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Application of Contextual Teaching and Learning (CTL) to Improve Mathematics Learning Outcomes of Class VIIF Students at SMPN 1 Mataram in the 2024/2025

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Abstract: This classroom action research aims to improve the mathematics learning outcomes of 7F grade students at SMPN 1 Mataram through the application of Contextual Teaching and Learning (CTL). The low understanding of abstract mathematical concepts and the lack of connection between the material and students' real lives are the backgrounds for conducting this research. Through the CTL approach, it is expected that students can more easily understand mathematical concepts and improve their learning outcomes. This research was conducted in two cycles, which included the stages of planning, implementation, observation, and reflection. Student learning outcome data was collected through a posttest at the end of each cycle, with daily test scores from previous material used as pretest data. The results showed an increase in students' mathematics learning outcomes after the application of the CTL approach, where the completeness percentage in the pre-cycle was 13.95%, while at the end of the CAR cycle, the completeness percentage reached 88.37%. This increase indicates that the application of Contextual Teaching and Learning is effective in improving the mathematics learning outcomes of 7F grade students at SMPN 1 Mataram.

Keywords: *Contextual Teaching and Learning (CTL), mathematics learning outcomes, 7th-grade students, SMPN 1 Mataram, and classroom action research.*

Introduction

Education is a fundamental and essential need for every individual and serves as the primary foundation for character formation and intelligence development. Through the educational process, every individual is given the opportunity to optimize their potential and talents, while acquiring crucial knowledge and skills to face the dynamics of future life.

In the context of elementary and secondary education curricula, mathematics occupies a central position as a compulsory subject. The importance of mathematics in daily life is undeniable, as this discipline significantly contributes to sharpening logical thinking and facilitating clarity in problem-solving (National Research Council, 1989; OECD, 2019). More than just studying concepts and theories, mathematics learning also fosters analytical, logical, and problem-solving skills that can be applied across various aspects of life.

However, field observations often reveal challenges in mathematics learning that lead to low student achievement. In this CAR, conducted in class 7F of SMPN 1 Mataram in the 2024/2025 academic year, specifically in the second semester (February - May 2025), the main problem identified was the low mathematics learning outcomes of students. To measure initial ability, an analysis of initial data in the form of daily test scores for prerequisite material and previous chapter material was carried out as a pretest. The results of this analysis showed that the average class score only reached 37.49, with a very low classical completeness level of only 13.95% (6 out of 43 students) achieving the Minimum Completeness Criteria (KKM) of ≥75. This data clearly indicates that most 7F grade students have inadequate mathematics learning outcomes.

In addition to quantitative data from initial ability tests, direct observation in the classroom also reinforced the indication of problems. It was observed that teachers tended to adopt a dominant teacher-centered teaching method, where material delivery was done through lectures and students mostly acted as passive recipients. Reliance on textbooks and Student Worksheets (LKS) as the sole primary learning guide also limited strategy variation. This kind of approach can potentially impact students' level of understanding. Although students may follow explanations during presentations, their ability to retain and apply concepts in the long term tends to be limited. This is because of the abstract nature of mathematical concepts that are not always linked to students' real experiences, so these concepts are not strongly embedded in their memory and are difficult to apply in different contexts (Wieman, 2007). This condition demands innovation in learning approaches that can bridge abstract concepts with student reality to improve learning outcomes.

Learning outcomes themselves are essential indicators of the success of the learning process in students. According to Sudjana (2017), learning outcomes are the abilities possessed by students after they receive their learning experience, covering cognitive, affective, and psychomotor aspects. In line with that, Pranoto and Hidayat (2023) concluded that learning outcomes are achievements obtained by individuals from the learning process they have undergone. Many factors can influence learning outcomes. Wahap (2021) states that the learning outcomes achieved by individuals are a complex interaction between internal factors (from within the student) and external factors (from outside the student, such as the learning environment). Mu'in (2024) further underlines that the learning approaches and methods used by teachers have a very significant impact on learning outcomes. Therefore, teachers are expected to choose an approach that can inspire students to be active and fully engaged in learning. If the approach used is less effective, it can negatively impact students' learning progress.

