TEKNODIKA
e-ISSN: 2656-6621
http://jurnal.uns.ac.id/Teknodika

Implementation of Project-Based Learning Assisted by Simlitar Media to Improve Creative Thinking Abilities and Student Learning Outcomes

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Abstract: *The project-based learning model is deemed to be a student-centered model when applied to learning activities. It undoubtedly opens higher opportunities for students to optimize their abilities, and hopefully, they can achieve the competencies set in the learning objectives. This research, therefore, aims to improve the creative thinking abilities and learning outcomes of third-grade elementary school students in Yogyakarta, assisted by Simlitar Media, through a project-based learning model. The type of research used was classroom action research (PTK). The research subjects were 26 students. Data collection was carried out through interviews, observations, and tests. The data analysis techniques employed were qualitative and quantitative. Based on the results of this research, the project-based learning model could improve students' creative thinking abilities and learning outcomes. From the results of data analysis and discussion in this research, there was an increase in students' creative thinking abilities from the pre-cycle stage to cycle 2, which initially averaged 27% to 88%. The average creative thinking ability of students in one class increased by 61%. Student learning outcomes also increased from the pre-cycle stage to cycle 2. The average completeness of student learning outcomes in the pre-cycle stage was 15%, becoming 88% in cycle 2. The average completeness of third-grade students' overall learning outcomes increased by 73%. Hence, it can be concluded that the application of this learning model accompanied by Simlitar media has been proven to improve creative thinking abilities and student learning outcomes.*

Keywords: *Creative Thinking, Learning Outcomes, Project-Based Learning*

Abstrak: Model pembelajaran berbasis project dinilai menjadi salah satu model yang berpusat pada siswa ketika diterapkan dalam aktivitas belajar, hal ini tentu saja membuka peluang yang lebih tinggi bagi siswa untuk bisa mengoptimalkan kemampuannya dan harapannya dapat meraih kompetensi – kompetensi yang telah ditetapkan pada tujuan pembelajaran. Penelitian ini bertujuan untuk meningkatkan kemampuan berpikir kreatif dan hasil belajar siswa kelas III Sekolah Dasar di Yogyakarta dengan berbantuan media Simlitar melalui model pembelajaran berbasis proyek. Jenis penelitian yang digunakan adalah Penelitian Tindakan Kelas (PTK). Subjek penelitian berjumlah 26 siswa. Pengumpulan data dilakukan dengan wawancara, observasi dan tes. Teknik analisis data yang digunakan yaitu kualitatif dan kuantitatif. Berdasarkan hasil dari penelitian ini menunjukan bahwa model pembelajaran berbasis proyek dapat meningkatkan kemampuan berpikir kreatif dan hasil belajar siswa. Berdasarkan hasil dari analisis data dan pembahasan dalam penelitian ini, terdapat peningkatan dari tahap pra siklus hingga siklus 2, yang mulanya rata-rata kemampuan berpikir kreatif siswa yaitu 27% menjadi 88%. Rata-rata kemampuan berpikir kreatif siswa dalam satu kelas naik sebesar 61%. Hasil belajar siswa juga mengalami peningkatan, pada tahap pra siklus sampai siklus 2. Rata-rata ketuntasan hasil belajar siswa pada tahap pra siklus yaitu 15% menjadi 88% pada siklus 2. Rata-rata ketuntasan hasil belajar siswa kelas III naik 73%.

Kata Kunci: Berpikir Kreatif, Hasil Belajar, Pembelajaran Berbasis Proyek

Submitted: May 2023	Accepted: June 2023	Published: September 2023

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INTRODUCTION

Education has an essential role in the development of a nation as it can create quality human resources (Anugraheni, 2017, p. 16). Every child has the right to receive an appropriate and quality education. Support and guidance to gain a good understanding of learning are needed by every child to avoid ongoing misconceptions so that student learning outcomes will be maximized. To achieve an advanced Indonesia, an educator is required who is ready to create quality human resources who can compete in social life. The 2013 education process regarding the national education system formulates the foundations, functions, and objectives of national education. Article 2 of the Republic of Indonesia Law of 1945 aims to develop the potential of students to become human beings who believe in and are devoted to God Almighty, have noble character, are healthy, capable, knowledgeable, creative, independent, and become democratic and responsible citizens (Ministry of National Education, 2006: 28). It is hoped that the educational process will be able to give birth to creative, innovative ideas in the dynamics of current developments.

Currently, people have entered an era where competence has become a crucial component for individuals. Known as the 21st century, education in the 21st century requires students to master four skills, which are also called the 4C abilities. In this case, teachers play an important role in helping students improve these four skills (Karatas & Arpaci, 2021) (van Laar et al., 2020). One way is to use the right and suitable model during the learning process. The Ministry of Education and Culture has recommended four preferred models to be used in implementing the 2013 Curriculum. One of the learning models recommended to be implemented simultaneously and comprehensively to improve students' 4C abilities is project-based learning (PjBL). It aligns with the opinion (Suswanto et al., 2019) that project-based learning is an ideal model for meeting the goals of 21st-century education.

