications. When it comes to keeping learners engaged and interested in learning, variety in delivery and reinforcement of course material is the key. Through digital learning such as whiteboard apps and engagement materials, educators can create a more fun and captivating learning environment for learners.

Flipping classrooms improves comprehension, when learners are more engaged in the class session, their comprehension naturally develops. Learners also have more autonomy over their learning. In blended learning, learners can partake in the online portion of the class and look through class materials wherever they have internet accessibility, allowing them to take time with their studies.

It gives efficient use of instructors' time, the use of technology in blended learning, many of those tasks can be automated, allowing educators to spend more time to assist and facilitate learners comprehend materials and enhance their skills and potential, to create more bandwidth to prepare strong lessons. This also helps to gather learner data for better insights, with the use of digital materials to collect data such as comprehension, engagement, and attendance administrators can examine trends and use their findings to help learners succeed. Blended learning allows access and enrollment of more learners, Prospective learners interested in enrolling will seek programs with flexibility, schools that can offer blended learning are a way to captivate a wider variety of learners.

In the Philippines' Educational Curriculum system, a basic understanding of whole numbers and Integers using number lines were introduced as early as their Elementary days. More complex concepts involving the negative sign and the rules of Integers were introduced in their 7th grade in school. However, research showing a significant number of learners in higher education who still have difficulty grasping the concept of Integers has become alarming. According to research done by M. Khalid and Embong (2016), most learners who had trouble solving Integer problems lacked

knowledge, could not assimilate the concept of Integers, have superficial understanding, and get confused by the rules resulting in learners mixing them up.

Even great Mathematicians have certain fields in mathematics that they are not very comfortable with. Newton could have hated Algebra for all we know, but we do not know that. However, what we could take from that statement, although groundless, is that learners have weaknesses, and it could be a thing or two or more, but we should never be ashamed of it and instead find alternative ways to learn better if not best. With the fast-paced progression of our technology-based lifestyle due to restrictions implemented to counter Covid-19, there are many applications made available now to create a simple, inventive, and interactive display or presentation that could help teachers present their lessons that learners could access through their technologies in a way that would help them understand better.

Currently, grade 7 students are having difficulty coping with their math lessons due to the epidemic. Learners face struggles with the concept of integers. The goal of this study is to gain a better understanding of the nature of integers in a blended learning setting using a whiteboard application as teaching material. The general purpose of this study is to improve the performance of grade 7 students in both online and offline modes in understanding their topics, specifically like integers. Also, to assess the efficacy of employing a whiteboard application as a teaching tool.

The researcher aims to provide further studies about how blended whiteboard enhanced activities could improve learners' operational problem skills in Integers.

Action Research Questions

This study determines the Blended Whiteboard activities as an innovation to improve learners' operational problem skills in integers among Grade 7 learners.

Specifically, this research tries to answer the following question.

1.What is the level of learner's operational skills about integers in terms of;

1.1 Addition
1.2 Subtraction
1.3 Multiplication
1.4 Divisions
1.5 Positive and Negative numbers

2.What are the attitudes of learners towards integers as exposed to Blended Whiteboard activities?

3. How effective is the Blended Whiteboard activities as an innovation to improve learners' operational problem skills in integers among Grade 7 learners as revealed by their pretest and posttest mean scores?

4. Is there a significant difference between the pretest and posttest mean scores?

5. What lesson exemplar in mathematics 7 may be developed based on the findings of the study.

Methods

This study used one-group pretest-posttest research design to test the validity of the Blended whiteboard enhancement activities as an innovation to improve learners' operational problem skills in integers. The assessment of the pre-test and post-test results for previous evidence produced by the intervention will be guided by this research design. After adopting the components of cause and effect, the researcher keeps the respondents under monitoring in this design. It is the ideal way to test the theory or instructional material that is incredibly congruent to the study's concept (Samosa, 2020). The result given by this design will be accurate and specific with the help of the respected respondents of the study. This study examines the effectiveness of the Whiteboard Activity Enhancement Application as an Innovative teaching pedagogy to improve the learners' operational skills in integers by assessing the pretest and posttest results of the respondents.

