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Math Challenge Card Game Method (Medkit.Id) for Learning Basic Multiplications for Junior High School Students Guided by The Nusa Educator Community

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Abstract

Purpose: The purpose of this research is to determine the effect of using the Math Challenge Card (Mathkit.id) card game method in learning multiplication on students assisted by the Nusa Educator Community.

Method: This research used 25 students assisted by the Nusa Educators Community aged 12-17 years. The data obtained is in the form of post-test scores which will be compared with students' pre-tests during research at each level of the game.

Practical Applications: This card game method can be used as a tool in learning multiplication, especially for students who have not memorized basic multiplication operations.

Conclusion: The results of the research showed an increase in the post-test skills scores compared to the students' pre-test. The increase in score at level 1 was 23%, at level 2 was 31%, and the average mathquiz score was 85. This indicates that the Math Challenge Card (Mathkit.id) card game method is effective in improving students' multiplication abilities.

Introduction

Multiplication is a matter of number operations which is one of the foundations in the science of arithmetic (Davydov, 2020; Resnick, 2020). Multiplication is a mathematical operation which involves scaling (folding) one number with another number (Jacob et al., 2018; Simon et al., 2018). Multiplication material as a repeated addition operation is starting to be introduced to students in elementary school (SD), especially in grade 2 of elementary school. Then students are targeted to memorize basic multiplication, as a steppingstone to learning more advanced numeracy. Multiplication is a science that can be found in everyday life, such as in buying and selling activities, transactions, commerce, and other activities (Ahmad, 2019; Hodaňová & Nocar, 2016; Schroeder, 2015). Students are expected to be skilled at using multiplication in daily activities.

However, in fact, many students at the secondary school level have not memorized basic multiplication. This was discovered by volunteer teachers from the Nusa Educator Community with students at the junior high school level who were taking part in the learning program. multiplication, Students cannot understand and have not memorized basic multiplication which should have been completed in grade 3 of elementary school, even though basic multiplication material is the mainto key in junior high school-level numeracy. Basic multiplication underlies algebra, pythagoras, geometric figures, statistics, probability, measurement, and various other numeracy materials. Students' lack of memorizing basic multiplication is an obstacle in the teaching and learning process of numeracy and affects students' skills in using multiplication in everyday life. Based on a survey conducted by researchers during interviews with teaching volunteers from the Nusa Educators Community, the average pre-test score obtained from 10 junior high school students was 45 from a range of 1-100. In fact, 2 out of 10 students scored 20, which is far from the average score. Even though the pre-test questions given were basic multiplication questions from 1 to 10, such as 2x3, 6x7, and 8x6, there were a total of 10 questions. Students' lack of memorizing basic multiplication hinders teaching volunteers from teaching junior high school-level numeracy. According to information from teaching volunteers, students must repeat elementary school material because students' mathematical abilities are still equivalent to grade 4 elementary school.

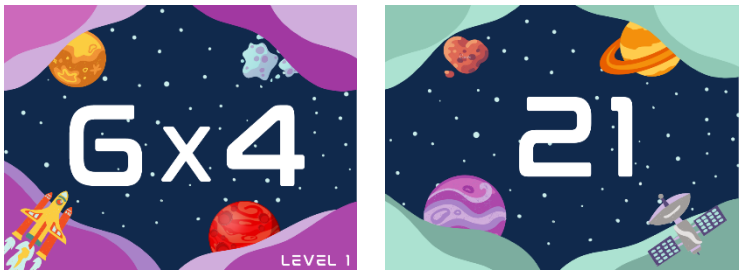
The learning program organized by the Nusa Educators Community aims to help school-age children who have dropped out of school due to their family's economic conditions, as well as school students who have difficulty understanding lessons but are unable to take paid lessons. The Nusa Educators Community is a non-profit, non-profit organization that operates in the field of community education, especially for the poor and underprivileged. All study program students are free of charge. This community is centered in Benteng Village with 7 volunteers and 40 assisted students spread across three villages, namely Benteng Village, Petir Village, and Ciaruteun Ilir Village. Apart from Benteng Village, the problem of junior high school students not memorizing basic multiplication also occurs in the other two villages. Teaching volunteers have made efforts to improve students' memorization by memorizing basic multiplication tables, but the results have not been optimal. Teaching volunteers find it difficult to teach junior high school level numeracy material because of students' varying abilities in basic multiplication material. Therefore, researchers consider that there is a need for a new method to improve the memorization of basic multiplication in junior high school students in the Nusa Educator Community.

Method

The method used in this research is the Math Challenge Card method, which is a learning medium in the form of multiplication-based game cards. Math Challenge Card consists of a level 1 card game which contains basic multiplication cards and answer cards, level 2 cards which contain challenge cards and number guessing cards (multiplication applications in life), and mathquiz which is a group math quiz. Researchers took 25 students

as respondents who had problems memorizing multiplication, 10 students from Benteng village, 5 students from Petir village, and 10 students from Ciaruteun Ilir village. The research was carried out from 1 June to 30 September 2022, with 10 meetings in each village (5 level 1 meetings, 5 level 2 meetings), and 1 joint meeting. Each meeting has an average duration of 1.5 to 3 hours, starting with a pre-test and ending with a post-test.

