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Fun Learning by Applying Competition and Cooperation Strategies Through Mathematical Games

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Info Article	Abstract
	The aim of this research is to create a joyful learning environment through a competitive and cooperative activities by using mathematics games. The subject of this research is elementary school the fourth grade students. The research conducted in the Edu-Fun Learning Centre in Talang bakung, Jambi. This is Classroom Action Research (CAR). The instrument used is observation and video recording of learning activities. The qualitative data analyzed by employing the Miles and Huberman (1994).The research was conduct for three cycles. The result showed that 1) the use of games in learning mathematics created a fun and interestingly learning, 2) grouping students randomly based on academic ability to effectively train students mutually learn and work together to get better grades, 3) competition in learning activities trained students to be sportive, learning to posed ideas, and confident to answer teacher's questions, 4) students response in learning activities affects students achievement, 5) competitiveness does not affect students learning achievement directly but able to make students actively involved in learning activity, 6) the cognitive, affective and physicomotoric achievement based on students response, the classroom teaching process, competitive character, and students active involvement in learning activities. .

INTRODUCTION

Learning mathematics in children requires a deep understanding of children's learning theories and the mathematics learning process. Children learn through personal experiences that involve interactions with the environment and other people (Anderha & Maskar, 2021; Langegård et al., 2021). Emphasizes the role of teachers in helping students understand the concepts being studied. Apart from that, the stages of children's cognitive development according to Piaget need to be taken into account in developing an appropriate learning approach (Rohaina, 2020; Yadi, 2020).

The mathematics learning process is also influenced by human information processing systems, such as learning by induction, working memory capacity, and metacognitive development (Pratama & Lestari, 2020; Verschaffel et al., 2020). The use of audio-visual media can strengthen the mathematics learning process in children. The learning model chosen must be appropriate to the characteristics of the students and the material being taught (Sudargini & Purwanto, 2020; Wicaksono et al., 2021). In addition, competitive and fun learning strategies can increase students' interest and understanding of

mathematics (Mulyati et al., 2023; Rosa & Pujiati, 2017). Competition in learning needs to be accompanied by collaborative learning to prevent the negative impacts of competition (Liang et al., 2022; Ningsih, 2020). This strategy aims to increase the spirit of competition and cooperation in students, as well as change their perception that mathematics is fun (Et.al, 2021; Hoyi & Liza, 2021).

Combining child learning theories, mathematics learning processes, and fun competitive learning strategies is important in designing learning approaches that are effective and interesting for students (Hajarina, 2021; Rohaina, 2020). This research will explore the influence of using competitive and fun learning strategies on understanding and interest in mathematics in elementary school students, with the aim of contributing to the development of innovative and meaningful learning methods (Baran et al., 2018). The problem that arises is a lack of understanding of how social media use specifically affects the psychological well-being of teenagers. Although some research has been conducted in this regard, there is still a lack of comprehensive and in-depth understanding of the factors involved and the underlying mechanisms (Juharti & Kartika, 2021; Wu et al., 2020). Therefore, this research is important to bridge this knowledge gap and provide deeper insight into how social media use impacts the psychological well-being of adolescents.

In an effort to overcome this problem, this research will investigate the patterns of social media use among teenagers, its impact on their psychological well-being, and the factors that influence the relationship between the two (Ngkoti, 2021; Wicaksono et al., 2021). It is hoped that the results of this research will provide a better understanding of the complex dynamics between social media use and the psychological well-being of adolescents, as well as provide a basis for the development of more effective interventions in managing social media use among adolescents to improve their well-being (Prastuti, 2020; Yang et al., 2021). In the context of this research, social media will be defined as digital platforms that allow users to interact, share content, and connect with other people via the internet, including but not limited to Facebook, Instagram, Twitter, and Snapchat. Adolescents' psychological well-being will be measured through aspects such as levels of depression, anxiety, and sleep quality, which have consistently been shown to be affected by social media use (Ningsih, 2020; Sukiminiandari et al., 2015). Through this research, it is hoped that it can make a significant contribution to our understanding of social media use among adolescents and its impact on their psychological well-being, as well as pave the way for the development of more effective interventions to manage healthy social media use among adolescents (Refliana & Pertiwi, 2023).