The study involves one section of grade 7 learners who enrolled in the K-12 curriculum and were taught by the same teacher in the morning session in Ateneo Casa Famiglia School in the City schools division of San Jose Del Monte City, Bulacan.

A survey questionnaire was given to the selected teachers and academic coordinator to evaluate the learning materials provided by the researchers and to be used with the thirty (30) students. The LRMDS evaluation tool is used to examine the content, format, presentation, and organization of the survey questionnaire, as well as its correctness and reliability. Teachers will use the learning materials that will be used among the students to assess the operational abilities of the grade 7 students. While working on the proposed instructional material, the researcher utilized a purposive sample technique to see if the participants shared similar qualities or characteristics.

The researchers employed innovation as a technique to construct and implement the Whiteboard activity enhancement application in order to assure the continual development of innovative instructional material. The teaching material will be utilized to help students enhance their mathematical abilities.

The researcher carried out a request letter acknowledged by the academic coordinator that is submitted to the chosen school for approval and permits to conduct the study. After the informed consent form has been accepted, the researcher can now disseminate it to all of the learners' parents/guardians.

To assure that their responses will be kept confidential and used only for academic and purposes. They understand that participation in the study is completely optional, and that they can withdraw at any moment and for any reason. The study's goals were made clear to all participants.

In this study, the data will be evaluated utilizing statistical methods. The proponents will utilize the t-test standard, deviation, and mean to calculate the pretest scores for the experimental group. After the pre-test, the conciliation

was delivered to the participation group. After the intervention, a post-test was given to see if there was a significant difference between the pretest and posttest results for the participant group. Weighted average is used. The calculated critical scores and t-values, as well as the p-value and alpha level of 0.05, were statistically considered to determine the academic performance of the interviewed learners.

Results and Discussions

Table 1 level of learner's operational skills about integers in terms of;

	PRETEST		POSTTEST		
Variables	**Weighted Mean (Pretest)**	**Standard Deviation (Pretest)**	**Weighted Mean (Posttest)**	**Standard Deviation (Posttest)**	**Verbal Interpretation**
Addition	2.60	0.80	4.00	0.68	**Closely towards Excellent**
Subtraction	2.77	0.88	4.07	0.77	**Closely towards Excellent**
Multiplication	2.57	0.96	3.87	0.81	**Closely towards Excellent**
Division	2.63	0.75	3.80	0.87	**Closely towards Excellent**
Positive and Negative Numbers	2.68	0.84	3.83	0.84	**Closely towards Excellent**
Total	13.25	4.23	19.57	3.97	**Closely towards Excellent**

Note: 1.00- 1.50 Beginning, 1.51- 2.50 Developing, 2.51- 3.50 Average, 3.51- 4.50 Closely towards Excellent, 4.51- 5.00 Excellent

Table 1 shows the pretest and post-test weighted mean scores of Grade 7 learners before and after using Blended Whiteboard Enhancement Activities As An Innovation To Improve Learners' Operational Problem Skills In Integers. According to the tabulated statistics, the pre-test weighted mean was 13.25, and the post-test weighted mean was 19.57. As a result, from the pretest to the post-test, they obtained 6.32 percent of the possible percentage points. The overall data obtained 3.97 which is the learners are closely toward excellent. After using the Blended Whiteboard application in class, the learners' scores in each operational skill improved as shown in the table. Furthermore, the significantly higher mean in the posttest compared to the pretest indicates that the Blended Whiteboard Enhancement application strategy was effective in teaching Operational Problem Skills in Integers.

These findings support Allen and Seaman's (2013) claimed that today's students perform better and are more proficient in activities and exams after being instructed in a blended learning environment than in traditional classes. According to Pereira et al., (2017), blended learning has the ability to sharpen and deepen learners' knowledge and maybe one of the causes for increased student performance.

Table 2 Attitudes of learners towards integers as exposed to Blended Whiteboard activities

Variable	Mean Scores	Interpretation
Attitude	4.03	Positive Attitude

Table 2 represented the learners' attitudes toward the use of Blended Whiteboard Enhancement Activities as An Innovation to Improve Learners' Operational Problem Skills In Integers. Aside from that, the data presented in the table showed that learners ' attitudes toward learning Operational skills involving integers, based on the mean score of 4.03, it indicates that the students appreciated, acknowledged, and were successful in studying concepts through the use of Blended Whiteboard Enhancement Activities.