In the context of searching for learning innovations, the Contextual Teaching and Learning (CTL) approach appears as a promising alternative. CTL is a learning concept that facilitates teachers to relate academic material to students' real-world contexts, thus encouraging students to build connections between the knowledge they already have and its application in daily life (Johnson, 2002). This approach is rooted in constructivism theory, where students actively construct their knowledge through interaction with the environment and real experiences (Piaget, 1977; Vygotsky, 1978). CTL fully engages students and encourages them not only to understand theory but also to implement it directly (Yuliani, 2020). Burhan et al. (2023) also define CTL as a strategy that emphasizes full student involvement to discover material and connect it with real-life situations, encouraging its application. Through this approach, learning becomes more meaningful because students can see the relevance of the material to their lives, which in turn can improve learning outcomes. This is in line with the research results of Majid (2021) which concluded that the CTL approach has a positive and significant influence on student learning outcomes. In addition, Indro (2022) also showed that CTL not only improves learning outcomes, but also student activeness and learning motivation.

The steps in Contextual Teaching and Learning (CTL), as explained by Patarani in Sulistio (2022), include eight main components: (1) Constructivism, where students build their own understanding; (2) Inquiry, which is the process of discovery and investigation; (3) Questioning, to encourage critical thinking; (4) Learning Community, which promotes collaboration; (5) Modeling, providing concrete examples; (6) Reflection, to reflect on learning experiences; (7) Authentic Assessment, assessing based on performance in a real context; and (8) Feedback. From this explanation, it can be concluded that the CTL approach is very suitable to be applied in class 7F of SMPN 1 Mataram because it allows students to make connections between academic material and their daily lives, which is essential for improving mathematics learning outcomes.

The Contextual Teaching and Learning (CTL) approach has several significant advantages, including making learning more meaningful and real. According to Hosnan in Sulistio (2022), students are required to grasp the relationship between learning experiences at school and their real lives. By directly linking subject matter to the real world or students' personal experiences, the concepts taught will be more strongly embedded in students' memory and not easily forgotten. However, Hosnan in Sulistio (2022) also stated that the application of contextual learning requires a relatively longer time compared to conventional learning. This can happen because students often work in heterogeneous groups, requiring time to adapt and collaborate. In addition, because students are expected to discover new knowledge and skills independently through connections with the real world, this process requires a longer exploration time.

To overcome potential time challenges in the CTL approach, heterogeneous grouping of students can be an effective strategy. According to Lie (2014), heterogeneous groups provide opportunities for peer tutoring and mutual support. This means that students with higher abilities in a group can guide other members in discovering new knowledge and skills, which can ultimately accelerate the learning process. Heterogeneous grouping also helps teachers guide students more directly so that learning objectives can be achieved according to the plan.

In addition to grouping strategies, in an effort to create mathematics learning that is in line with real-life daily contexts, learning materials such as teaching aids and Student Worksheets (LKPD) are needed. Anas

(2014) states that the function of teaching aids is to reduce the level of abstraction of concepts, so that students are able to grasp the true meaning of the concept. Meanwhile, Usma (2022) explains that LKPD functions to facilitate students' understanding of the subject matter obtained.

Empirical support regarding the effectiveness of the Contextual Teaching and Learning (CTL) approach in improving student learning outcomes, especially in mathematics, is widely found in research conducted by lecturers and students of Mataram University. For example, research by Lamhabaha, Baidowi, and Suntoko (2024) specifically shows that the application of CTL successfully improved the mathematics learning outcomes of VIII D grade students at SMPN 1 Mataram, indicating the relevance and potential success of this approach in the same school environment. Furthermore, a study by Siti Nurjannah, Agustan S., and Andi Husniati (2023) significantly proved the positive influence of CTL on problem-solving abilities and mathematics learning outcomes of elementary school students. Similar findings were also reinforced by the research of Maulawi Majid Abdul Aziz, Muhammad Tahir, and Itsna Oktaviyanti (2021) which examined the impact of CTL on mathematics learning outcomes of elementary school students. In addition, Asib Hani, Ida Ermiana, and Asri Fauzi (2024) also showed that CTL assisted by animated video is effective in improving conceptual understanding of mathematics. These findings from various relevant studies in the Mataram University environment provide a strong empirical basis to believe that CTL has great potential to overcome the problem of low mathematics learning outcomes of 7F grade students at SMPN 1 Mataram.

