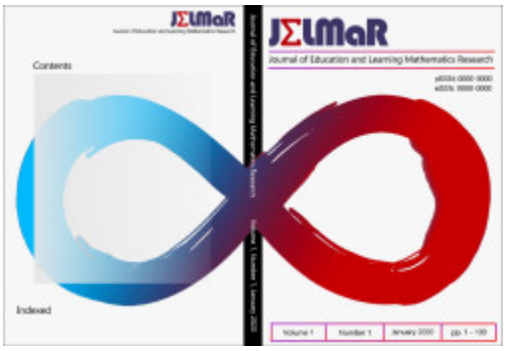

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Enhancing Students' Mathematical Conceptual Understanding through Team Games Tournament with a Culturally Responsive Teaching Approach

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Abstract: *This study uses the Teams Games Tournament (TGT) learning model and the Culturally Responsive Teaching (CRT) approach to enhance students' understanding of mathematical concepts. Classroom action research is a study design conducted at SMP Negeri 20 Malang with 32 eighth-grade students as the subject group. The study consists of cycles of four stages: planning, action implementation, observation, and reflection. The instruments used are concept understanding tests, observation forms, and interview protocols. The average student score rose from 55.13 in the pre-cycle (28% completeness) to 75.38 in cycle I (63% completeness), indicating improved learning outcomes. However, cycle II must be carried out because it does not satisfy the Indicators of Success standards. In cycle II, they rose to 81.72 (84% completion). In addition to encouraging determined development, the TGT with CRT strategy encouraged students' active participation in the learning process. It offered educational opportunities more in line with the students' cultural backgrounds. Students' comprehension of mathematical topics is thereby improved by using the CRT-based TGT learning approach.*
Keywords: teams games tournament, culturally responsive teaching, mathematical conceptual understanding

INTRODUCTION

Mathematics is a subject that plays an essential role in the development of science and technology, and contributes significantly to forming logical, analytical, critical, creative, and systematic thinking skills (Siregar, 2021). Furthermore, mathematics develops students' focus and awareness for comprehending real-world factual cases. (Juniantari et al., 2019). Therefore, learning mathematics is not only about memorizing formulas and procedures but also about building a deep understanding of the concepts taught. The Learning Outcomes in the Kurikulum Merdeka state that mathematics subjects strive to help students understand various mathematical concepts, principles, and operations, as well as apply them flexibly, precisely, and efficiently in solving problems (Badan Standar Kurikulum dan Asesmen Pendidikan, 2022). Concerning this goal, one of the essential aspects that needs to be considered is understanding students' mathematical concepts.

Understanding concepts is fundamental to learning mathematics (Hulu et al., 2023). Concept comprehension is the ability to interpret, estimate, and understand a material concept after being studied and applying it in various contextual situations (Solihah et al., 2022). Understanding mathematical concepts is an essential competency that students must have, as it allows them to express concepts in their language as well as understand the material containing many formulas thoroughly, and apply relevant procedures flexibly, accurately, efficiently, and appropriately (Dini et al., 2018; Sirait, 2018). If students comprehend mathematical concepts well, they will find it easier to solve various problems in learning mathematics and in daily life (Radiusman, 2020). Understanding concepts is an essential process for students in understanding and applying mathematics.

However, the reality is that many students still have difficulty understanding mathematical concepts. Based on the results of observations in grade VIII of SMPN 20 Malang, it was found that students still often make mistakes in solving problems due to a lack of a deep understanding of the concepts that have been taught. This condition makes

the concepts obtained easy to forget and difficult to apply in real situations. This low understanding also impacts declining learning outcomes in mathematics subjects. Similar cases were also encountered by Apriliyana et al (2023) and Musa et al (2024), who revealed that students had difficulty understanding mathematical concepts. Students tend to memorize formulas without understanding their application, and experience obstacles in solving various problems, especially those in the form of stories, thus affecting the overall mathematics learning outcomes.

One of the results of improper learning models is a poor comprehension of mathematical ideas. To overcome these problems, it is necessary to implement a learning model that can create a more meaningful learning experience to encourage an effective improvement in the understanding of mathematical concepts (Putra et al., 2021). Thus, a more interactive, collaborative, and contextual learning method is needed to improve students' understanding of mathematical concepts. In this study, the learning model used is *Teams Games Tournament* (TGT), part of cooperative learning, and uses *Culturally Responsive Teaching* (CRT).