Figure 1. Level 1 Card



Source: Private Documentation, 2022

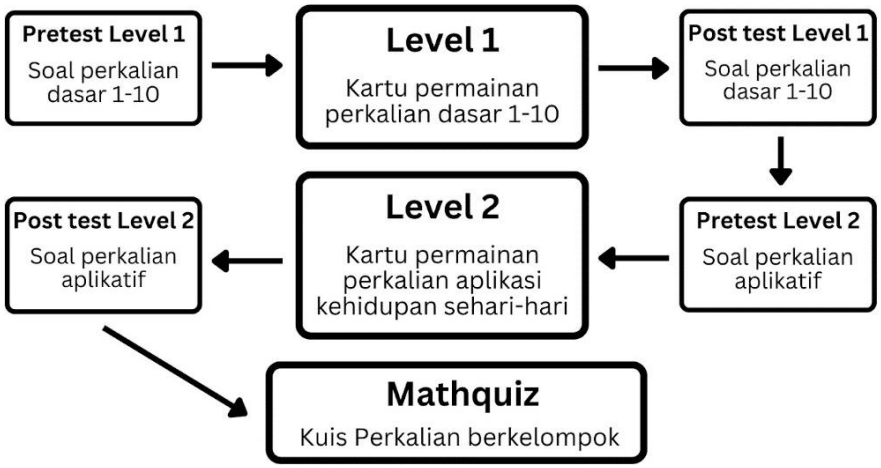
Figure 1. Level 2 Card

Source: Private Documentation, 2022

Figure 3. Multiplication Poster

Source: Private Documentation, 2022

Figure 4. Method Scheme: Math Challenge Card



Source: Private Documentation, 2022

This research measures the increase in students' memorization of multiplication after implementing the Math Challenge Card program. Increased memorization is measured from post test scores in the range of 70-100. The increase in post test scores over the pretest is calculated using the following formula.

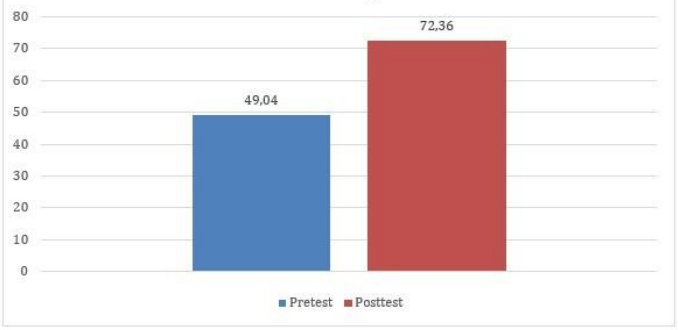
$$NP = \frac{(Nz - Na)}{100} \quad (1)$$

Np: Increase value
Na: Initial value (pretest)
Nz: Final score (post test)

Result

Post test and pretest measurements in the Mathkit.id level 1 game are carried out using questions related to basic multiplication and numbers 2 digits and above. The following is the effect of Math Challenge Card level 1 activities on increasing student grades.

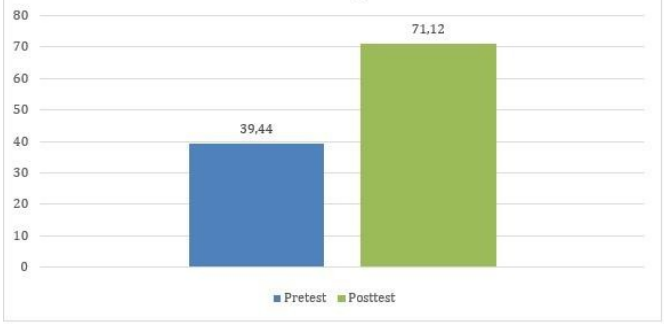
Figure 5. Average student pre-test and post-test scores on Math Challenge Card Level 1



Source: Private Documentation, 2022

Based on the results of students' pre-test and post-test on Math Challenge Card level 1, there was an increase in their score from 49.04 to 72.36. If this increase is converted into a percentage, there is an increase in value of 23%. The increase in scores shows that Math Challenge Card level 1 influences students' ability to do basic multiplication. The average student pre-test and post-test scores on Math Challenge Card Level 2 can be seen in the following image.

