

Improving Collaboration Skills of Students in Class V through Math Puzzle Games at UPT SDN 066054 Medan

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Abstract

Students are less enthusiastic when given tasks in groups. They are not used to dividing tasks and roles in their discussion groups because they are not used to collaborating in their discussion groups. At the same time, collaboration skills are critical in 21st-century learning. From the problems found, a Classroom Action Research (PTK) was conducted to find out the improvement of collaboration skills of class V UPT SDN 066054 Medan students through math puzzle games on the material of FPB and KPK. The treatment results over two cycles showed a significant increase in collaboration skills. In the pre-cycle, the percentage of students' collaboration skills was 53%. Furthermore, the sample was given treatment by working on math puzzle games in groups so that the percentage of students' collaboration skills in cycle I increased by 28% to 81%, and in cycle II also increased by 8% to 89%. Thus, it can be concluded that puzzle games positively and effectively impact students' collaboration skills in mathematics subjects.

Keywords: Collaboration, Mathematics, Puzzle,

Abstrak

Peserta didik kurang antusias ketika diberikan tugas secara berkelompok dan belum terbiasa membagi tugas dan peran dalam kelompok diskusinya dikarenakan mereka tidak terbiasa untuk berkolaborasi dalam kelompok diskusinya. Padahal keterampilan kolaborasi merupakan salah satu keterampilan kunci dalam pembelajaran abad ke-21. Dari permasalahan yang ditemukan, maka dilakukan Penelitian Tindakan Kelas (PTK) untuk mengetahui peningkatan keterampilan kolaborasi peserta didik kelas V UPT SDN 066054 Medan melalui game puzzle matematika pada materi FPB dan KPK. Hasil perlakuan selama dua siklus menunjukkan peningkatan keterampilan

kolaborasi yang signifikan. Pada prasiklus, persentase keterampilan kolaborasi peserta didik sebesar 53%. Selanjutnya sampel diberikan perlakuan dengan mengerjakan game puzzle matematika secara berkelompok sehingga persentase keterampilan kolaborasi peserta didik pada siklus I meningkat sebesar 28% menjadi 81%, dan pada siklus II juga mengalami peningkatan sebesar 8% menjadi 89%. Dengan demikian, dapat disimpulkan bahwa game puzzle berdampak positif dan efektif dalam mengingkatkan keterampilan kolaborasi peserta didik pada mata pelajaran matematika.

Kata Kunci: Kolaborasi, Matematika, Puzzle,

1. INTRODUCTION

Science and technology are developing rapidly in line with life in the 21st century. With the development of science and technology and global needs, the expected literacy in the future that students must have is no longer just reading and arithmetic; students must be proficient in various skills, including collaboration skills (Irwansyah & Perkasa, 2022). In line with that, the government has also formulated a learning paradigm that requires students to have collaborative skills, as stipulated in Permendikbud No. 21 Tahun 2016 that one of the competency standards that graduates need to have at the primary and secondary education levels is the skill of presenting collaboratively.

Learning activities with the ultimate goal of collaboration have many advantages, including training in socializing, exchanging new ideas, cooperation/task sharing, conflict resolution, resource sharing, and communication (Child, 2016). Furthermore, collaboration skills not only help learners understand the concepts better but also prepare them to face global challenges that require teamwork. However, various studies show that learners' collaborative skills are still low.

Based on research by Ulhusna et al. (2020), it is known that students' collaboration skills are still in the low category. This is because students find it difficult to collaborate in learning. If learning activities are carried out in groups, students spend more time telling stories and not completing the tasks given by the teacher. In line with that, Ifada et al. (2024) stated in their

research that the collaborative learning process can consume much time because students talk to other students outside the learning topic, which results in tasks from the teacher needing to be completed.

The same problem also occurs in grade V students at SDN 066054 Medan. Based on observations made, it is known that students are less enthusiastic when given tasks in groups; they are not accustomed to dividing tasks and roles in their discussion groups, so group tasks are only done by one or two people, and other friends do other activities outside of learning. Furthermore, the researcher interviewed the fifth-grade teacher and found out that so far, the group assignments given were in accordance with the instructions in the students' textbooks without careful preparation and without paying attention to their suitability to the characteristics and needs of the students. This is undoubtedly one of the things that affect the lack of formation of students' collaboration skills during group discussions, as stated by Ulhusna et al. (2020) that the problems that occur in the field related to the low collaboration skills of students are influenced by the teacher's readiness in designing learning. In addition, Firman et al. (2023) also stated that the teacher often dominates the learning that takes place. Hence, collaboration occurs because communication and activities take place in only one way. This is in accordance with the study of Kariuki et al. (2018), which identified teacher readiness as an important dimension that can help improve student performance in Mathematics. Daud's (2016) study stated that teacher readiness in the learning process can improve learning outcomes and students' collaboration skills in learning.