Teams Games Tournament (TGT) is one of the cooperative learning models that integrates game elements and actively involves all students. The games used, such as quizzes, are designed by containing questions related to the learning material, so that students can learn while playing in a fun and meaningful way (Merti, 2020) *Team Games Tournament* (TGT) is a cooperative learning model that begins by listening to the teacher's explanation in front of the class (class presentation), followed by group learning activities (*Team*), games (*Games*), academic tournaments (tournaments), and ends with awards for the team (team recognition) (Sari et al., 2022). With TGT, students feel a fair tournament atmosphere because they compete with groups with similar abilities. They compete in academic tournaments as team representatives, competing with other team members with equivalent academic achievements (Adiyono et al., 2023). This competitive but still fun learning atmosphere can potentially strengthen students' understanding of concepts in a more in-depth way. In addition to using *the Teams Games Tournament* (TGT) learning model, this study uses *the Culturally Responsive Teaching* (CRT) approach to improve students' understanding of concepts.

Culturally Responsive Teaching (CRT) is an approach that integrates students' cultures, experiences, and learning styles into the environment, curriculum, and teaching methods to reflect and value diversity. This approach encourages creating inclusive, equitable learning and makes students feel safe, valued, and free to express themselves (Cheng et al., 2021; Kurniasari et al., 2023). The Culturally Responsive Teaching (CRT) approach involves students' cultural backgrounds to assist them in comprehending the subject. In its application, teachers integrate cultural elements into the learning process (Hernita et al., 2024). The implementation of the *Culturally Responsive Teaching* (CRT) approach can strengthen students' understanding of mathematical concepts by connecting learning materials in familiar cultural contexts, building an inclusive learning atmosphere, and implementing strategies that are in harmony with students' daily life (Susilowati et al., 2024)

Research on improving students' concept understanding through *Teams Games Tournament* (TGT) has previously been conducted by Merti (2020) and Rahmat et al (2018). Research related to improving conceptual understanding with *the Culturally Responsive Teaching* (CRT) approach has also been conducted by Hernita et al (2024) and Susilowati et al (2024). However, no research has been undertaken to improve understanding of mathematical concepts using the *Teams Games Tournament* (TGT) learning model combined with *the Culturally Responsive Teaching* (CRT) approach. The novelty of this study lies in combining the *Teams Games Tournament* (TGT) learning model, which involves collaborative groups and games, with *the Culturally Responsive Teaching* (CRT) approach that pays attention to the culture of students. Combining these two approaches is expected

to create a more fun, relevant, and inclusive learning atmosphere, and can help students understand mathematical concepts better.

METHOD

This research is a classroom action research (PTK) that aims to improve students' understanding of mathematical concepts by using the *Teams Games Tournament* (TGT) model and *the Culturally Responsive Teaching* (CRT) approach. The research was conducted at SMPN 20 Malang, with 32 research subjects in grade VIII. The research design refers to Kemmis and McTaggart's cycle model, which consists of four stages in each cycle, namely: (1) *Planning*, (2) Implementation of actions, (3) Observation, and (4) *Reflection*. The research is carried out in several continuous cycles until most students successfully achieve all indicators of understanding of mathematical concepts that have been set. Each stage in the cycle is carried out systematically to encourage continuous improvement during the learning process. The following is Kemmis and McTaggart's cycle model.

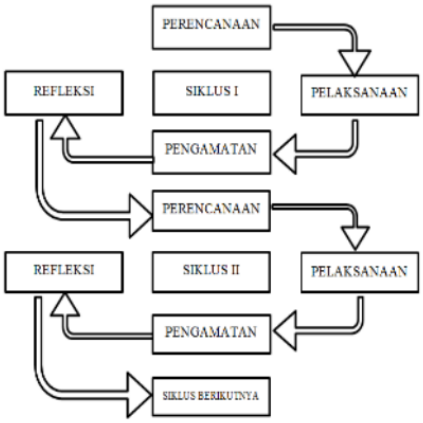

Figure 1. Kemmis and Mc. Taggart's PTK Cycle Model
Source: adopted from Novakhta et al (2023)

The instruments used in this study were compiled to measure students' understanding of mathematical concepts during the learning process using the *Teams Games Tournament* (TGT) model with *a Culturally Responsive Teaching* (CRT) approach. Each instrument is developed based on relevant indicators and validated in advance by experts to ensure the feasibility of the content and relevance to the learning objectives. The instruments used in this study include concept understanding test sheets in the form of essay questions, interview guidelines, and observation sheets.

