

Online-Merge-Offline Jamboard Application as an Innovation in Teaching Word Problems among Grade 4 Learners

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Abstract: This study assessed the effectiveness of an online – merge – offline Jamboard application as an innovation in teaching word problems to Grade 4 learners was evaluated in this study. The research evaluates a learner's level of mathematical word problem skills in terms of understanding, devising a plan, solving a problem, and interpreting, as well as improving learners' knowledge of the online – merge – offline Jamboard application as an invention. The study employed a one-group pretest-posttest research design to test the viability of the online-merge-offline Jamboard application as an innovation in teaching word problem solving that will be utilized to Grade 4 learners for their improvement in mathematical skills. The adoption of a Table of Specification (TOS) was required by the Curriculum Guide provided by the Department of Education to ensure its reliability and validity. The findings revealed that the learners showed outstanding as exposed to online – merge – offline Jamboard application had a positive effect on teaching word problems. The significantly higher mean in the post-test than in the pretest shows that the online – merge – offline classroom strategy had a positive effect on teaching word problems among Grade 4 learners. The pretest and posttest scores of learners who were exposed to the online-merge-offline Jamboard application as an innovation in teaching word problem-solving were significantly different. Additionally, the findings of this study will benefit Math teachers by providing information on the effectiveness of using the Jamboard application as an innovation in teaching word problems to Grade 4 learners.

Keywords: innovation, Jamboard application, mathematical skill, problem-solving

Introduction

The National Council of Teachers of Mathematics (NCTM) defines mathematical skills as "the ability to explore, conjecture, and reason logically; to solve non-routine problems; to communicate about and through mathematics, and to connect ideas within mathematics and between mathematics and other intellectual activity." (Rahmawati, 2018) This is one of the abilities that learners must master after learning mathematics. This ability is very much needed by learners, related to learners' needs to solve problems they face in their daily lives and to be able to develop themselves. Understanding problems is a step that helps learners to deepen problem situations, select facts, determine relationships between facts and make formulations of problem questions. After understanding the problem, learners are directed to make a problem-solving plan. In this step, a special strategy is needed to solve the problem, namely the strategy of making diagrams/images. Strategies to make diagrams/drawings related to making sketches or drawings to make it easier for learners to understand the problem and make it easier for learners to get an overview of problem-solving.

Problem-solving is not just one of the most important components of the study of mathematics; it also permeates all aspects of life which includes the professional world. This

teaches the learners to be critical and creative thinking skills, hones organizational skills, and builds a rational thought process required for making logical decisions. Learners who are prepared in problem-solving will eventually pursue technical careers and become researchers, inventors, designers, and engineers of the future. (Christopher Masullo, 2017).

The low ability of learners of mathematical problem solving is also caused by the learning process of mathematics in the classroom which does not improve higher-order thinking skills and is less closely connected to real-life according to Shadiq and Sumarmo (in Surya, 2013). Teachers are strongly encouraged to improve problem-solving skills when teaching mathematics. (Azriati & Surya, 2017).

In solving problems, learners are expected to understand the process of solving the problem, identifying relevant and concepts, seeking generalizations, formulating a plan of completion, and organizing previously acquired skills. It will be observed that mathematical problem solving plays a significant role in mathematics education and learning. The teacher presents the problem because through problem-solving learners can practice and interpret the concepts that have been learned. (Novriani & Surya, 2017) According to the findings of Kharisma et al (2020), 82.25 percent of online

learners have difficulty understanding mathematics. These limits undoubtedly have an impact on problem-solving ability. This is consistent with a study that found that learners' great capacity to understand mathematical ideas has an effect on their problem-solving abilities. (Muniroh et al, 2020).

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The said difficulties in mathematics continue to be encountered by researchers and other learners. Learners continue to be concerned about this, and it has only gotten worse in recent years, especially during the pandemic. More learners will be affected by this problem in mathematics if it is not addressed. It can also lead to a lack of comprehension and a narrow mindset.

The researchers intend to promote an innovative and simple method of teaching problem-solving in order to improve the performance of learners in problem-solving, which will lead to improved learners' performance in problem-solving. There will be numerous advantages to employing an innovative method of teaching, such as the use of an application that is relevant and popular with the learners.