Teachers can build student creativity by implementing active and innovative learning models. The models aim to enable students to experience learning and motivate students to master learning even though the learning is tedious (Silberman, 2012, p. 32). With their abilities and skills, teachers can choose and use models that can build student creativity so that they can achieve meaningful learning. Specifically, project-based learning, according to Bie in (Ngalimun, 2013, p. 185), is a learning model that focuses on the main concepts and principles of a discipline, involves students in problem-solving activities and meaningful tasks, provides students with opportunities to work on constructing their ideas, and ultimately produces a work. The project-based learning model can foster a more disciplined student-learning attitude and make students more active and creative in their learning. The project-based learning model also has enormous potential to create a more interesting and meaningful learning experience. Apart from that, project-based learning facilitates students to investigate, solve problems, be student-centered, and produce real products in the form of project results.

On the other side, students' creative thinking abilities should be supported to be developed in each student so that they can overcome the problems they face. According to Munandar (in Harisuddin, 2019), creative thinking is the ability to see various possible solutions to a problem. Several studies have discussed creative thinking abilities, learning outcomes, and project-based learning models. Research has been conducted on "Implementation of the Project-Based Learning (PjBL) Learning Model to Improve Learning Outcomes and Creativity of Third-Grade Students at SD Negeri Sidorejo Lor 01 Salatiga" (Surya, 2018). The project-based learning model to enhance creative thinking abilities and student learning outcomes has also been studied (Erisa, 2018). Another piece of research is about the application of the project-based learning model to improve science learning outcomes and the creative thinking abilities of fifth-grade students (Gunawan, 2018). Based on these studies, the researcher differs from others. It can be seen from research, i.e., the use of media, which is different from other studies. Not many other studies have examined creative thinking skills and improving learning

outcomes by using the project-based learning (PjBL) model in mathematics lesson content with the help of Simlitar (Folding and Rotating Symmetry) media, considering the criteria for good learning media, according to Rohani (2019: 29). They consist of 1) suitability to learning objectives, 2) suitability to learning material, 3) suitability to learner characteristics, 4) suitability to theory, 5) suitability to learner styles, and 6) suitability to environmental conditions, facilities, and available time. In this research, learning activities were also designed to improve 21st-century competencies and use a scientific approach.

To implement the project-based learning model to achieve the goals, the right learning media can assist. According to Suryani et al. (2018: 5), learning media are all forms and means of conveying information created or used in accordance with learning theory and can be used for learning purposes in conveying messages, stimulating students' thoughts, feelings, attention, and will so that they can encourage a deliberate, purposeful, and controlled learning process. Munadi (in Elsya Fitri Utami 2021: 39) defined learning media as anything that can convey messages from planned sources to create a conducive learning environment where recipients can carry out the learning process effectively. Sumanto (in Talizaro, 2018: 103) also described learning media as anything used to channel messages so that they can achieve learning objectives and stimulate students' attention, interest, and feelings.

Based on the results of classroom observations and interviews conducted in third-grade A at SD Kanisius Wirobrajan, the learning process in the classroom used facilities in the form of LCDs and speakers to support learning activities. The LCD was utilized to convey material so that all students it could reach it, while the speakers were used so that all students could hear the sound that the teacher wanted to convey. The teacher delivered the material directly via YouTube video or PPT. This learning is certainly teacher-centered, and students were only limited to getting the material presented by the teacher without any teaching aids that they could observe, hold, and practice directly. Learning without teaching aids is certainly less able to stimulate students' creative thinking abilities. Third-grade learning outcomes are classified as unstable, and students only like certain subjects. When students did not like a subject, one of which is mathematics, the learning outcomes achieved were also low.

Departing from those results, the current mathematics learning process still tended to be passive and not interactive, and the use of learning models and strategies as a whole did not provide any stimulus for students to think creatively, even though teachers had tried to integrate digital devices and digital learning resources during the learning process. Therefore, the learning strategies used need to be replaced, and other learning model innovations should be tried. For this reason, the project-based learning model can be applied since it supports students to create projects using learning tools independently and responsibly. Hence, this research aims to apply project-based learning to improve student learning outcomes (creative thinking).

RESEARCH METHODS

This research employed classroom action research (CAR) using the Kemmis and McTaggart model with a spiral research model consisting of four components: planning, action, observation, and reflection. This spiral model is a repetitive and continuous cycle model, with the hope that each action shows an increase according to the changes and improvements to be achieved. This research was carried out in two cycles by applying the steps of the project-based learning model: 1) preparing project questions or assignments; 2) designing a project plan; 3) preparing a schedule according to the real steps of a project; and 4) monitoring project activities and developments (Arikunto, 2016).