Based on the comprehensive background of the problem, relevant theoretical foundations, and support from previous research studies, the main problem formulation in this classroom action research is: "How can the application of the Contextual Teaching and Learning (CTL) approach improve the mathematics learning outcomes of 7F grade students at SMPN 1 Mataram in the 2024/2025 academic year?" The main objective of this research is to deeply analyze and determine the level of improvement in mathematics learning outcomes of 7F grade students at SMPN 1 Mataram after the implementation of the Contextual Teaching and Learning (CTL) approach during the 2024/2025 academic year. The results of this research are expected to provide a significant contribution to the development of more effective and student-centered mathematics learning practices, as well as serve as a reference for efforts to improve the quality of education at the school level and beyond.

Method

This research was conducted at SMP Negeri 1 Mataram in the even semester of the 2024/2025. The subjects of this research were all 43 students of class 7F SMP Negeri 1 Mataram, with heterogeneous academic abilities, covering various levels of initial understanding of mathematics material. The type of research used was Classroom Action Research (CAR), a reflective research approach carried out by teachers in their own classrooms. In line with Kemmis and McTaggart's (1988) view, CAR aims to understand and continuously improve learning practices. In the context of this research, CAR was chosen as the most suitable method to directly investigate the impact of the application of Contextual Teaching and Learning (CTL) on students' mathematics learning outcomes in the classroom environment.

This research adopted the CAR cycle model developed by Kemmis and McTaggart (1988), which emphasizes a collaborative and reflective process in four stages per cycle: planning, action, observation, and reflection. This research was conducted in two cycles. The selection of two cycles was based on the assumption that through repeated actions and reflections, the effectiveness of CTL implementation can be optimized and improvements in student learning outcomes can be observed significantly. Each cycle was designed with a focus on specific mathematics learning material that was deemed to require a contextual approach to improve student understanding. The duration of each cycle was 3 meetings.

The research procedure in each cycle followed a systematic flow. The planning stage involved the preparation of a Learning Implementation Plan (RPP) that explicitly integrated CTL principles. This RPP was designed to link mathematical concepts with students' daily life contexts through the selection of relevant activities, examples, and problems. In addition, contextual Student Worksheets (LKPD) were developed to encourage students to actively construct their understanding through inquiry and collaboration activities. Learning outcome test instruments (posttest for each cycle) were also prepared to measure students' understanding of the material taught in that cycle. Observation sheets focusing on aspects of CTL implementation (e.g., how teachers facilitate connections with context, how students are involved in contextual activities) and student responses (e.g., enthusiasm, participation, interaction) were also designed.

The action implementation stage was the implementation of mathematics learning in accordance with the CTL-based RPP. The researcher acted as the teacher facilitating learning by emphasizing the connection of concepts with real contexts, encouraging student questions, facilitating group discussions, and providing opportunities for students to reflect on their understanding. The observation stage was carried out simultaneously with action implementation. Observations were made by the researcher (and, if possible, collaborators) using observation sheets and field notes to systematically record how CTL learning was implemented and how students responded to it. The reflection stage was carried out after each cycle ended. Data from observations and posttests were analyzed to evaluate the effectiveness of the actions, identify strengths and weaknesses of CTL implementation, and formulate improvement plans for the next cycle. The focus of reflection was not only on improving learning outcomes but also on improving the quality of the CTL learning process.

The main data collection instruments in this research were learning outcome tests in the form of essay questions with an emphasis on contextual problem-solving. These tests were given as a posttest at the end of each cycle to measure conceptual understanding and students' ability to apply mathematical concepts in relevant contexts. The posttest questions in each cycle would be different but would measure the same basic competencies with different contexts to avoid memorization effects. Pretest data was obtained from the analysis of students' daily test scores on material before the implementation of CTL actions, which would provide an initial overview of students' mathematical abilities. In addition, observation sheets would be used systematically to record student behavior (level of engagement, interaction, response to contextual material) and teacher teaching practices (implementation of CTL steps, ability to facilitate connections with context). Field notes would complement observation data with more in-depth qualitative information about classroom dynamics and challenges that arose during implementation. Data collection techniques involved giving tests (pretest and posttest) and participant observation (researcher as teacher conducting observations). Tests were used to measure changes in student learning outcomes quantitatively, while observations and field notes were used to collect qualitative data about the CTL implementation process and student responses.