Action Research Questions

This study aimed to determine the effectiveness of Online-Merge-Offline- Jamboard Application as an Innovation in Teaching Word Problems among Grade 4 Learners in the school year of 2021-2022. This study sought answers to the following specific questions:

1. What is the learners level of mathematical word problem skills as described in terms of:
 - 1.1 Understanding the Problem
 - 1.2 Planning Devise
 - 1.3 Solving a Problem
 - 1.4 Interpretation
2. How effective is the Online-Merge-Offline- Jamboard Application in improving the problem-solving skills of Grade 4 learners as revealed by their pretest and posttest mean scores?
3. Is there a significant difference between the pretest and posttest mean scores of the Grade 4 Learners?
4. What lesson exemplar in word problem-solving in Mathematics 4 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 online-merge-offline Jamboard application as an innovation in teaching word problem solving that will be utilized to grade 4 learners for their improvement in mathematical skills. This research design will guide the assessment of the pre-test and post-test

results for former evidence made by the intervention. In this design the researcher is keeping the respondents under observation after implementing the factors of cause and effect, it is the best method to test the theory or the instructional material which is extremely congruent to the concept of the study (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 Jamboard Application as an Innovative teaching pedagogy to improve the learners' problem-solving skills in mathematics by assessing the pretest and posttest results of the respondents.

The study involved one section of Grade IV learners enrolled in the K to 12 Curriculum and attending the Special Science Elementary School (SSES) at Jose Juan Serapio Elementary School were purposefully chosen as research participants.

The researcher utilized the pretest and posttest in gathering the data. The use of a Table of Specification (TOS) was required to ensure its reliability and validity in accordance with the Curriculum Guide provided by the Department of Education. It consisted of fifty (50) items in higher-order thinking skills where 52% applying, 30% analyzing 6% understanding, 2% evaluation, and 10% creating.

The selected teachers were given a survey questionnaire to evaluate the learning materials prepared by the researchers that will be used with the thirty (31) learners. The LRMSD evaluation tool is used to assess the survey questionnaire's content, format, presentation, and organization, as well as its correctness and reliability. The learning materials that will be used among the learners will be used by the teachers to test the mathematical skills of the grade 4 learners. The study used a purposive sample strategy to assess whether or not the participants share comparable traits or characteristics while working on the proposed instructional material

To ensure the continued development of new instructional material, the researchers used innovation as a technique to create and execute the Jamboard application. The instructional material is to be used in order for the learners to improve their mathematical skills.

The researchers carried out a request letter acknowledged by the school principal and research 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 researchers can now disseminate it to all of the learners' parents/guardians. Another letter should be sent to the principal of the chosen school requesting permission to conduct the research.

To protect the respondents' well-being, data privacy and necessary consent will be taken into account. Data will be treated with utmost care and solely for the purpose of validating the study's conduct. Proper communication with the authorized person will be possible, ensuring the transparency of the documents.

This study will use statistical techniques in analyzing the data that will be gathered. The pre-test scores of the experimental group using the t-test standard, deviation, and mean will use the proponents. After the pretest showed, the conciliation was given to the participant group. After being given the intervention, a post-test was conducted to see if there was a significant difference between the results of the pre-test and post-test of the participant group. The weighted average is used. The calculated critical scores and t-values, as well as the p-value and an alpha level of 0.05, were statistically considered to determine the academic performance of the interviewed learners.

Results and Discussions

Table 1 Learners level of mathematical word problem skills in terms of:

Variables	Mean Score (Pre-test)	Standard Deviation (Pre-test)	Mean Score (Post-test)	Standard Deviation (Post-test)	Verbal Interpretation
Understanding the problem	3.10	0.69	4.10	0.74	Closely toward mastery
Planning device	3	0.75	3.90	0.84	Closely toward mastery
Solving a problem	2.45	0.72	3.71	0.81	Closely toward mastery
Interpretation	1.94	0.88	3.32	1.15	Accomplished
Total	10.49	3.04	15.03	3.54	Outstanding

Note: 1.00-1.49 Beginning 1.50- 2.49 Developing 2.50-3.49 Accomplished 3.50- 4.49 closely toward mastery 4.50 - 5.00 Outstanding

Table 1 illustrates the pretest and post-test weighted mean scores of learner respondents before and after using the online – merge – offline Jamboard application as an innovation in teaching word problems in grade 4 learners. The weighted mean in the pretest was 10.49, and the weighted mean in the post-test was 15.23, according to the tabulated statistics. As a result, they obtained 4.74 percent of the potential percentage points from pretest to post-test. The table indicates how the learners' scores improved in each mathematical skill after utilizing the Jamboard application in class. Furthermore, the considerably higher mean in the posttest than in the pretest indicates that the online – merge – offline classroom strategy had a favorable effect on teaching word problems.