Similarly, online activity enhancement improved learners' interest and positive attitude (Martinblas, and Serranofernandez, 2009; Somenarain, et al., (2010); Kotzer, et al., (2012); Zakaria, and Daud, (2013). In addition, the improvement of blended online learning affects learners' attitudes toward mathematics (Aiken, 1976; Collins, 1996; Iozzi, & Osimio, 2012).

Table 3 the improvement of learners' operational problem skills in integers based on the pretest and posttest scores by using Blended Whiteboard Enhancement Activities.

Percentage mean of Pretest	Percentage mean of Posttest	Percentage Gain Scores
73. 60	86.27	12.67

Table 3 shows learners' average pretest and posttest scores before and after using the Blended Whiteboard Enhancement Activities as an Innovation to Improve Learners' Operational Problem Skills in Integers. There were 73.60 tabular scores in the pretest, and 86.27 in the posttest. This resulted in 12.67% of the possible percentage points both before and after the exam. Additionally, the Blended Whiteboard Enhancement application has a significantly higher average post-test than the pretest, indicating that it improves operational skill in integers of the learners.

In line with Tunaboylu, C. & E. Demir (2017), math teaching with an interactive whiteboard is beneficial in enhancing student achievement. Furthermore, it has been found that the students who studied in a blended learning environment performed academically better than students who studied in a traditional learning environment (Kazu, I. & Demirkol, M. (2014).

Table 4 Test of significant difference between the pretest and posttest mean result of using Blended Whiteboard Enhancement Activities as an Innovation to Improve Learners' Operational Problem Skills in Integers.

T-computed value	t-critical value	Degree of freedom	Probability Level	Decision	Verbal Interpretation
8.13	2.05	28	P<0.05	Ho is rejected	Significant

The tabulated data show that the computed t value of 8.13 is greater than the critical value of 2.05 at 28 degrees of

freedom in the.05 probability level, suggesting that the null hypothesis is rejected, and the alternative hypothesis is accepted. There is a significant difference in the learners' pretest and posttest scores as a result of being exposed to blended whiteboard enhancement activities as an innovation to improve learners' operational problem skills in integers.

These findings are consistent with past studies (Yorganci & Terzioglu, 2013; Tercan, 2012; Oztan, 2012; Kennewell & Beauchamp, 2007). Teaching and interactive enhancing activities contribute to learners' knowledge being expanded and deepened. Furthermore, it has been demonstrated that students who study in a blended learning environment achieve greater academic achievement Kazua, I. and M. Demirkolb (2014).

Conclusion

The research presentation and analysis data on the Blended Whiteboard Enhancement Activities as an Innovation to improve Learners' Operational Problem Skills in Integers in mathematical teaching draw several conclusions.

1. After using the Whiteboard Enhancement Activity, the level of learners' operational problem skills concerning integers of Grade 7 learners in solving equations involving integers was closely toward excellent. This study discovered that the Whiteboard Enhancement Activity, as an innovation, had a favorable impact on the learner's mathematics performance, as indicated by a considerably higher mean in the posttest than in the pretest.
2. The mean post-test score for the blended whiteboard application increasing Grade 7 learners' operational problem skills is significantly higher than the pre-test score, demonstrating that it has a positive effect on operational problem skills.
3. There is a significant difference as exposed to the Blended Whiteboard Enhancement Activities as an Innovation to improve Learners' Operational Problem Skills in Integers after comparing the pre-test and post-test results of the learners.
4. The learners' have closely toward excellent after utilization of Blended Whiteboard Enhancement Activities as an Innovation to improve Learners' Operational Problem Skills in Integers.

Recommendation

Based on the study's findings and conclusions, the following are suggested:

1. Additional studies need to be conducted to engage students in using the Whiteboard Application and to see what other ways teachers may use the Whiteboard Application with their students as an innovative way to answer questions about their integer-related activities.
2. Further studies are needed in order to use the Blended Whiteboard Activity Enhancer as an innovation in teaching the operational problem involving integers to a wider and larger population.
3. Further study on the same topic can be done to gain more accurate and comprehensive results that will improve education and benefit students and teachers that use such innovation.

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