Data analysis was carried out in a qualitative descriptive manner. The analysis process was carried out through data collection, compiling, presentation, and drawing conclusions referring to the Miles and Huberman model (Miles et al., 2014). Qualitative data is analyzed based on indicators of understanding of mathematical concepts. The indicators of understanding mathematical concepts used in this study are: 1) the ability to re-express the concepts that have been learned, 2) classify objects based on special characteristics or characteristics, 3) provide examples and not examples of a concept, 4) present concepts in various representations, 5) formulate necessary and sufficient conditions, and 6) apply these concepts in solving mathematical problems (Sirait, 2018) Quantitative data in the form of test results are used to support the findings and provide an overview of the development of students' concept understanding from cycle to cycle.

The research is considered successful if it meets the following two criteria: (1) problem-based learning is declared successful if after the implementation of the action there is an increase in students' understanding of concepts by at least 75%, and (2) as many as 75% of the number of students obtain a minimum score of 75 (Handriastuti et al., 2024)

RESULT AND DISCUSSION

This research begins with observation activities to identify problems during learning and find the right solutions to overcome them. The researchers also conducted an initial test to determine the extent of students' understanding of mathematical concepts before being given action. The results of the concept understanding test at the pre-cycle stage are presented in Table 1 below.

Table 1. Pre-Cycle Concept Comprehension Test Results

Number of Students	Average score	Students who meet the indicators		Students who do not meet the indicators	
		Sum	Percentage	Sum	Percentage
32	55,13	9	28%	23	72%

Based on the pre-cycle results in Table 1, it is known that the average score of the 32 students was 55.13. Of these, only nine students achieved completeness scores, while the other 23 did not complete them because they obtained scores below 75. This data shows that most students do not understand the concepts taught well. The low completeness indicates the need to learn using appropriate models and approaches to improve students' understanding of mathematical concepts. Thus, applying a more interactive, collaborative, and contextual learning model through *Teams Games Tournament* (TGT) based on *Culturally Responsive Teaching* (CRT) is necessary to correct the condition.

Cycle 1

At the planning stage, the activities carried out are: 1) making a learning implementation plan using the learning model *Teams Games Tournament* (TGT) and the *Culturally Responsive Teaching* (CRT), 2) prepare the material to be taught, 3) study the material to be taught, 4) prepare questions for the game, 5) prepare rewards for the team that wins the tournament, 6) make observation sheets to observe student activities during the teaching and learning process, 7) make evaluations in the form of concept comprehension tests, and 8) create interview guidelines to find out students' responses to learning models and approaches used in improving comprehension skills their concept.

At the implementation stage, the researcher conducts learning activities for 2 hours of lessons according to the stages of the learning model, *Teams Games Tournament* (TGT), based on *Culturally Responsive Teaching* (CRT). The culture integrated in the geometry learning material is a Traditional indigenous house, like Figure 2 below.

BAHAN AJAR LIMAS DAN PRISMA

Pernahkah kalian melihat bentuk atap rumah adat di Indonesia, seperti Rumah Osing dari Banyuwangi atau Joglo dari Jawa? Coba perhatikan bentuk atapnya ! Menurut kalian, bangun ruang apa yang mirip dengan bentuk tersebut?

Bangun ruang tidak hanya kita temui di pelajaran matematika, tapi juga dalam kehidupan sehari-hari, termasuk dalam budaya kita sendiri. Contohnya, atap rumah adat Joglo memiliki bentuk yang menyerupai limas, sedangkan atap rumah adat Osing yang menyerupai prisma segitiga. Bentuk-bentuk ini tidak dipilih sembarangan, tetapi dirancang sesuai fungsi dan nilai budaya. Dari sini kita bisa belajar bahwa memahami bangun ruang tidak hanya membantu kita dalam matematika, tetapi juga dalam memahami kearifan lokal dan arsitektur tradisional Indonesia.