This research is unique in its focus on the relationship between social media use and adolescents' psychological well-being, exploring the factors that influence this relationship in depth. While much previous research has investigated the negative impacts of social media use, this study aims to provide a more holistic understanding of the complex dynamics between social media use and adolescents' psychological well-being. The implication of this research is that the results can help develop more targeted and effective interventions in managing teenagers' social media use to improve their psychological well-being. In addition, this research can also provide insights for practitioners and policy makers to develop better guidelines and strategies to support healthy social media use among adolescents. This study aims to investigate issues related to social media use among adolescents and its impact on their psychological well-being. Therefore, it is urgent to conduct this research to understand more deeply the relationship between social media use and the psychological well-being of adolescents.

RESEARCH METHODS

Research Design

Classroom action research is a form of research with a qualitative approach. The Classroom action research implementation procedure was based on Kurt Lewin's thoughts in 1946 (Saban, 2021; Sari, 2020). He describes action research as a series of steps that form a spiral. Each step has four stages, namely planning, acting, observing and reflecting. This classroom action research was carried out at the Edu-Fun Educational Institute for mathematics subjects. The timing of the research was carried out based on the academic calendar at the Edu-Fun Educational Institute.

Research Target/Subject

The subjects of this research were fourth grade elementary school guidance participants. The selection of fourth grade elementary school students is because at this grade level students need to be instilled with good concepts about correct number calculation operations, so that they do not experience difficulties at the next grade level.

Research Procedure

This research procedure follows a reflective action approach with stages of planning, implementation, observation, reflection, data analysis and interpretation. Thus, it is hoped that this research can provide a deeper understanding of the influence of fun competitive learning strategies on understanding and interest in mathematics in fourth grade elementary school students.

Instruments, and Data Collection Techniques

Data collection methods in classroom action research are 1) Questionnaires, 2) interviews, 3) documents, 4) field notes, and 5) observations, 6) video recordings. The author will use these six methods to obtain accurate data during the research process. There are three types of instruments that will be created to collect data, namely: 1) learning process observation sheets 2) questionnaires about student interest and motivation in learning, 3) student learning outcome tests.

Data analysis technique

The qualitative data analysis technique commonly used in classroom action research is the qualitative data analysis technique Miles and Huberman. The data collected in the form of sentences was analyzed through the stages of data reduction, data presentation, as well as drawing conclusions and verifying the data. However, there is quantitative data in classroom action research which is one of the supporting data which is analyzed using descriptive statistics (Creswell, 2014). The first step in qualitative data analysis is data reduction (Sugiyono, 2017). Data in the form of sentences from questionnaires, observations or field notes are selected which are most relevant to the research objectives. Data that is not directly related can be discarded. Apart from selection, data collection also needs to be simplified to provide meaningful information. The essence of the Reduction stage is to select basic data and give meaning to it and discard irrelevant data (Sugiyono, 2010). Data interpretation is the process of understanding the meaning of a series of data that has been presented, in the form of not just seeing what is written, but understanding or interpreting what is implied in the data that has been presented. Interpreting the results of data analysis can be done in the following ways: 1) expanding the analysis, 2) connecting the findings with personal experience, 3) asking for opinions from colleagues or superiors, 4) connecting the analysis with the literature, and 5) return to the relevant theory.

RESULTS AND DISCUSSION

Learning activities in the first cycle were carried out in four meetings with a duration of sixty (60) minutes for each meeting. Based on the observation results in table 1, data was obtained from eleven (11) students, four (4) students namely Ez, My, No and Rf showed very good responses, and seven (7) other students namely Rb, Ri, Ra, Ro, Al, Jo, and Ay showed good responses. In this first cycle the teacher uses colorful cards and electronic games. The use of this media influences students' responses in learning activities. The use of electronic media makes the learning atmosphere very noisy and students are difficult to control. However, this stimulates students' competitive spirit because they try to beat their opponents.