Related to the problems found, PTK was carried out as an effort to improve students' collaboration skills. What researchers do is design lessons using suitable media to teach mathematics in the classroom, especially in elementary schools. The press that researchers use in this study is a puzzle game. Puzzle games were chosen as learning media because, based on Widiana et al.'s research (2019), puzzle learning media effectively increased

students' competence. In their research, Sari et al. (2023) also stated that learning using puzzles effectively improves students' collaboration skills. Furthermore, Nurhadiani et al. (2024) stated that using puzzle games in learning can improve students' teamwork and collaboration skills in solving math problems.

Thus, a study entitled "Improving Collaboration Skills of Students in Class V through Math Puzzle Games at UPT SDN 066054 Medan" was conducted. With math puzzle games, it is hoped that students will become active in collaboration with their groups so that their collaboration skills in math lessons can improve through the strategies applied.

2. LITERATURE REVIEW

Collaboration skills are one of the critical skills needed in 21st-century life. This refers to the fact that 21st-century learning is essential to develop relevant to global challenges and future needs so that students can compete globally. Thus, collaboration skills are crucial to apply in classroom learning activities. The goal is for students to get used to working collaboratively so that the learning is more meaningful and produces more knowledge (Ulhusna et al., 2020). In addition, students who work collaboratively will create more enjoyable learning activities (Anam et al., 2024). To obtain these advantages, teachers can design learning with the ultimate goal of collaboration. This learning design can be done on every subject matter and all subjects, including mathematics (Ulhusna et al., 2020).

Mathematics, as a subject studied from primary education to college, can certainly be designed to achieve the ultimate goal of collaboration (Tambychik et al., 2010). Furthermore, Putri et al. (2022) explained that 21st-century mathematics learning is essential to hone four skills; one of these skills is collaboration. Thus, mathematics learning needs to be designed using various techniques so that students in collaboration can innovate and create new

valuable ideas to evaluate the ideas they get through collaborative activities. One of the techniques that can be applied in learning mathematics, especially at the elementary school level, is the use of learning media.

Learning media and its relationship with children started from infancy. Today, children's learning media are encompassed in many different types, including the Internet, newspapers, games, cell phones, magazines, and text messages. However, the characteristics of elementary school students are always identified with playing. This is based on research by Nurjaya et al. (2023), which states that the game method can increase students' interest in mathematics. Students feel learning is more fun, not burdened, and mathematics is not dull anymore. In this context, the game is defined as a fun activity and plays a vital role in children's acquisition of new skills. Recognizing the importance of this, educators use games as the most essential tool in planning and managing children's educational processes (Ulhusna et al., 2020).

3. METHOD

The research method used is Classroom Action Research (PTK), which is carried out to improve the collaboration skills of grade V students at UPT SDN 066054 Medan. The PTK focused on studies on enhancing students' collaboration skills through math puzzle games on the material of FPB and KPK. The research was conducted in two cycles, where each cycle in the study consisted of four stages referring to the Kemmis and McTaggart PTK cycle model, which includes plan, act, observe, and reflection (Darmayanti et al., 2024). The Kemmis and McTaggart PTK cycle model is visualized in Figure 1.