Figure 2. Culture Material as Part of CRT

The TGT stage begins with listening to the teacher's explanation in front of the class (class presentation), followed by group learning activities (*Team*), games (*Games*), and academic tournaments (*Tournament*). It ends with an award for the team (team recognition).

The observation stage is carried out to determine student participation and the development of concept understanding during the learning process. The observation results showed increased student participation compared to before the action, especially in group discussions and involvement during tournaments, although it was not evenly distributed across groups.

Table 2. Results of the Concept Comprehension Test Cycle I

Number of Students	Average score	Students who meet the indicators		Students who do not meet the indicators	
		Sum	Percentage	Sum	Percentage
32	75,38	20	63%	12	37%

In cycle I, the reflection results showed that the average student score increased to 75.38. However, the proportion of students who have reached the success indicator has only reached 63%, so it has not met the target of 75%. The final test on a cycle I results also show students' lack of comprehension, as shown in Figure 3.

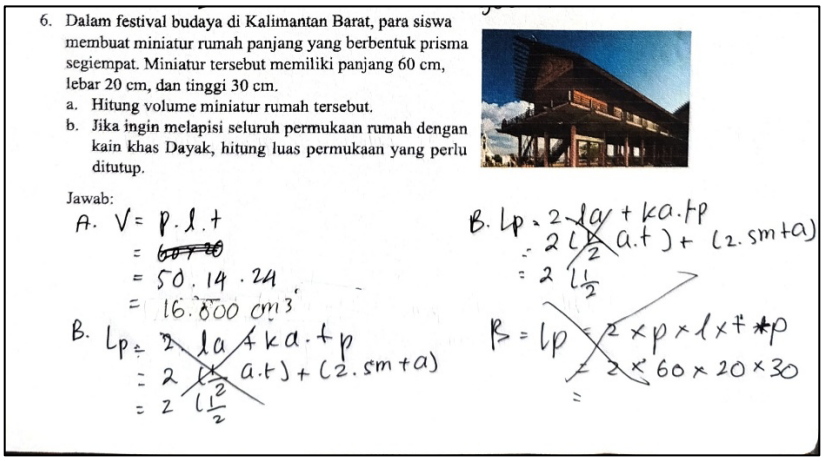

Figure 3. Students' Answers to The Final Test On A Cycle I

By reflection, the main weakness lies in managing time during group activities and tournaments, and the imbalance of roles between group members, where there are still students who are less actively contributing. In addition, an indicator of concept understanding that has not been maximized is the ability to present concepts in various representations and apply concepts in solving contextual problems. The lack of cycle I became the basis for improvement planning in cycle II, emphasizing strengthening the role of group members and more effective time management.

Cycle II

The planning and implementation stages in cycle II are generally similar to those in cycle I. However, in cycle II, improvements are made to the shortcomings found previously. One of the improvement plans implemented is using more interactive tournament games, such as quizzes based on digital media or interesting question cards, so that all group members can play an active role and work together optimally in tournament activities.

The observation stage is carried out systematically to monitor the development of student participation during the learning process, both in group discussions, tournament

activities, and in conveying ideas and concept understanding. The observations showed a significant increase in student engagement and interaction between group members compared to the previous cycle.

There was a significant increase in grade achievement and student involvement in learning from cycle I to cycle II. The improvement plan implemented has proven to be successful in overcoming weaknesses in cycle I. In cycle II, improvement actions are carried out based on the results of previous reflection, namely by managing tournament time better and using interactive games to make learning more fun and collaborative.

Table 3. Results of the Concept Comprehension Test Cycle II

Number of Students	Average score	Students who meet the indicators		Students who do not meet the indicators	
		Sum	Percentage	Sum	Percentage
32	81,72	27	84%	5	16%

The results of the second cycle action showed a more significant increase: the average student score reached 81.72, and the percentage of learning completeness increased to 84%. In addition to quantitative grade achievement, observations and reflective interviews show that students are more active, enthusiastic, and able to relate mathematical concepts to their daily experiences. The classroom atmosphere becomes more inclusive, competitive, and fun, with students more emotionally and intellectually engaged. From the results of the interviews, several students revealed that the Teams Games Tournament (TGT) learning model with the Culturally Responsive Teaching (CRT) approach helped them better understand the material because it was delivered in a fun, easy-to-understand way, and at the same time introduced them to the cultural richness of the archipelago. These results show that combining the TGT model and the CRT approach has improved students' understanding of mathematical concepts. The final test of cycle II also shows students' progress in understanding the geometry material, as shown in Figure 4.

