

Application of the Problem-Based Learning (PBL) Model to Enhance Students' Mathematics Learning Outcomes

Yunia Fiza^{1*}, Agustina Sri Purnami², Budi Hartati³, Hastuti Wahyuningsih⁴.

¹⁻² Universitas Sarjanawiyata Tamansiswa, Indonesia

³ SD Negeri Ungaran 1, Indonesia

*Corresponding Author e-mail: yuniazfiza8@gmail.com

1. Abstract

This research started with the problem of low Mathematics learning outcomes for first graders of SDN in Yogyakarta under the Minimum Completeness Criteria (KKM), namely 65. Out of 28 students only 25 students who achieve KKM is about 50%. The aim of the research is to improve the results learning Mathematics first grade students of SDN in Yogyakarta. This research is an action research class (CAR) which was carried out in 5 cycles. This research was carried out in class 1 at a public elementary school in Yogyakarta for the 2022/2023 academic year with a total of 28 students. Based on the results of the discussion and the analysis concluded through the application of problem based learning (PBL) learning models can improve students' Mathematics learning outcomes in the materials of Spatial and Flat Shapes. The increase in teacher activity in the learning process is due to the fact that the teacher is used to it using the problem based learning (PBL) learning model. Student learning outcomes experience improvement from cycle II to cycle V. Student learning outcomes before the action reached KKM only 25 students with a classical average of 50%. Then in cycle II students who achieve KKM is only 26 students with a classical average of 70%. Cycle III-V students who achieve KKM 27 students with a classical average of 98%.

Keywords: *Learning Outcomes, Problem Based Learning Learning Model, Mathematics*

2. Introduction

The best preparation for learning mathematics should be made, and different kinds of activities employing different learning models should be used. Learning models serve as a guide for instructors while they carry out the teaching process. Involving students in the learning process or actively guiding students in the learning process is more important while studying mathematics. Students who study mathematics acquire firsthand experience and are taught to research a range

of topics in a comprehensive, meaningful, authentic, and engaged manner. Students won't be able to use their mathematical skills to their full potential while solving mathematical issues if they are not actively engaged in the mathematics learning process. Additionally, pupils will not pay attention to lessons in class if they are not interested in the mathematics they are learning.

According to observations made at SDN Yogyakarta, students are still unable to improve learning outcomes in thematic learning, teacher-centered learning activities, or other teaching methods. As a result, this tends to make students bored, which ultimately makes them passive and causes many of them to be busy themselves. Students with grades below the Minimum Completeness Criteria (KKM) do exist. In SDN Yogyakarta, the KKM is 75; of the 10 students in class I, 50% are still performing below the KKM, while 70% have achieved the KKM or higher. This demonstrates that the prior teaching strategies were still ineffective in enhancing student learning results. The manner in which the instructor implements the lesson plan affects the learning outcomes. The manner in which the teacher facilitates learning, his or her command of the subject matter, the way in which they interact with pupils, how they instill motivation, and the manner in which they employ effective teaching strategies, appropriate models and learning resources all have a role in the accomplishment of learning goals. According to Pasaribu's (2015) perspective, the way a teacher carries out the learning process, masters the subject matter, interacts with students, inspires them, and fosters a positive learning environment is what determines if learning outcomes are met in a classroom. Therefore, in order to improve learning outcomes, the teacher must be able to design the ideal learning environment, foster student creativity, and provide a comfortable learning environment. These issues lead to the conclusion that the question "Can the PBL model improve student learning outcomes in Flat and Spatial Construct learning?" is still a valid one. How can student learning results in Flat and Spatial Construct learning be improved by using the Picture and Picture model? The goal of this article's research is to determine whether using the PBL paradigm to teach flat and geometric forms has

improved student learning results. The Picture and Picture model's application procedure is described, along with how it helps students learn flat and geometric forms more effectively.