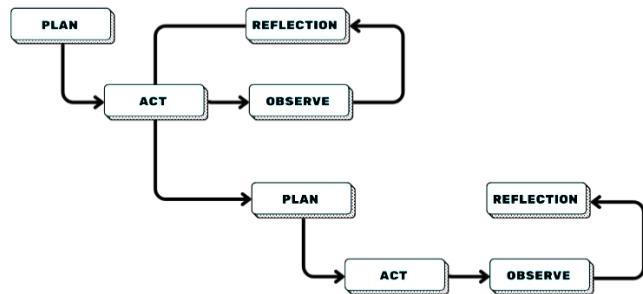


Figure 1. The Kemmis and McTaggart Cycle Model

Researchers first plan each learning cycle by designing Teaching Modules and other teaching tools. In the planning stage, the researcher designs the LKPD that students will complete in groups. The LKPD is in the form of puzzles that must be arranged by first completing the questions on the puzzle board, where the answer to each question is contained in the puzzle image pieces. At the implementation stage, learning activities were carried out following PBL syntax, with students formed into four groups. Each group is given a puzzle with different questions and pictures. During the implementation, researchers observed the activities of students while filling out observation sheets and conducting documentation. After completing one learning cycle, students are asked to fill out a collaboration skills questionnaire according to their learning activities during one cycle. Furthermore, researchers reflect on the learning done during one cycle for improvement in the activities in the next cycle.

The research was conducted at UPT SDN 066054 Medan in class V with 23 students from July 15 to August 2, 2024. The data collection techniques were administered by administering a collaboration skills questionnaire, observing, and documenting the implementation of activities. After the data is collected, data analysis is carried out using the following formula.

$$P = \frac{n}{N} \times 100\% \quad (\text{Sudijono, 2006})$$

Where,

P = Percentage of collaboration skills

n = Number of average scores of assessment aspects

N = the maximum score of the assessment aspect

Data analysis is done after obtaining the P value, which modifies the Likert scale. The criteria for the percentage of students' collaboration skills using math puzzle games are as in Table 1.

Table 1. Percentage Criteria for Collaboration Skills

Percentage	Criteria
86% - 100%	Very High
71% - 85%	High
50% - 70%	Medium
< 50%	Low

(Arikunto, 2010)

4. FINDINGS AND DISCUSSION

The research was conducted to analyze the effect of using math puzzle games on the collaboration skills of fifth-grade students at UPT SDN 066054 Medan, totaling 23 people. The sample was first given treatment by working on math puzzle games in groups. Furthermore, a questionnaire containing 20 questions containing five indicators of collaboration skills. Greenstein (2012) includes contributing actively, working productively, showing an attitude of responsibility, flexibility and compromise, and mutual respect.

Pre-classroom learning was implemented on Monday and Friday, July 15 and 19, 2024, by giving group assignments as questions to find the value of FPB and KPK. Based on observations made, during the task work, students did not divide tasks and roles in their discussion groups, so group assignments were only done by one or two people. In contrast, other friends worked on different activities outside of learning. Thus, the data obtained from the pre-class collaboration skills questionnaire showed that the % of students' collaboration skills was only 53%.

The implementation of cycle I activities was carried out on Monday and Friday, July 22 and 26, 2024, by reinforcing the learning material and then

giving group assignments in the form of questions to find the value of FPB and KPK where the answers to the FPB and KPK values sought were in the pieces of the picture which then the students arranged the pieces of the picture to reveal the meaning of the image obtained. Based on observations made during the task work, they were curious about the image behind the puzzle, so they divided the tasks into their discussion groups to immediately know the image that was compiled. After the treatment was given, students were asked to fill out a collaboration skills questionnaire, and after being analyzed, a percentage of 81% was obtained.

The same treatment was given in cycle II activities, carried out on Monday and Friday, July 29, 2024, and August 2, 2024, but with sub-topic material, namely determining FPB and KPK with prime factorization. Based on observations, students in cycle II were more enthusiastic. They tried to correct the mistakes they made in the division of tasks in implementing the previous cycle so that the task work was more organized and quickly completed. After the treatment was given, students were again asked to fill out a collaboration skills questionnaire, and after being analyzed, a percentage of 89% was obtained.

The research results conducted in cycles I and II showed an increase in students' collaboration skills. This can be seen from the percentage results in the pre-cycle, which were only 53%. In cycle I, the percentage increased by 28% to 81%, and in cycle II, it increased by 8% to 89%. The percentage increase in students' collaboration skills can be seen in Table 2 and Figure 2.