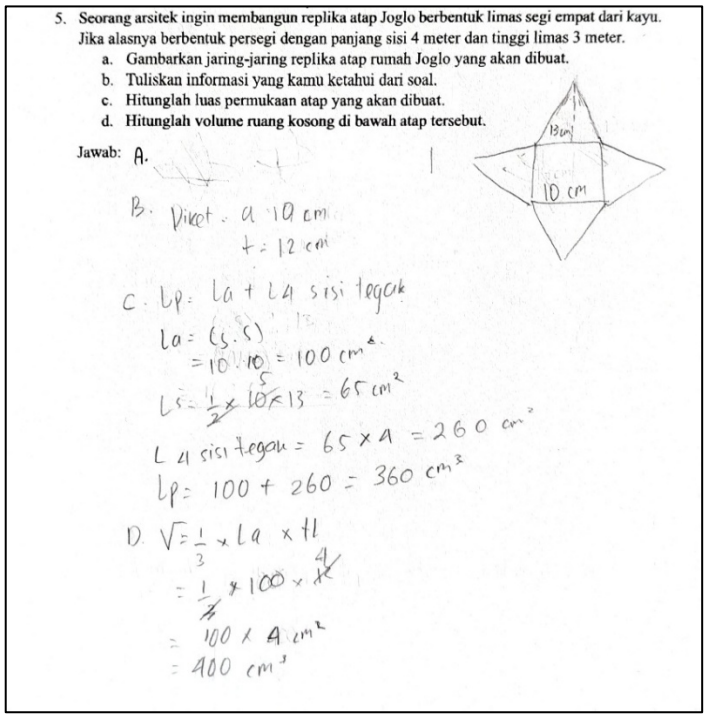

Figure 4. Students' Answers to The Final Test On Cycle II

Based on the results of the test of mathematical concept comprehension ability through essay questions, interviews, and observations, the development of concept comprehension skills presented in Table 4 is obtained below:

Table 4. Development of Students' Mathematical Conceptual Understanding Results

Comparison	Pre-cycle	Cycle I	Cycle II
Average score	55,13	75,38	81,72
Completeness of concept understanding	28%	63%	84%
Number of students completed	9	20	27
The number of students is incomplete	23	12	5

Table 4 above shows that applying the Teams Games Tournament (TGT) learning model with the Culturally Responsive Teaching (CRT) can improve students' understanding of mathematical concepts. This result aligns with the research of Adha et al. (2020), which states that the TGT model can improve students' understanding of mathematical concepts. Similarly, research by Astriana et al (2017) shows that cooperative learning with the TGT model can help students become more active and responsive in learning. Ardianti et al (2025) argue that *Culturally Responsive Teaching* (CRT) can improve understanding of mathematical concepts by incorporating culturally relevant concepts. Fatonah et al (2024) stated that the CRT approach can make students more interested and active because learning gives space to students' cultural expression and identity, thus positively impacting their learning outcomes.

The increase in understanding of mathematical concepts and the increase in the number of students who obtained scores above the Minimum Completeness Criteria showed that the use of the learning model *Teams Games Tournament* (TGT) with the *Culturally Responsive Teaching* (CRT) has a positive influence. Learning becomes more meaningful, fun, and contextual by paying attention to students' cultural background and implementing healthy competition through academic tournaments.

CONCLUSION

Based on the results of the PTK that has been implemented in two cycles, it can be concluded that the application of the learning model *Teams Games Tournament* (TGT) with the *Culturally Responsive Teaching* (CRT) shows an improvement in the ability to understand mathematical concepts of grade VIII students of SMPN 20 Malang evidenced by an increase in the average score from 55.13 in the pre-cycle to 75.38 in Cycle I, and increased again to 81.72 in Cycle II. In addition, the achievement of success indicators also showed an increase, from 28% in pre-action to 63% in Cycle I, and reached 84% in Cycle II. The application of this model also positively impacts increasing students' active involvement in the learning process, creating a more inclusive learning atmosphere, and linking learning materials with students' cultural context to improve the relevance and meaning of learning.