The first prior study, "Improving of Indonesian Language Learning Outcomes on Free Poetry Writing Materials Through the PBL Learning Method for Class V MI Salafiyah Students, Tukangan, Temple, Boyolali Academic Year 2016/2017," was done by Murtofiah (2017). According to the study's findings, using the PBL technique to teach students can enhance their learning outcomes. This is demonstrated by the pre-cycle results obtained before using the PBL technique; only 61.5% of students (8 students) satisfied the KKM requirements, while 38.4% of students (5 students) did not. rose in cycle I, demonstrating that pupils met the traditional completion criterion. while in cycle II the traditional completion criterion, 69.23% (9 students finished) with an average score of 7.2. Every student is expected to develop learning goals that align with the KKM as it stands. According to Sudjana (2014), learning outcomes are skills that students hold after completing their learning experience. Learning outcomes—changes in behavior from ignorance to knowledge and from ignorance to understanding—are signs that someone has learnt, according to Hamalik (2014). This is consistent with Jihad's (2013) assertion that learning outcomes are the realization of behavioral modifications that often occur in the cognitive, emotional, and psychomotor domains throughout the course of a learning process. It may be said that learning outcomes are modifications in a student's behavior from ignorance to knowledge that are brought about by the learning process. Based on the aforementioned issues, the author proposed the Problem Based Model of Learning (PBL) for math instruction so that the aforementioned issue with the execution of math instruction and the outcomes to be gained in line with the learning objectives may be correctly accomplished. The PBL methodology was chosen to carry out mathematics instruction because it allows for the development of students' problem-solving skills.

3. Methods

3.1. Participants and context

This study makes use of earlier research findings from study records. deep data gathering Journals were tracked down for this study using a variety of electronic resources, including the internet, digital libraries, and library journal collections. Search Google Scholar is used to search for the journal. Improvement learning outcomes, problem-based learning, and primary mathematics courses are the search terms utilized for journals. From the outcomes The results of the search, including the availability of data both before and after the activity in score form, satisfy the criteria. 10 research findings from a problem-based model study were chosen for additional analysis. Analysis of adoption effect models, research-based learning, and score variation utilizing the laying technique To calculate the degree to which learning activities have an impact on learning outcomes, divide the difference between the scores obtained before and after the action by the score obtained before the activity (in percentage terms).

3.2. Material

based on the findings of the observations made at this point by observers throughout cycle I. Primary duty According to the attached observer sheet, the observer watches the activity that the teachers and students are participating in. The following is provided based on the findings of the observer's observations in cycle I: This shows that student learning is still less active and that pupils can still not respond to teacher queries. then have the student address internal issues Because some students choose not to join in the conversation, there are still certain student groups where no one is actively participating. This makes it necessary for the teacher to actively engage inactive students in group discussions. Students engage in enough activity as a result of observation, according to instructors' findings.

3.3. Data Collection and analysis

According to the analysis's findings, which are shown in the table above, studying with problem model-based learning (PBL) can enhance students' mathematical learning outcomes.

improved learning outcomes with an average improvement of 44.9% from the lowest 50% to the highest 98%. The average student learning yield before the research class act is 65, 042 and after the study was done in a classroom setting with There was an increase to 79,808 students using problem-based learning techniques.

The relationship between the instructor and pupils as well as between students should be fostered via learning and learning activities in schools (Wijayanti, 2016). The instructors' traditional lectures, explaining information in front of the class, and making it less engaging are problems that happened in the 10 primary schools evaluated, particularly in mathematics. There was an increase to 79,808 students using problem-based learning techniques. focus on the teacher. The lack of student engagement in their studies is yet another issue. The choice by the teacher of an improper learning approach is what caused the issue. The adoption of the problem-based learning approach in mathematics lessons can enhance student learning results, as shown in the table above.