In support of this study, Lant and Lawson (2016) stated Jamboard had the potential to generate knowledge. Teachers and learners share ideas and build models of understanding together rather than being transmitted from the

teacher to the learners. In addition, educational technology tools played an important role in bringing innovation and motivation for learners Stockwell, (2016). Furthermore, Noor-UI-Amin (2013) revealed that very interesting teachings using various kinds of educational technology helped learners to retain content knowledge in their minds for a longer period.

Table 2 the improvement of Learners problem-solving skills based on pretest and posttest scores obtained by using the Online-Merge-Offline Jamboard Application as an Innovation in Teaching Word Problem Solving.

Percentage mean of pretest	Percentage mean of post test	Percentage gain scores
83.81	91.77	7.96

Table 2 illustrates the average pretest and posttest scores for learners before and after utilizing the online merge offline Jamboard application as an innovation in teaching word problem-solving. The pretest contained 83.81 tabular data, while the posttest contained 91.77. Before and after the exam, this yielded 7.96% of the possible percentage points. In addition, the online merge offline Jamboard application has a significantly higher average post-test than the pretest, which has a positive effect on word problem-solving.

The findings of this study support Lorenzo's (2017) claim that learners who are exposed to an online-merge-offline classroom model perform better in their activities, exams, and quizzes. Moreover, J. Kenney and E. Newcombe (2011) discovered in their research that online-merge-offline learning had a slightly higher average score on the unit test than the other form of learning.

Table 3 Test of significant difference exists between the pre-test and post-test results of using Online – Merge – Offline Jamboard Application in Teaching Word Problem-Solving

T-computed value	T-critical value	Degree of freedom	Probability level	Decision	Verbal Interpretation
13.00	2.04	29	P<0.05	Ho is rejected	Significant

The tabulated data shows the computed t value is 13.00 is greater than the greater than the critical value of 2.04 at the degree of freedom at 29 in the .05 probability level, thus rejecting the null hypothesis and accepting the alternative hypothesis. As a result, there is a significant difference in the learners' pretest and posttest scores after being exposed to the online-merge-offline Jamboard application as an innovation in teaching word problem-solving.

This study is in line with Awodeyi et al., (2014), the utilization of an online-merge-offline Jamboard application contributes to the diversification of mathematics instructional delivery. In addition, the study found that employing an online-merge-offline Jamboard application enhanced learners'

achievement levels when compared to other techniques Awodeyi et al., (2014).

This study suggests that the online-merge-offline Jamboard application as a virtual classroom is potentially significant when utilized as an instructional tool to increase both the probability and productivity of major learning outcomes. This will not only boost learners' learning but will also make them more likely to listen to their teacher in the midst of a pandemic.

Conclusion

1. The level of mathematical skills of Grade 4 learners in solving word problems was outstanding after the utilization of the Jamboard application. This study found that the Jamboard application, as an innovation, had a positive impact on the learner's performance in mathematics, as evidenced by a significantly higher mean in the posttest than in the pretest.
2. The mean post-test score for the online-merge-offline Jamboard application in improving Grade 4 learners' problem-solving skills is much higher than the pre-test score, indicating that it has a positive effect on word problem-solving.
3. By comparing the pre-test and post-test results of the learners' there is a significant difference as exposed to the online-merge-offline Jamboard application as an innovation in teaching word problem-solving.
4. The learners' have closely toward mastery towards utilization of Jamboard application as an innovation in teaching word problems.

Recommendation

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

1. Further study is needed to find how teachers can use the Jamboard application as an innovation in teaching word problems, as well as how teachers can use the innovative materials to create more innovative instructional materials for learners' development in word problem-solving.
2. Utilization of the Jamboard application as an innovation in teaching word problems for the improvement of learners' mathematical skills for further research with the larger population.
3. Further research on the same topic may be undertaken to obtain more comprehensive results that will improve education and benefit learners.

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