Data analysis would be carried out quantitatively and qualitatively. Student learning outcome data (pretest and posttest scores for each cycle) would be analyzed using comparative descriptive statistics, including calculations of mean, standard deviation, and percentage of learning completeness based on the applicable KKM. Improvement in learning outcomes between cycles would also be analyzed to see developmental trends. Observation data and field notes would be analyzed qualitatively through transcription, data reduction, categorization, and interpretation to identify patterns of student behavior, the effectiveness of implemented CTL strategies, and challenges encountered during implementation. Data triangulation from tests and observations would be carried out to increase the validity of the research findings.

The success indicators in this research were set as an increase in the average class score by at least 15% from the pretest to the second cycle posttest, and at least 85% of students achieving the KKM in the second cycle posttest with a minimum score of 75. These indicators would serve as benchmarks to assess the effectiveness of applying the CTL approach in improving the mathematics learning outcomes of 7F grade students at SMPN 1 Mataram.

Result and Discussion

CYCLE I

Planning

The planning stage in this Cycle I aimed to prepare everything needed before the implementation of the actions designed by the researcher, in order to improve the ability of 7F grade students to understand the material on Lines and Angles according to the established learning scenario. The preparations included the creation of a Teaching Module based on the syllabus for two learning meetings. The Teaching Module used a contextual approach with learning outcomes covering the understanding of concepts of lines and angles, types of lines and their relationships, and types of angles and their measurement, as well as the ability to solve related problems. In the implementation of learning, the use of Student Worksheets (LKPD) was planned, so these learning tools also needed to be thoroughly prepared. The LKPD was designed by presenting contextual problems commonly encountered by students in daily life, such as identifying parallel lines on train tracks or determining the angle formed by clock hands. The next preparation was the creation of observation sheets for teachers and students, based on the learning steps that had been arranged according to the CTL approach. Because this research was participatory, the researcher requested the cooperation of a fellow student who had studied research methods to be an observer and carry out the observation sheets. In addition, the researcher also created a reflection journal written by the observer regarding the actions taken in the research cycle. Finally, the researcher prepared an evaluation instrument in the form of a learning outcome test to measure student understanding at the end of Cycle I.

Action Implementation

The implementation of actions in Cycle I was carried out over two learning meetings and one evaluation meeting. The first meeting discussed the basic concepts of lines and relationships between lines, while the second meeting discussed types of angles and how to measure them. The third meeting was dedicated to giving the Cycle I evaluation test. Learning actions were carried out by the researcher, while a peer acted as an observer. Learning began with the teacher opening the class using greetings, prayers, attendance, providing motivation, and conditioning students to be ready to follow the learning (constructivism step). Before starting the material, the teacher conveyed the learning objectives to be achieved. To build basic concepts, the teacher provided apperception about the material to be studied, for example by showing objects around that have elements of lines or angles (modeling step). After students understood the basic concepts of lines and angles, they were divided into heterogeneous groups consisting of 4-5 students per group (learning community). The teacher distributed LKPD to each group, and students were instructed to solve the given problems through group discussion (inquiry). The teacher walked around monitoring the discussion to ensure that students were actively involved and to minimize individual work. The problems presented were contextual problems that could be encountered in daily life, such as determining the viewing angle in an illustration, and students were asked to relate the concepts of lines and angles that had been learned to the solutions of the problems they encountered (constructivism and questioning). The teacher gave groups the opportunity to ask questions if they encountered obstacles in solving problems. After the discussion time was over, group representatives were asked to present their answers, while other groups were allowed to respond (learning community). The teacher then guided students to jointly conclude the material on lines and angles that had been studied (reflection). Before closing the lesson, the teacher gave independent practice questions to evaluate student understanding of the material, and distributed reflection sheets as material for evaluating the next learning (authentic assessment). The teacher also conveyed the material to be studied in the next meeting.

Observation

Observation was carried out by the observer, starting from the beginning of the lesson until the end of the lesson. The observer constantly monitored teacher and student activities based on the prepared observation sheets. The observation results showed that the teacher's classroom management was still not optimal, so some students appeared less focused and involved in learning activities. In addition, student activities monitored based on student observation sheets were still suboptimal. Many students were not active in group discussions and tended to work on tasks individually. This indicates that student involvement in contextual learning has not been fully achieved, and additional strategies are needed to increase student participation and collaboration in teaching and learning activities, thus requiring improvements in the next action.

