**Application of Collaborative for Academic, Social, and Emotional Learning-Based Game-Based Learning Model in Improving Mathematics Learning Outcomes in Class IV A**

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| **Article History**  Received: 8 June 2025;  Revised : 13 July 2025;  Accepted: 17 July 2025.  **Keywords**  Game Based Learning;  CASEL;  Learning Outcomes;  Social-Emotional;  Mathematics. | | | **Abstrack**  This study aims to analyze the effectiveness of the application of the Game-Based Learning (GBL) model based on Collaborative for Academic, Social, and Emotional Learning (CASEL) in improving the mathematics learning outcomes of grade IV A students of Bandungrejosari 3 Public Elementary School Malang. The research background is the low learning outcomes and student engagement in mathematics learning, along with the limited integration of social-emotional learning components in classroom practices. The method used is Classroom Action Research which is carried out in three stages, namely pre-cycle, cycle I, and cycle II, following the Kemmis and McTaggart model that includes planning, implementation, observation, and reflection. Data were collected through learning outcome tests and student response questionnaires administered at each stage. The results showed a significant increase in the completeness of learning outcomes from the pre-cycle stage to cycle II, indicating that students’ academic performance in mathematics improved through the implementation of this model. In addition to academic achievement, the application of the CASEL-based Game-Based Learning model also contributed to the development of students’ social-emotional aspects, particularly in collaboration, communication, empathy, and self-regulation skills, which were observed during group activities and interactive game sessions. These findings indicate that integrating CASEL-based GBL is effective in promoting both cognitive and social-emotional competencies in elementary school students. | |
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**Introduction**

Globally, 21st century education demands the strengthening of literacy, numeracy, and the development of students' social-emotional competencies as part of a complete character education. The OECD report (2022) states that the education system in various countries today does not only focus on academic aspects, but also emphasizes the importance of character education and 21st-century skills such as collaboration, communication, and self-control. One of the approaches that has begun to be applied in various countries is Social Emotional Learning (SEL), which is an educational process that helps students recognize emotions, manage stress, build positive relationships, and make responsible decisions (CASEL, 2020). The integration of social-emotional learning in the curriculum is a global strategy in shaping individuals who are not only intellectually intelligent, but also socially and emotionally mature. This is reinforced by UNESCO (2021) which emphasizes that the development of soft skills such as resilience, empathy, and collaboration must go hand in hand with strengthening the academic competence of students at various levels of education.

In Indonesia, the implementation of learning that supports the development of social-emotional skills is also starting to become a concern in the Merdeka Curriculum. The Ministry of Education and Culture (2022) noted that the results of the 2022 National Assessment showed that more than 40% of elementary school students had difficulty understanding basic mathematical concepts, as well as showing low social-emotional skills, such as the ability to interact, collaborate, and self-regulate in the classroom. This condition is exacerbated by the conventional learning model which is still dominated by lecture methods without actively involving students. In addition, a survey by the Center for Education Assessment (Pusmendik, 2023) also revealed that more than 30% of elementary school teachers in Indonesia find it difficult to manage interesting and fun mathematics learning. Therefore, a learning approach is needed that can improve learning outcomes while developing students' social-emotional skills in an integrated manner.

The problems faced in grade IV A Bandungrejosari 3 Public Elementary School Malang are the low completeness of students' mathematics learning and the weak social-emotional skills shown in learning activities. The results of observations and interviews with classroom teachers showed that most students were less enthusiastic, tended to be passive, busy with personal activities, and showed poor social interaction during group discussions. In addition, the use of impolite language and a low sense of responsibility for group tasks are still often found. This condition not only has an impact on academic achievement, but also hinders the formation of a conducive and collaborative learning environment. Therefore, learning innovations are needed that are able to overcome this problem, while increasing the motivation, activeness, and social-emotional skills of students in the classroom.

Several previous studies have examined the effectiveness of the Game-Based Learning (GBL) model in improving learning outcomes and student motivation. Hermawan (2024) said that the integration of game media in mathematics learning has been proven to increase students' interest and active participation. A study by Priyambada (2023) shows that the implementation of GBL is able to increase mathematics learning completeness from 68.3 to 78.3 in two learning cycles. Meanwhile, the development of social-emotional competencies through the CASEL approach has been widely applied globally (CASEL, 2020), but research in Indonesia is still limited. Rahmaningrum et al. (2024) prove that the integration of CASEL in learning can increase students' confidence, cooperation, and self-control. However, most of those studies have focused on cognitive or social-emotional aspects separately, and not many have combined the two in game-based math learning in elementary school.