Table 1. Overall data for the first cycle

No	Student Name/Initials	Cycle 1 Student Responses	Competitive Spirit	Cycle 1 Learning Outcomes
1	Rb	53.8%	35.4%	66.7
2	Ri	57.4%	64.6%	55.0
3	Ra	57.9%	16.7%	55.0

4	Ro	59.4%	66.7%	66.7
5	Al	68.1%	92.7%	73.3
6	Jo	70.6%	45.8%	60.0
7	Ez	93.9%	54.2%	76.7
8	My	78.5%	31.3%	61.7
9	NO	82.8%	33.3%	70.0
10	Ay	70.2%	25.0%	43.3
11	Rf	77.7%	40.6%	70.0

From table 1 above, it shows that in this first cycle student responses will influence learning outcomes, while the competitive spirit has no effect on student responses and learning outcomes. However, a competitive spirit will influence students' activeness in learning activities. This is shown in the learning video recording.

The learning activities carried out in the second cycle are the result of revisions and improvements from the first cycle. There are several things that are different from the first cycle, namely 1) students are grouped randomly based on academic grades, 2) each meeting uses cards and electronic games, 3) apperception is carried out by inviting students to discuss the ideals and benefits of learning as well as the activities they undertake. do at school. The observation results show that random grouping is very effective. These results are better when compared to the first cycle, as seen in graph 1 below:
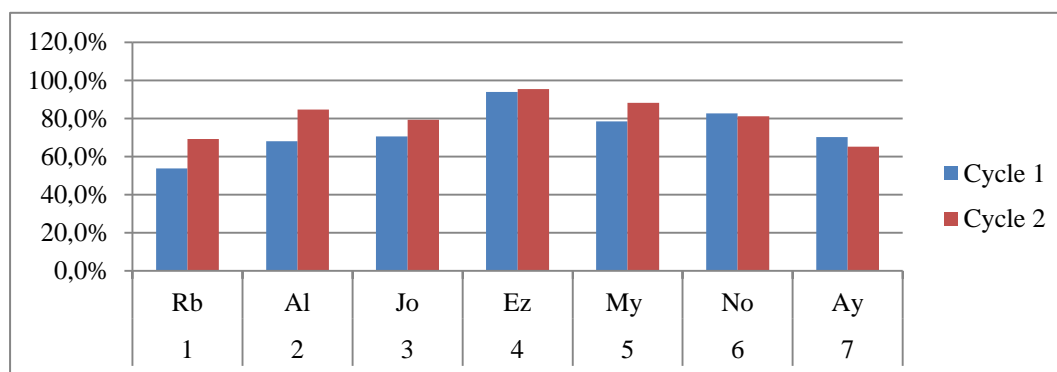

Figure 1. Observation results

Based on the presentation of the results in the second cycle, it can be concluded that the teacher's actions by randomly grouping students can increase student responses and student learning outcomes, but do not change the students' competitive spirit. From the results of observations and video recordings of learning, it can be seen that the advantages of random grouping are 1) students can learn from each other, 2) good cooperation is established, 3) group members are united to win the game, 4) male students can give way to other members. the group is female so that each group member has the same opportunity to answer questions, 5) there is no mutual domination between group members.

The learning activities in the third cycle are not much different from the second cycle, but in the third cycle the form of play is different. The games used are games that make students move more, namely the "clap hands" and "leapfrog" games. Electronic games are still used but are not played at every meeting, only at the third meeting.

The results of observations of learning activities shown in table 4.9 showed that three (3) students showed very good responses, and four (4) students showed good responses. To clearly see the changes, look at table 2:

Table 2. Student responses from cycle 1-cycle 2-cycle 3

No	Initials	Cycle 1	Cycle 2	Cycle 3	Criteria
1	Rb	53.8%	69.3%	71.6%	Fine – fine – fine
2	Al	68.1%	84.7%	78.5%	Good–Very good–very good
3	Jo	70.6%	79.3%	74.2%	Fine, very fine
4	Ez	93.9%	95.5%	97.0%	Very good
5	My	78.5%	88.1%	82.3%	Very good
6	No	82.8%	81.1%	75.7%	Very good
7	Ay	70.2%	65.2%	71.6%	Fine, fine
	amount	517.7%	563.1%	550.9%	
	Average	74.0%	80.4%	78.7%	Good-very good-very good