Reflection

Assessment was carried out after the teacher implemented actions on students using a contextual approach for 7 teaching hours (3 learning meetings). The learning objectives included explaining how to determine the concepts of lines and angles, types of lines and angles, and solving problems related to lines and angles. The purpose of the evaluation was to measure the extent of student understanding improvement from the actions that had been given. The evaluation results given after the third meeting in Cycle I are as follows:

Table 1. Analysis of Mathematics Learning Outcomes Completeness of 7F Grade Students at SMPN 1 Mataram Cycle I

No	Completeness Standard	Number of Students	Percentage
1	≥ 75	19	55,81
2	< 75	24	44,19
	Highest Score	95	
	Lowest Score	10	
	Average	58,93	

From Table 1 above, it can be seen that 19 students (44.19%) had achieved learning completeness with a score of ≥75. Meanwhile, 24 students (55.81%) had not yet or did not achieve completeness. The lowest student score was 10, the highest student score was 95, and the average student score was only 58.93. To see if there was an increase in learning outcomes, the comparative results in the pre-cycle and Cycle I are described below.

Table 2. Comparative Analysis of Mathematics Learning Outcomes Completeness of 7F Grade Students at SMPN 1 Mataram Pre-Cycle and Cycle I

No	Completeness	Pre-Cycle		Cycle I	
		F	%	F	%
1	Complete	6	13,95	19	44,19
2	Not Complete	37	86,05	24	55,81
Highest Score		95		95	
Lowest Score		10		10	
Average		37,49		58,93	

Table 2 shows an increase in student learning outcomes in Cycle I compared to the pre-cycle. Out of 43 students, 19 students (44.19%) were declared complete, which is a significant increase from 13.95% in the pre-cycle. The overall average score of students in this cycle was 58.93, up from 37.49. The highest score achieved by students remained 95, while the lowest score was still 10.

Although there was clear progress, Cycle I was considered unsuccessful because it had not reached the minimum success indicator of 85% of students completing. Therefore, further improvements were needed in Cycle II.

Based on the reflection results from Cycle I, some stages in the CTL approach had not been optimally implemented. In the learning community stage, students were not used to working in groups, so many group members did not actively participate. This indicates that collaboration among students had not been well established and there was a need for improvement in classroom management by the teacher to facilitate more effective interaction. Then, the modeling stage also had not been effective, as students still needed a lot of guidance from the teacher to complete the LKPD related to line and angle concepts. This shows that the teacher needed to provide clearer examples or more structured problem-solving scenarios. The lack of student independence in working on the LKPD indicates that the constructivism stage had not been fully implemented. Ideally, students should be able to construct their own understanding more independently.

Improvement efforts to be made in the next cycle are:

- Maximizing the implementation of learning in the learning community, modeling, and constructivism stages to optimize learning according to the CTL approach.
- The teacher will more intensively monitor and facilitate the role of each group member.
- Creating teaching aids relevant to the material on angle relationships to make the learning process more interactive and facilitate understanding of more abstract concepts.

CYCLE II

Planning

Based on the weaknesses found in the actions of Cycle I, the researcher collaboratively with peers planned actions for Cycle II, in order to maximize student understanding and learning implementation. The preparations made were almost the same as in Cycle I, with a similar CTL approach but with different learning objectives. The learning objectives in Cycle II included angle relationships. Additional plans included the preparation of individual LKPD for each student and the use of more interactive learning media.

Action Implementation

The implementation of actions in Cycle II was carried out in two learning meetings and one evaluation meeting. The first meeting discussed supplementary, vertically opposite, and complementary angles, while the second meeting focused on the relationship of angles when two parallel lines are cut by a transversal line. The third meeting was used for evaluation with a test. Learning began with the teacher opening the lesson through greetings, prayers, attendance, motivation, and student conditioning (constructivism step), where students were prepared to build new knowledge based on previous experiences. After conveying the learning objectives, the teacher provided apperception to build a basic understanding of the material on angle relationships, helping students understand the concepts to be learned by showing examples of angle relationships in real life. Students were then divided into heterogeneous groups consisting of 4-5 people to carry out learning community. In groups, they were given individual Student Worksheets (LKPD) to discuss and solve the problems presented (inquiry step). The teacher walked around to monitor discussions, ensuring all students actively participated, and consistently linking the material to daily life situations (constructivism). The teacher gave each group the opportunity to ask questions and then present their answers, with other groups listening and providing feedback (through questioning and learning community). After that, the teacher guided students to jointly conclude the material that had been studied (reflection). Before closing the lesson, the teacher gave independent practice questions to evaluate student understanding of the material that had been delivered and distributed reflection sheets as material for learning evaluation (authentic assessment). The teacher also conveyed the material to be studied in the next meeting.