However, until now, there have not been many studies that have systematically examined the integration of the Game-Based Learning approach with the five CASEL competencies in mathematics learning at the elementary school level. In fact, the combination of these two approaches is believed to be a strategic solution in overcoming the problem of learning completeness while forming students' social-emotional skills holistically. The majority of GBL research previously only focused on improving academic results, without touching on aspects of students' character. Likewise, SEL research in elementary schools is more applied in the context of character education or religious education, not specifically in mathematics learning (Fauzi et al., 2022; Hidayat & Wijaya, 2023). Therefore, this study seeks to fill the research gap through the integration of the two approaches in one integrated learning model.

This research is expected to make a theoretical contribution to the development of an integrated learning model between the cognitive and social-emotional aspects of students. Practically, the results of this research can be a reference for elementary school teachers in designing mathematics learning strategies that are more interesting, meaningful, and in accordance with student characteristics. In addition, this research is also in line with the Independent Curriculum policy which emphasizes strengthening character education and improving students' numeracy competence. With the CASEL-based Game-Based Learning model, it is hoped that it can create a more interactive, collaborative, and fun learning environment in elementary schools.

This study aims to analyze the effectiveness of the CASEL-based Game-Based Learning model in improving mathematics learning outcomes and social-emotional competence of grade IV A Bandungrejosari 3 Public Elementary School Malang. Through the integration of the five CASEL competencies, namely self-awareness, self-management, social awareness, relational skills, and responsible decision-making, it is hoped that a more positive and productive learning atmosphere can be formed. In addition, this study also wants to test the extent to which this model is able to overcome the problem of learning completeness and form students' social-emotional skills simultaneously. The novelty of this research lies in the combination of GBL and CASEL approaches in the context of mathematics learning in elementary schools that have not been widely explored in Indonesia.

**Method**

This study is a Classroom Action Research spiral model by Kemmis and McTaggart (1988) which was carried out to analyze the effectiveness of the application of the Game-Based Learning (GBL) model based on Collaborative for Academic, Social, and Emotional Learning (CASEL) in improving the learning outcomes of mathematics and social-emotional skills of grade IV A Bandungrejosari 3 Public Elementary School Malang. Classroom Action Research was chosen because it is considered relevant to directly improve learning problems in the classroom systematically through the stages of planning, action, observation, and reflection (Susilowati, 2020; Kemmis et al., 2019). This research was carried out during February-March 2025 in two cycles, each consisting of two meetings lasting 70 minutes. The subjects of the study were 27 students of class IV A, consisting of 14 males and 13 females aged 9–10 years, selected purposively because based on the results of the initial evaluation showed low mathematics learning completeness and minimal collaboration skills. The instruments used included (1) learning outcome tests in the form of 10 multiple-choice questions to measure cognitive aspects, (2) observation sheets of students' social-emotional skills based on the five CASEL competencies, (3) student response questionnaires to measure interest and involvement in learning, and (4) photo documentation and field notes. All instruments are validated by two lecturers of basic education experts and grade IV teachers before use. The research procedure began pre-cycle for observation of initial conditions, followed by cycle I as the initial implementation of the CASEL-based GBL model, then reflection was carried out to design improvements in cycle II. Data are analyzed descriptively, quantitatively, and qualitatively; Quantitative data was analyzed through the calculation of the average score and percentage of learning completeness with the criteria of minimum completeness of 75 and classical completeness of 80%, while qualitative data was analyzed through the stages of reduction, data presentation, and drawing conclusions based on observation and documentation. The qualification of student learning outcome scores refers to Suharsimi Arikunto's range scale: 76–100 (excellent), 56–75 (good), 40–55 (adequate), and 0–39 (poor). This research was carried out with the consent of the principal, class teachers, and parents of students, and all identities of students were kept confidential in accordance with the principles of educational research ethics.

**Results and Discussion**

**Result**

The results of this research were obtained through three stages, namely pre-cycle, cycle I, and cycle II. Data on students' learning outcomes were collected through formative tests and observation of CASEL-based social-emotional skills. The following are the results of student achievements at each stage.

Mathematics learning at the pre-cycle stage still uses conventional teacher-centered methods. The results of the pre-cycle test showed that out of 27 students, as many as 18 students (66%) had not reached the criteria of minimum completeness (75), while 9 students (34%) were declared complete.