4. Results and Discussion

4.1. Section Headings

Based on the results of observations and research on the activities of students and teachers, the researchers carried out the research stages through two cycles. The following is a description of the implementation of each cycle carried out by researchers. Prior to the implementation of the first cycle stage, the researcher conducted research on the initial conditions of the students before the Picture and Picture model was applied. Based on the results of interviews with fourth grade teachers, the results obtained were that the thematic learning process that had been applied by the teacher experienced problems when the thematic learning process took place. The change from

the old curriculum to the new curriculum, namely the 2013 curriculum, causes students to adapt. This is because the subjects that were originally separated are now combined into one theme so that students and teachers experience difficulties in conveying learning and determining the learning model to use. In thematic learning, teachers have not used other learning media but only use thematic textbooks. For the value of learning outcomes achieved by students when applying an interesting learning model, students will be active and this can improve student results. So, the application of a learning model will be able to increase student learning motivation which results in increased student learning outcomes.

The results of the pre-test or before the holding of cycle I and II tests showed that the thematic learning process that had been applied by the teacher was experiencing problems, this was due to changes in the KTSP curriculum to the 2013 curriculum which caused students to have to adapt because the subjects that were originally separated were now combined into one theme, namely thematic books so that teachers experience difficulties in determining the learning model that will be applied in the teaching and learning process. The interaction that occurs between teachers and students is still lacking because when conducting questions and answers many students do not answer. In addition, the condition of the class when the teacher explained was also not running optimally because there were some students who did not pay attention when the teacher explained the subject matter. However, when the teacher uses an interesting learning model, student learning outcomes also increase because students become more active.

The application of the Picture and Picture model in thematic learning in class I is proven to improve student learning outcomes. This can be seen from the implementation of lesson plans, teacher activities, student activities, and student learning outcomes that have been implemented in cycles I and II. The RPP that has been prepared has been carried out properly and sequentially by researchers in both cycle I and cycle II. Observation of teacher activity was carried out by class IV teachers. Based on the results of observations on the management of learning in using the

Picture and Picture model, it was in a good category and experienced an increase from cycle I which obtained a percentage of 80.3%, increasing to 88.04%. The percentage is obtained from the observation sheet which contains items related to the activities carried out by the teacher referring to the lesson plans that have been prepared. If the teacher's activity has increased, then this will affect student learning outcomes because the teacher's role in achieving student learning goals is very important.

Based on observations of student activity during the learning process by applying the Picture and Picture model to thematic learning, in cycle I a percentage of 70.8% was obtained because there were still student activities that were not effective during the learning process. However, in the implementation of cycle II, student activities experienced a significant and good increase, in cycle II, a percentage of 82.6% was obtained. In cycle I there were still students who did not listen to the teacher's explanation, did not listen to the motivation conveyed by the teacher and chatted with other friends. So if it is allowed to affect student learning outcomes. With the reflection stage in cycle I, then in cycle II there was a change in student activity which was better as seen from the percentage results which were originally 70.8% to 82.6%.

The implementation of the Picture and Picture model refers to the RPP that has been prepared which consists of preliminary activities, core activities, and closing activities. The process of applying the Picture and Picture model in cycle I is divided into 7 phases, the first phase the teacher conveys the competencies to be achieved; the second phase the teacher presents the material as an introduction; the third phase the teacher shows pictures related to the material then divides students into groups consisting of 3-4 members; the fourth phase the teacher appoints/calls students in turn to sort the pictures into a logical sequence; the fifth phase the teacher asks the rationale for the sequence of pictures; the sixth phase the teacher begins to instill concepts or material from the reasons/sequences of the images in accordance with the competencies to be achieved; and the seventh phase Students are invited to conclude/summarize the material they

have just received. After all the phases were carried out, then the cycle I test was carried out. However, the results obtained both from teacher activities, student activities, and student learning outcomes had not been optimally achieved because there were several items that had not been carried out effectively. Therefore, the process of implementing the Picture and Picture model was carried out in cycle II.