From table 2 above, it shows that students' responses Rb, Ez, My, No and Ay showed consistent responses from the first cycle to the third cycle. Based on the results of observations, these five students have stable characters so that changes in the methods, media or games used do not affect changes in their responses in each cycle. Al students experienced an increase in response from good in the first cycle to very good in the second and third cycles. The change in Al students occurred due to random grouping, so that his dominant attitude was reduced when grouped with female students. Meanwhile, student Jo experienced a change in response from good in the first cycle to very good in the second cycle and decreased to good in the third cycle. This is due to changes in the type of game which is not easy for Jo to understand. Based on these results it can be concluded that changing the type of game does not affect students' responses to learning. In the third cycle there was no change in the results of observing students' competitive spirit. Meanwhile, student learning outcomes experienced changes in the third cycle. That is, the average student score of 70.5 is lower compared to the second cycle with learning outcomes of 73.1. Based on observations from the results of the assignments given at each meeting, this is because the Factors and Multiples material is material that is difficult for students to understand. Because the prerequisite for understanding, students must be able to multiply and divide. Meanwhile, of the seven students in this research subject, only four people understood multiplication and division well, the other three students still did not understand it well. So this becomes an obstacle for students.

Previous research found that traditional games can be preserved by integrating them into learning, such as the Ma'dende (Engklek) game which can be used as a medium to introduce flat shapes; Magalaceng (Congklak) as a learning medium for teaching material on least common multiples (Rustan & Munawir, 2020). In this context, the current research is in line with previous research by showing that the use of games in learning can create a fun and effective learning environment. In addition, both emphasized the importance of understanding the factors that influence students' interest and participation in learning, as well as designing appropriate learning approaches to promote local cultural heritage.

This research shows that the use of appropriate media in mathematics learning can influence student responses and learning outcomes. Random group assignment has also been proven to increase student responses. Changes in the type of game or learning activity also have an impact on student responses. Teachers need to pay attention to students' individual characteristics to adjust learning methods (Gregory, 2010). Difficult material such as Factors and Multiples highlights the importance of understanding prerequisites. A holistic approach to mathematics learning is necessary to ensure effective learning. These implications provide guidance for teachers and policy makers in developing more responsive mathematics learning strategies at the elementary school level.

This research provides a new contribution to the understanding of the use of media and learning strategies in the context of mathematics learning in elementary schools. Observations of media use, random group assignments, and variations in learning activities provide new insights into how these factors influence student responses and learning outcomes. The implications of this research also

highlight the importance of a holistic approach in mathematics learning, which includes cognitive, affective and psychomotor aspects. Thus, this research makes an important contribution to the development of more effective and responsive mathematics learning strategies at the elementary school level.

This study has several limitations that need to be noted. First, because the research was conducted at one educational institution only, the results may not be fully applicable generally. Second, due to the limited sample size, the generalizability of the findings of this study may be limited. In addition, factors such as students' background or previous learning experiences were not fully investigated in this study. Therefore, further research with larger samples and varied contexts may be needed to validate these findings more broadly.

CONCLUSION

The conclusion of this research is that the application of fun and competitive learning strategies through mathematics games is effective in creating a more enjoyable and meaningful learning atmosphere for elementary school students. From the research results, it was found that the use of games in mathematics learning increases students' interest and enriches their learning experience. In addition, random group division based on academic ability is effective in encouraging collaboration between students and improving learning outcomes. Competition in games also helps train students' sportsmanship and increases their active involvement in learning activities. However, attention to student responses in learning activities remains important, because of its influence on student learning outcomes. From this research, it is recommended that mathematics learning be more varied and interesting, and teachers need to use learning strategies that suit student characteristics. Apart from that, teachers can develop their own math games according to students' needs and conditions. Thus, these findings provide useful guidance for future research, teachers, educational institutions, and schools in improving the quality of mathematics learning at the elementary school level.

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