Observation

The observation results in Cycle II showed that the teacher's classroom management was better than before. The teacher appeared more effective in directing and facilitating learning. Students also began to get used to working on LKPD and completing them in groups, although there were still some students who did not actively participate in their groups. However, overall, the level of student participation and collaboration showed a clear improvement. Students appeared more enthusiastic and active in group discussions, showing significant progress in their adaptation to contextual learning methods. The teacher also succeeded in minimizing individual work and encouraging interaction among students. This shows progress in the learning method, but further improvements are still needed in the next action to ensure that all students can be actively and equally involved in the teaching and learning process. The researcher needs to identify additional strategies to increase the participation of less active students and ensure that every group member contributes to discussions and task completion.

Reflection

The achievement of 7F grade students in Cycle II is as follows:

Table 3. Analysis of Mathematics Learning Outcomes Completeness of 7F Grade Students at SMPN 1 Mataram Cycle II

No	Completeness Standard	Number of Students	Percentage
1	≥ 75	37	86,05
2	< 75	6	13,95
Highest Score		100	
Lowest Score		70	
Average		84,44	

From Table 3 above, it can be seen that 37 students (86.05%) had achieved completeness with a score of ≥75. Meanwhile, 6 students (13.95%) had not yet or did not achieve completeness. The lowest student score was 70, the highest student score was 100, and the average student score increased significantly to 84.44. To see if there was an increase in learning outcomes, the comparative results in Cycle I and Cycle II are described below.

Table 4. Comparative Analysis of Mathematics Learning Outcomes Completeness of 7F Grade Students at SMPN 1 Mataram Pre-Cycle, Cycle I, and Cycle II

No	Completeness	Pre-Cycle		Cycle I		Cycle II	
		F	%	f	%	F	%
1	Complete	6	13,95	19	44,19	38	88,37
2	Not Complete	37	86,05	24	55,81	5	11,62
Highest Score		95		95		100	
Lowest Score		10		10		70	
Average		37,49		58,93		84,44	

Based on Table 4 of the Cycle II evaluation, there was an increase in student learning outcomes in the material on angle relationships. The percentage of students who completed increased from 44.19% in Cycle I to 88.37% in Cycle II, while the percentage of students who did not complete decreased sharply from 55.81% to 11.62%. The average score also increased from 58.93 to 84.44, with the highest score reaching 100 and the lowest score increasing from 10 to 70. This significant increase in scores indicates that the steps taken have been successful in improving the understanding and learning outcomes of 7F grade students.

Reflection on Cycle II showed significant progress compared to Cycle I for both teachers and students. The teacher showed improvement in classroom management, so the learning process ran more optimally and structured. Students also became more enthusiastic, active, and eager during learning. Discussions were effective, with the teacher successfully reducing individual work and encouraging group cooperation. The activeness and self-confidence of students in asking questions and expressing opinions increased. Nevertheless, some students were still found discussing outside the topic of the lesson, although this did not significantly disrupt the learning process. This condition is related to the learning community stage in the CTL approach, where students should remain focused on the material being discussed. With the achievement of the desired learning outcomes target and a significant improvement in learning quality, the research can be stopped at this cycle as the results have been adequately achieved.

Conclusion

Based on the results of the classroom action research in class VII F of SMPN 1 Mataram, the gradual application of the Contextual Teaching and Learning (CTL) approach was able to improve student learning outcomes in the material on Lines and Angles. The improvement was seen from Cycle I to Cycle II, with the percentage of student completeness increasing significantly, and the completeness target successfully achieved in Cycle II. The CTL approach proved effective in making learning more contextual and in line with students' daily lives, thereby helping to improve their understanding and achievement in mathematics.

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Author Contributions

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Conflicts of Interest

The authors declare no conflict of interest.

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