Table 2. Percentage of Improvement of Learners' Collaboration Skills

Research Variable	Percentage		
	Pre-cycle	Cycle I	Cycle II
Collaboration Skills	53%	81%	89%

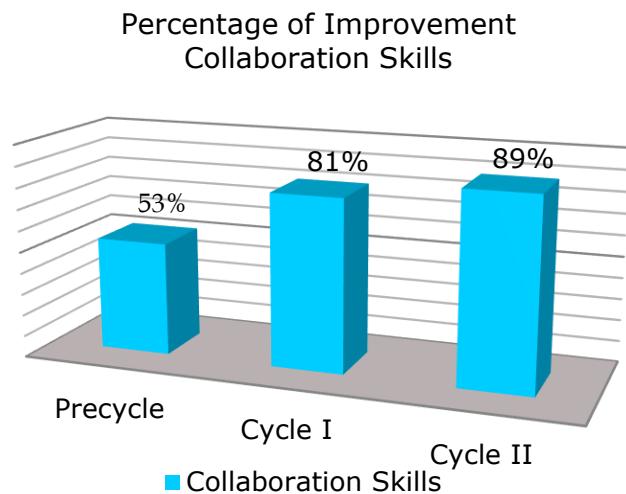


Figure 2. Diagram of the Improvement of Learners' Collaboration Skills

The data analysis results show increased students' collaboration skills through math puzzle games. In the pre-cycle, the percentage of students with collaboration skills was 53%, which was still in the medium criteria. After learning using math puzzle games in cycle I learning activities, students' collaboration skills increased by 28% to 81% with high criteria. Then in cycle II, students' collaboration skills increased by 8% to 89% with very high criteria.

Based on the data, students' collaboration skills have increased each cycle. Thus, it is proven that learning mathematics using math puzzle games can improve the collaboration skills of grade V students at UPT SDN 066054 Medan.

The use of math puzzle games has proven to be effective. It can positively impact students' collaboration skills in mathematics lessons on the material of FPB and KPK. In its implementation, students are enthusiastic and curious about the image behind the puzzle, so they divide the tasks into their discussion groups to know the image arranged immediately. This follows the research of Valentina et al. (2024), which states that the use of puzzle media has a positive impact on student learning outcomes; students are more active and enthusiastic in the learning process when applying puzzle media, and the

classroom atmosphere becomes exciting and feels impressed with the use of puzzle media. Furthermore, Hanim et al. (2023) in their research also stated that the use of puzzle media can improve students' activities and learning outcomes. In their study, Mandala & Setyabudi (2024) also said that students' collaboration skills increased by 15,2% when learning was carried out by applying the TGT learning model assisted by puzzle media.

5. CONCLUSION

The results of the research and discussion that have been presented regarding the improvement of collaboration skills of class V UPT SDN 066054 Medan students in mathematics subjects on the material of FPB and KPK through puzzle games can be concluded that there is a significant increase in collaboration skills. In cycle I, with 23 students, data obtained that students' collaboration skills were 81% with high criteria. Furthermore, in cycle II, with 23 students, collaboration skills increased by 8% to 89% with very high criteria. Thus, it can be concluded that puzzle games positively and effectively improve students' collaboration skills in mathematics.

6. REFERENCES

Anam, S., Abidin, U. K., & Rasidi. (2024). *Gamifikasi Dalam Pembelajaran: Membangun Kreativitas dan Kolaborasi Siswa*. Academia Publication.

Arikunto, S. (2010). *Prosedur Penelitian Suatu Pendekatan Praktik*. Rineka Cipta.

Child, S. (2016). Collaboration In The 21st Century: Implications For Assessment. *Research Matters: A Cambridge Assessment Publication*, 22.

Darmayanti, N. W., Selamet, K., Sanjayati, N. P. A. H., Qondias, D., Wijaya, I. K. W. B., Witraguna, K. Y., Jaya, I. K. M. A., & Persi, N. N. (2024). *Penelitian Tindakan Kelas (PTK): Panduan dan Implementasinya bagi Guru dan Mahasiswa*. PT Nilacakra Publishing House.

Daud, A. P. M. (2016). *Implementasi Pendekatan Ilmiah (Scientific Approach)*

dalam Meningkatkan Kemampuan Kolaborasi dan Hasil Belajar Siswa di SMK Negeri 5 Surabaya. *Jurnal Pendidikan Teknik Mesin*, 5(1), 123–129.

Firman, Nur, S., & Taim, M. A. S. (2023). Analisis Keterampilan Kolaborasi Siswa SMA pada Pembelajaran Biologi. *Diklabio: Jurnal Pendidikan Dan Pembelajaran Biologi*, 7(1), 82–89.

Greenstein, L. (2012). *Assessing 21st Century Skills: A Guide to Evaluating Mastery and Authentic Learning*. Corwin Press.