The process of implementing the Picture and Picture model in cycle II was almost the same as cycle I, the difference being the presence of puzzle games in the application of the model. Puzzle media was chosen because by using this media the focus of students will increase and can affect their learning outcomes. Chamidah & Mintohari (2014) revealed that puzzle media is a simple media in the form of pieces of images that are arranged to form a complete picture. Through learning with puzzle media students are actively involved in the learning process. Students carry out playing activities while learning, with these activities students will better remember the material being studied and have an impact on improving learning outcomes. Utilization of puzzle media is felt to be very helpful in learning because apart from being affordable economically, it can also be played while learning.

Fajariyah (2017) revealed that puzzle media is also called an educational game because it is not just a game but sharpens the brain and trains the speed of thought and hands, so puzzle media can improve student learning outcomes. Because in a game using this puzzle there is a challenge in itself, which is that it will always have an addictive effect to always try, try and keep trying until it succeeds. Because learning by playing can provide opportunities for children to think and act imaginatively and full of imagination which is closely related to the development of children's creativity. So as is known by using this puzzle media, students are required to think creatively and actively both individually and in groups in the teaching and learning process so that they can improve learning outcomes and later students are accustomed to thinking in solving every problem they face.

The steps for implementing the Picture and Picture model in cycle II were carried out in 7 phases as in cycle I. After the implementation of cycle II, teacher activities, student activities, and student learning outcomes experienced a significant increase which can be seen from the percentage results obtained. The process of applying the Picture and Picture model in cycle II refers to the deficiencies that exist in the reflection stage of cycle I, so that cycle II can correct these deficiencies and student learning outcomes increase.

Table 1. Reflection Results

Reflection	Maintenance plan
Teachers are lacking in motivating students	The teacher must motivate and attract the attention of students by providing apperception in the form of songs and movements so that students feel relaxed in participating in the learning process.
The teacher is too fast in delivering learning material	More detailed and gradual in explaining learning material
During the discussion, there were students who were not active in the discussion	Guiding students to be more active in the group discussion process, so that cooperation in groups can run well. If necessary use pictures that make students interested.
There are still students who cheat on the cycle I test	The teacher must be firm and if necessary give sanctions.

Reflection	Maintenance plan
There are still 6 students whose learning outcomes have not reached minimal completeness because in the learning process students pay less attention to the teacher's explanation.	For cycle II, the teacher must be more assertive so that students pay more attention to the teacher's explanation.

5. Conclusion

According to research done in two cycles with grade 1 students using the PBL learning model, there is an improvement in student learning outcomes in mathematics learning with the theme of Building Space and Flat Buildings when the PBL learning model is used. Only four of the ten students who took the examinations in cycle I had scores above the KKM, resulting in a 40% success rate in terms of learning outcomes. Cycle II had a 100% rise after that. There are two cycles involved in implementing the PBL paradigm with class I pupils. The planning stage, the implementation stage, the observation/observation stage, and the final stage of cycle II implementation are nearly identical to those of cycle I.

6. References

- Andriyani, R., Hidayat, S., & Ganda, N. (2020). Penerapan Model Pembelajaran Picture And Picture untuk Meningkatkan Pemahaman Siswa Tentang Kenampakan Alam di SD (Penelitian Tindakan Kelas di Kelas V SDN 4 Pamalayan Kecamatan Cijeungjing Kabupaten Ciamis). *Jurnal Ilmiah Mahasiswa PGSD*.
- Arikunto, S. (2012). *Prosedur penelitian: Suatu pendekatan Praktik*. Jakarta: Rineka Cipta.
- Chamidah, & Mintohari. (2014). Penerapan Media Puzzle Untuk Meningkatkan Hasil Belajar Siswa pada Pelajaran IPA Kelas I di SDN SIDOTOPO III/50 SURABAYA. *JPGSD*, 2(1).
- Dimiyati, & Mudjiono. (2013). *Belajar Dan Pembelajaran*. Jakarta: Rineka Cipta.
- Esminto. (2016). Implementasi Model STAD dalam Meningkatkan Hasil Belajar Siswa. *BRILIANT*;

Jurnal Riset dan Konseptual, 1(1).