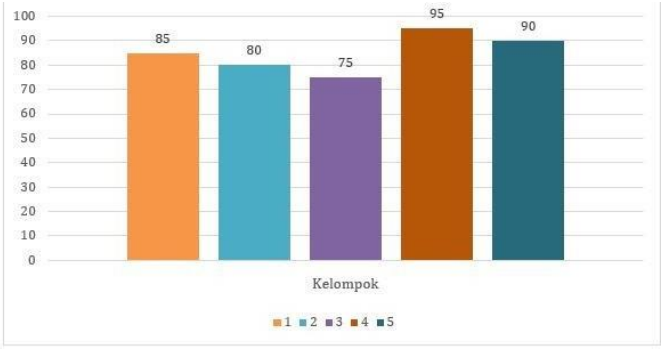
Figure 6. Average student pre-test and post-test scores on Math Challenge Card Level 2



Source: Private Documentation, 2022

Just like Math Challenge Card level 1, there was also an increase in the value for Math Challenge Card level 2. The value increased from the initial 39.44 to 71.12 or 31%. This increase in value shows the increasing ability of students to use multiplication in their applications.

Figure 7. Average student math quiz score



Source: Private Documentation, 2022

In the Mathquiz activity, the students' average score was 85. According to the Minimum Completeness Criteria (KKM), students had sufficient ability in multiplication mathematics. This average value also shows the influence of the Math Challenge Card, both level 1 and level 2, on students' multiplication abilities.

Discussion

The purpose of this study was to evaluate the effectiveness of the Math Challenge Card (Mathkit.id) card game method in teaching multiplication to students assisted by the Nusa Educator Community. The study was conducted with 25 students aged 12-17 years, and the data was collected in the form of post-test scores, which were then compared with the students' pre-test scores at each level of the game. The practical application of this research is significant. The card game method can serve as a valuable tool in teaching multiplication, particularly for students who have not yet memorized the basic multiplication operations (Ali & Mukhtar, 2017; Debrenti & László, 2020). This method provides an interactive and engaging way for students to learn and practice multiplication, which could potentially enhance their understanding and retention of the multiplication tables.

The conclusion drawn from the research findings is that the Math Challenge Card (Mathkit.id) card game method is effective in improving students' multiplication abilities. There was a noticeable increase in the post-test skills scores compared to the students' pre-test scores. Specifically, there was a 23% increase at level 1, a 31% increase at level 2, and the average mathquiz score was 85. These results suggest that the card game method not only helps students learn multiplication but also enhances their mathematical skills overall. However, it's important to note that while the results are promising, further research is needed to confirm these findings and to explore the long-term effects of using the card game method in teaching multiplication (Kwakye & Aggrey, 2022; Mohamed et al., 2020). Future studies could also investigate the effectiveness of this method with different age groups and in different educational settings (Ali & Mukhtar, 2017; Debrenti & László, 2020). This would provide a more comprehensive understanding of the potential benefits and limitations of the Math Challenge Card (Mathkit.id) card game method in mathematics education.

The use of game-based learning strategies, such as the Math Challenge Card (Mathkit.id) card game method, has been gaining attention in the field of education (Ding et al., 2017; Qian & Clark, 2016). This approach is believed to make learning more enjoyable and engaging for students, which can lead to improved motivation and academic performance. In this study, the card game method was used to teach multiplication to students aged 12-17 years. The results showed a significant improvement in the students' post-test scores compared to their pre-test scores. This suggests that the card game method was effective in enhancing the students' understanding and mastery of multiplication (Chong et al., 2022). However, it's important to consider the individual differences among students (Ali & Mukhtar, 2017). While the card game method may be effective for some students, others may benefit more from different teaching strategies. Therefore, it would be beneficial to incorporate a

variety of teaching methods to cater to the diverse learning needs and preferences of students. Moreover, the study focused on the short-term effects of the card game method. It would be interesting to investigate the long-term effects of this teaching strategy. For instance, future research could examine whether the improvements in the students' multiplication abilities are maintained over time. Additionally, the study was conducted with a relatively small sample size of 25 students. To generalize the findings, it would be necessary to conduct further research with a larger sample size and in different educational contexts. In conclusion, the Math Challenge Card (Mathkit.id) card game method shows promise as an effective teaching strategy for multiplication. However, further research is needed to validate these findings and to explore the potential of this method in broader educational settings. This could pave the way for innovative teaching strategies that make learning more enjoyable and effective for students.

Conclusion

Drawing from the research findings, it can be conclusively stated that the application of the Mathkit.id card game method in multiplication learning sessions significantly bolsters the computational abilities of students under the guidance of the Nusa Education Community. This innovative approach not only facilitates a deeper understanding of multiplication concepts but also fosters an engaging and interactive learning environment. The marked improvement in the students' post-test scores is a testament to the efficacy of this method. Therefore, the incorporation of such interactive and dynamic teaching strategies could potentially revolutionize traditional pedagogical practices, making learning a more enjoyable and fruitful experience for students. However, it's important to note that while these results are promising, further research with a larger sample size and diverse student populations is necessary to validate and generalize these findings. This will pave the way for a more comprehensive understanding of the impact and applicability of the Mathkit.id card game method in various educational contexts.

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