In cycle I, a CASEL-based Game Based Learning model was applied. The results of the pretest showed a low initial completeness. In the multifaceted material, only 4 students (14.81%) completed and 23 students (85.19%) did not complete. In the triangle material, the completeness was even lower, namely 1 student (3.70%) completed and 26 students (96.30%) were incomplete.

After the learning action, the post-test results have increased. In the multifaceted material, as many as 20 students (74.07%) completed. Meanwhile, the triangle material increased to 12 students (44.44%) completed.

The learning results in cycle II showed a significant increase. In the quadrilateral material, 21 students (77.78%) achieved the criteria of minimum completeness, while in the composition material, as many as 22 students (81.48%) completed. This increase shows the effectiveness of the CASEL-based Game Based Learning model in improving students' mathematics learning outcomes.

**Table 1.** Learning Outcome Recapitulation

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| **Phase** | **Complete Amount** | **Percentage Completion** |
| Pre-Cycle | 9 | 34% |
| Cycle I | 20 | 74,07% |
| Cycle II | 22 | 81,48% |

Social-emotional skills observations showed that learners experienced improvements in all five CASEL competencies. In the first cycle, collaboration and self-regulation increased from 40% of activeness to 70% in the second cycle. Empathy skills, group communication, and decision-making also showed positive trends based on teachers' observation sheets.

**Discussion**

The improvement of student learning outcomes in this study shows that the application of the CASEL-based Game Based Learning model is effective in improving understanding of mathematical concepts. The application of educational games encourages students to participate more actively and reduces the dominance of the teacher-centered method which has been causing student disengagement in learning. These findings are in line with the research of Rahmawati et al. (2020) and the theory of Social Constructivism Vygotsky (1978) which emphasizes the importance of social interaction in building knowledge. Not only does it have an impact on the cognitive aspect, this model also contributes to the development of students' social-emotional skills. Group-based game activities effectively train collaboration skills, empathy, emotion management, and decision-making according to the CASEL domain (2020). This is evidenced by an observation sheet which notes that in cycle II, most of the students have been able to work together, discuss well, and control their emotions during the game process.

Specifically, the results of completeness in multifaceted materials experienced the highest increase of 59.26%, while in triangular materials the increase in completeness was still not optimal. This condition is thought to be due to the higher level of abstraction of the concept of triangles compared to other polygons, as well as the limitations of the variety of games designed that have not fully facilitated the understanding of the concept of angles and types of triangles in a concrete way. In addition, students tend to have difficulty identifying the special characteristics of triangles during games, so game modifications are needed that are more adaptive to the complex material characters. This finding is important to observe for the development of further learning media, so that each type of mathematics material can be adjusted to the right game strategy.

On the other hand, this study also has limitations on instruments that are more observational in nature so that the potential for assessment bias from teacher-researchers cannot be completely avoided. Even though the observation instrument has been validated and the results show feasibility, there is still a possibility that the subjectivity of the researcher in assessing the activities of students during the game has an effect on the results of the qualitative data. This reflection is important to be a concern in future research, for example by involving more than one observer or applying video recordings as triangulation data. In addition, the limited number of participants in only one class and the short research time are also limited, so it cannot be ensured the sustainability of the impact of the application of this model in the long term. Therefore, it is recommended that follow-up research be carried out with a longer duration, wider scope, and different material variations to strengthen the generalization and validity of findings related to the effectiveness of CASEL-based Game Based Learning models in elementary schools.

**Conclusion**

Based on the results of action research over two cycles, it can be concluded that the application of the CASEL-based Game Based Learning model is effective in improving mathematics learning outcomes while developing social-emotional skills of grade IV A elementary school students. This model not only has an impact on improving academic achievement, but also succeeds in building a collaborative, active, and supportive learning environment through the implementation of the five CASEL competencies, namely self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. Theoretically, these findings strengthen the concept of integrating social-emotional approaches in game-based learning as a relevant strategy for basic education in the era of the Independent Curriculum. Practically, this model is an alternative learning strategy that is able to increase students' active involvement, a positive classroom atmosphere, and build social-emotional character from an early age. Implicitly, schools and education offices need to encourage teachers to adapt CASEL-based learning models in various subjects as an effort to strengthen character education that is integrated in the academic process. In addition, this study still has limitations in the scope of participants in one class and limited material topics, so it is recommended that further research be conducted with a wider scope, longer duration, and more complex learning materials, in order to obtain a comprehensive picture of the effectiveness of this model at various levels and learning situations.

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**Authors’ Note**

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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