- Fajariyah, E. L. (2017). Penerapan Media Puzzle Untuk Meningkatkan Hasil Belajar Siswa Mata Pelajaran IPS Kelas V SDN 01 Sumberrejo Kota Gajah. *IAIN Metro*.
- Fansury, A. H., & Januarty, R. (2017). Model Pembelajaran Picture and Picture Dengan Media Games Android Dalam Meningkatkan Kemampuan Kosa Kata Siswa Kelas VII SMPN 35 Makassar. *Jurnal Keguruan dan Ilmu Pendidikan, 4(1)*, 75–76.
- Fitrianiyngtyas, A., & Radia, E. H. (2017). Peningkatan Hasil Belajar IPA Melalui Model Discovery Learning Siswa Kelas IV SDN Gedanganak 02. *Jurnal Mitra Pendidikan, 1(6)*.
- Hamalik, O. (2014). *Kurikulum dan Pembelajaran*. Jakarta: Bumi Aksara.
- Hanafi, M., & Halim, A. (2012). *Analisis Laporan Keuangan*. Yogyakarta: (UPP) STIM YKPN.
- Huda, M. (2013). *Model-Model Pengajaran Dan Pembelajaran*. Yogyakarta: Pustaka Pelajar.
- Husniatun. (2020). Penerapan Model Pembelajaran Picture and Picture untuk Meningkatkan Hasil Belajar pada Muatan Pembelajaran Bahasa Indonesia di Kelas 1.A SDN 03/IX Senanung. *Jurnal Literasiologi, 3(2)*.
- Jihad, A. (2013). *Evaluasi Pembelajaran*. Yogyakarta: Multi Pressindo.
- Kemendikbud. (2014). *Panduan Penjaminan Mutu Proses Pembelajaran Daring*.
- Kusumah, W., & Dwitagama, D. (2012). *Mengenal Penelitian Tindakan Kelas*. Jakarta: Indeks.
- Murtofiyah. (2017). Peningkatan Hasil Belajar Bahasa Indonesia Materi Menulis Puisi Bebas Melalui Metode Pembelajaran Picture and Picture pada Siswa Kelas V MI Salafiyah, Tukangan, Candi, Boyolali Tahun Pelajaran 2016/2017. *IAIN Salatiga*.
- Ngalimun. (2012). *Strategi dan Model Pembelajaran*. Banjarmasin: Scripta Cendekia.
- Nurahmah, C. (2018). Penerapan Model Pembelajaran Kooperatif Picture And Picture Dalam Meningkatkan Hasil Belajar Siswa Pada Tema Hidup Bersih Dan Sehat Kelas II Min 16 Aceh Besar. *UIN Banda Aceh*.
- Rati, N. W., Kusmaryatni, N., & Rediani, N. (2017). Model Pembelajaran Berbasis Proyek, Kreativitas dan Hasil Belajar Mahasiswa. *Jurnal Pendidikan Indonesia, 6(1)*.
- Rusman. (2012). *Model-Model Pembelajaran: Mengembangkan Profesionalisme Guru*. Bandung: Alfabeta.
- Shoimin, A. (2016). *Model Pembelajaran Inovatif dalam Kurikulum 2013*. Yogyakarta: Ar-Ruzz Media.

- Sudjana, N. (2011). *Dasar-Dasar Proses Belajar Mengajar*. Bandung: Sinar Baru Algensind.
- Sudjana, N. (2014). *Penialian Hasil Proses Belajar Mengajar*. Bandung: Remaja Rosda Karya.
- Susanto, A. (2016). *Teori Belajar & Pembelajaran di Sekolah Dasar*. Jakarta: Kencana Prenadamedia Group.
- Trianto. (2012). *Model Pembelajaran Terpadu*. Jakarta: Bumi aksara.