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REFERENCES

Adha, I. A., Bintoro, H. S., & Wanabuliandari, S. (2020). Pemahaman Konsep Matematis Bangun Datar Melalui Model Teams Game Tournament Berbantuan Roda Bangun Data. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *4*(2), 637–644. https://doi.org/10.31004/cendekia.v4i2.270

Adiyono, Umami, F., & Rahayu, A. P. (2023). The Application of the Team Game Tournament (TGT) Learning Model in Increasing Student Interest in Learning. *Proceeding of International Conference on Education, Society and Humanity*, *01*(01), 817–825.

Apriliyana, D. A., Masfu'ah, S., & Riswari, L. A. (2023). Analisis Pemahaman Konsep Matematika Siswa Kelas V pada Materi Bangun Ruang. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *6*(6), 4166–4173. https://doi.org/10.54371/jiip.v6i6.2149

Ardianti, K. E., Rulviana, V., & Triastuti, A. (2025). *Peningkatkan Hasil Belajar melalui Pendekatan Culturally Responsive Teaching (CRT) pada Materi Bangun Datar Kelas 2 SDN Uteran 01*. *02*(03), 259–269.

Astriana, M., Murdani, E., & Mariyam. (2017). Penerapan Model Pembelajaran Kooperatif Tipe Teams Games Tournament untuk Meningkatkan Kemampuan Pemahaman Konsep Matematis Siswa pada Materi Operasi Bilangan Pecahan. *JPMI (Jurnal Pendidikan Matematika Indonesia)*, *2*(1), 27–31.

Badan Standar Kurikulum dan Asesmen Pendidikan. (2022). Capaian Pembelajaran Mata Pelajaran Matematika Fase A - Fase F. *Kementrian Pendidikan Dan Kebudayaan Riset Dan Teknologi Republik Indonesia*, 11–12.

Cheng, M. M., Lacaste, A. V., Saranza, C., & Chuang, H. H. (2021). Culturally responsive teaching in technology-supported learning environments in marine education for sustainable development. *Sustainability (Switzerland)*, *13*(24). https://doi.org/10.3390/su132413922

Dini, M., Wijaya, T. T., & Sugandi, A. I. (2018). Pengaruh Self Confidence Terhadap Kemampuan Pemahaman Matematik Siswa Smp. *JURNAL SILOGISME : Kajian Ilmu Matematika Dan Pembelajarannya*, *3*(1), 1. https://doi.org/10.24269/js.v3i1.936

Fatonah, S., Damayanti, A. Ti., Arif, A., & Murniati, N. A. N. (2024). Efektivitas Pendekatan CRT (Culturally Responsive Teaching) untuk Meningkatkan Hasil Belajar Peserta Didik pada Mata Pelajaran Bahasa Indonesia Kelas IV SD N Pedurungan Kidul 02. *Jurnal Pendidikan Tambusai*, *8*(2), 33165–33171.

Handriastuti, S. W., Nizaruddin, N., Handayani, E. S., & Zuhri, M. S. (2024). Peningkatan Kemampuan Pemahaman Konsep Matematika melalui Pembelajaran Berbasis Masalah Berbantuan Lembar Kerja Siswa. *Journal on Education*, *7*(1), 3703–3712. https://doi.org/10.31004/joe.v7i1.6960

Hernita, L. V., Istihapsari, V., & Widayati, S. (2024). Peningkatan Pemahaman Konsep Matematika Siswa Kelas XI-2 SMAN 2 Bantul dengan Pendekatan Culturally Responsive Teaching (CRT) Berbantuan Google Sites. *Proximal: Jurnal Penelitian Matematika Dan Pendidikan Matematika*, *7*(2), 517–523. https://doi.org/10.30605/proximal.v7i2.3590

Hulu, P., Harefa, A. O., & Mendrofa, R. N. (2023). Studi Model Pembelajaran Inkuiri terhadap Pemahaman Konsep Matematika Siswa. *Educativo: Jurnal Pendidikan*, *2*(1), 152–159. https://doi.org/10.56248/educativo.v2i1.97

Juniantari, M., Pujawan, I. G. N., & Widhiasih, I. D. A. G. (2019). Pengaruh Pendekatan Flipped Classroom Terhadap Pemahaman Konsep Matematika Siswa Sma. *Journal of Education Technology*, *2*(4), 197. https://doi.org/10.23887/jet.v2i4.17855