Hanim, N., Eriawati, & Syahputra, R. R. (2023). IMPLEMENTASI MEDIA PEMBELAJARAN PUZZLE PADA MATERI STRUKTUR BAGIAN TUMBUHAN UNTUK MENINGKATKAN HASIL BELAJAR SISWA. *Prosiding Seminar Nasional Biotik XI*, 11(1), 158–165.

Ifada, A. I., Toyib, M., & Marhamah, S. (2024). Peningkatan Kemampuan Kolaborasi dalam Pembelajaran Matematika melalui Problem Based Learning di Sekolah Menengah Pertama. *PTK: Jurnal Tindakan Kelas*, 4(2), 447–460.

Irwansyah, M., & Perkasa, M. (2022). *Scientific Approach dalam Pembelajaran Abad 21*. PT. Nasya Expanding Management.

Kariuki, L. W., Njoka, J. N., & Mbugua, Z. K. (2018). Influence of Teachers Preparedness on Performance of Pupils in Mathematics in Lower Primary Schools in Aberdares Region of Kenya. *European Journal of STEM Education*, 4(1), 1–6. <https://doi.org/10.20897/ejsteme/3931>

Kemdikbud. (2016). *Permendikbud No. 21 Tahun 2016 tentang Standar Isi Pendidikan Dasar dan Menengah*.

Mandala, D. D., & Setyabudi, T. (2024). Peningkatan Keterampilan Kolaborasi Melalui Model Pembelajaran TGT Berbantuan Media Puzzle Pada Mata Pelajaran Matematika Kelas II SD. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 9(2), 2203–2216.

Nurhadiani, R., Alifa, S., Aisy, R., Katrunada, S., Rizka, S. H., Dewi, A., & Astuti, S. D. (2024). Implementasi Game Math Puzzle Sebagai Media

Pembelajaran Numerasi Siswa SDN 02 Badrain. *Rengganis Jurnal Pengabdian Masyarakat*, 4(1), 125–132.

Nurjaya, Rahayu, N., & Sari, R. (2023). Deskripsi minat peserta didik dalam belajar matematika melalui permainan. *Al-Azkiya: Jurnal Ilmiah Pendidikan MI/SD*, 8(1), 66–75. <https://doi.org/10.32505/azkiya.v8i1.6511>

Putri, R. D. R., Ratnasari, T., Trimadani, D., Halimatussakdiah, Husna, E. N., & Yulianti, W. (2022). Pentingnya Keterampilan Abad 21 dalam Pembelajaran Matematika. *SICEDU: Science Education Journal*, 1(2). <https://doi.org/10.31004/sicedu.v1i2.64>

Sari, A. L. N., Yuliasari, L., & Abadi, M. (2023). Efektivitas Pembelajaran Kooperatif Team Games Tournament Melalui Media Puzzle terhadap Keterampilan Kolaborasi Siswa dalam Pembelajaran Bahasa Indonesia SDN 01 Ngadirenggo. *Pedagogika: Jurnal Ilmu-Ilmu Kependidikan*, 3(2), 197–203.

Sudijono, A. (2006). *Pengantar Evaluasi Pendidikan*. Rajawali Press.

Tambychik, T., Meerah, T. S. M., & Aziz, Z. (2010). Mathematics Skills Difficulties: A Mixture of Intricacies. *Procedia Social and Behavioral Sciences*, 7(C), 171–180. <https://doi.org/10.1016/j.sbspro.2010.10.025>

Ulhusna, M., Putri, S. D., & Zakirman. (2020). Permainan Ludo untuk Meningkatkan Keterampilan Kolaborasi Siswa dalam Pembelajaran Matematika. *International Journal of Elementary Education*, 4(2), 130–137. <https://doi.org/10.23887/ijee.v4i2.23050>

Valentina, A. A. D., Hartini, W., & Tijan. (2024). Permainan Puzzle Sebagai Metode Peningkatan Kemampuan Kerjasama Siswa Dalam Pembelajaran IPS. *Prosiding Webinar Penguatan Calon Guru Profesional*, 113–116.

Widiana, I. W., Tanggu, R. N., & Wulantari, N. W. (2019). MEDIA PEMBELAJARAN PUZZLE UNTUK MENINGKATKAN HASIL PENGETAHUAN IPA. *Indonesian Journal Of Educational Research and Review*, 2(3), 354–362.