Kurniasari, I. F., Dwijayanti, I., Roshayanti, F., & Handayani, S. (2023). Implementasi Culturally Responsive Teaching pada Materi Bentuk Bangun Ruang Kelas 1 SDN Pandean Lamper 04 Semarang. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *6*(7), 5364–5367. https://doi.org/10.54371/jiip.v6i7.2403

Made Merti, N. (2020). Penerapan Model Pembelajaran Teams Games Tournament (TGT) dengan Media Audio Visual Guna Meningkatkan Hasil Belajar Bahasa Inggris. *Journal of Education Action Research*, *4*(3), 315–321. https://ejournal.undiksha.ac.id/index.php/JEAR/index

Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative Data Analysis : A Methods Sourcebook* (3rd ed.). SAGE Publications, Inc.

Musa, R. N., Monoarfa, J. F., & Regar, V. E. (2024). Pemahaman Konsep Matematis Siswa dalam Menyelesaikan Soal Cerita Materi Barisan dan Deret Kelas X. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *8*(2), 1040–1048. https://doi.org/10.31004/cendekia.v8i2.3031

Putra, J. D., Suardi, D., & Juandi, D. (2021). Peningkatan Kemampuan Pemahaman Konsep Matematis Siswa Melalui Pembelajaran Kooperatif Berbasis Education for Sustainable Development. *Pythagoras: Jurnal Program Studi Pendidikan Matematika*, *10*(2), 122–129. https://doi.org/10.33373/pythagoras.v10i2.3130

Radiusman, R. (2020). Studi Literasi: Pemahaman Konsep Anak Pada Pembelajaran Matematika. *FIBONACCI: Jurnal Pendidikan Matematika Dan Matematika*, *6*(1), 1. https://doi.org/10.24853/fbc.6.1.1-8

Rahmat, F. L. A., Suwatno, & Rasto. (2018). Meningkatkan Pemahaman Konsep Siswa melalui Teams Games Tournament (TGT): Meta Analisis. *Manajerial*, *3*(5), 239–246.

Sari, N., Ananda, R., & Fauziddin, M. (2022). Meningkatkan Keterampilan Kerjasama Siswa melalui Model Pembelajaran Kooperatif Teams Games Tournament (TGT) Siswa Sekolah Dasar. *Al-Madrasah: Jurnal Ilmiah Pendidikan Madrasah Ibtidaiyah*, *6*(4), 1548–1557. https://doi.org/10.35931/am.v6i1.1444

Sirait, E. D. (2018). Pengaruh Gaya dan Kesiapan Belajar terhadap Pemahaman Konsep Matematika Siswa. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, *7*(3), 207–218. https://doi.org/10.30998/formatif.v7i3.2231

Siregar, N. F. (2021). Pemahaman Konsep Matematika Siswa SMP Melalui Pendekatan Realistic Mathematics Education. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *5*(2), 1919–1927. https://doi.org/10.31004/cendekia.v5i2.635

Solihah, A., Yusuf Aditya, D., & Saefullah Kamali, A. (2022). Pengaruh Gaya Dan Kemandirian Belajar Terhadap Pemahaman Konsep Matematika Siswa. *Berajah Journal*, *2*(2), 231–240. https://doi.org/10.47353/bj.v2i2.82

Sunny, V., Siti Sundari, F., & Kurniasih, M. (2023). Penerapan Model Project Based Learning Dengan Media Konkret Untuk Meningkatkan Hasil Belajar Matematika Kelas V E Di Sdn Polisi 1 Kota Bogor. *Didaktik : Jurnal Ilmiah PGSD STKIP Subang*, *9*(2), 1070–1079. https://doi.org/10.36989/didaktik.v9i2.788

Susilowati, I., Krisdiana, I., & Hidayati, S. N. (2024). Peningkatan Pemahaman Konsep Peserta Didik Melalui Penerapan Model Pembelajaran Problem Based Learning dengan Pendekatan Culturally Responsive Teaching pada Materi Persamaan Garis Lurus di Kelas VIII B SMP Negeri 3 Madiun Tahun Ajaran 2023/2024. *Journal on Education*, *7*(1), 5416–5425.