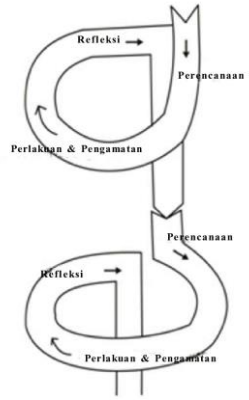

Figure 1. Spiral Model According to Kemmis and McTaggart

This research was carried out at SD Kanisius Wirobrajan I, Yogyakarta City, with 26 third-grade students as research subjects. They consist of 14 female students and 12 male students. Data collection was performed through interviews, observations, and tests. Interviews and observations were done to determine students' initial conditions regarding creative thinking abilities and student learning outcomes in mathematics learning, and tests were conducted to obtain data on student learning outcomes.

The instruments used were interview guides, observation sheets, and test instruments in the form of questions. The interview guide comprised ten questions related to creative thinking abilities and student learning outcomes. The observation sheet encompassed several indicators, which included several criteria for creative thinking. The observation sheet was filled in by ticking (√) the creative thinking criteria that appeared in students. The test instrument used was in the form of test questions consisting of ten questions per cycle.

The following is the instrument used and referred to in this research regarding creative thinking abilities:

Table 1. Indicators of Creative Thinking Skills

No	Assessed aspect	Achievement description
1	Fluency	Students can find various and correct answers to the problems given by using the one-solution method.
2	Flexibility	Students can find one correct answer by using a variety of problem-solving methods.
3	Originality	Students can find new ways that are different from those taught by the teacher and have the correct value in solving the problems given.
4	Elaboration	Students can develop an idea.

The data analysis techniques used were qualitative and quantitative. Qualitative analysis techniques were employed to provide descriptions of ongoing learning activities, while quantitative analysis techniques aimed to analyze data on student learning outcomes.

RESULTS AND DISCUSSION

Based on the results of research carried out, mathematics lessons using the project-based learning model improved. It was shown by changes, both in creative thinking abilities and student learning outcomes, which occurred in cycles I and II. Data analysis of students' creative thinking abilities in mathematics subjects using Simlitar media can be seen in the following table:

Table 2. Data Analysis of Creative Thinking Ability

No.	Cycle		Creative Thinking Ability
1.	Pre-cycle		27%
2.	Cycle 1	Meeting 1	55%
		Meeting 2	66%
3.	Cycle 2	Meeting 1	78%
		Meeting 2	80%

From this table, the percentage of creative thinking abilities started from the pre-cycle stage to cycle 2. At the pre-cycle stage, the average critical thinking ability of students in one class was 27%; in cycle 1 meeting 1, it was 55%; in cycle 1 meeting 2, it was 66%; in cycle 2 meeting 2, it was 78%; in cycle 2 meeting 2, it was 80%.

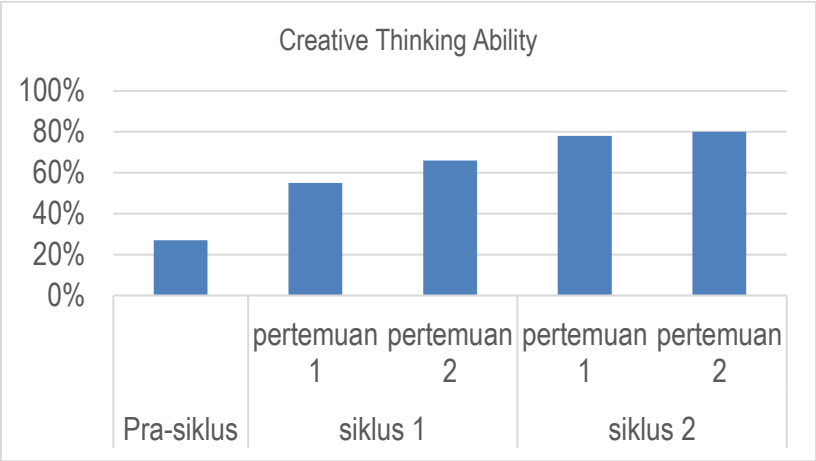

Figure 2. Data Analysis of Creative Thinking Ability

In Figure 2, it can be seen that the percentage comparison and increase in students' creative thinking abilities started from the pre-cycle stage to cycle 2. In the pre-cycle stage to cycle 1 meeting 1, the percentage increased by 28%; in cycle 1 from meeting 1 to meeting 2, the percentage increased by

11%; in cycle 1 meeting 2 to cycle 2 meeting 2, the percentage increased by 14%; in cycle 2 from meeting 1 to meeting 2, the percentage increased by 2%. In this research, the researcher carried out two research cycles, each of which was held in two meetings. The research was conducted with the aim of improving students' creative thinking abilities and student learning outcomes in mathematics lesson content using a project-based learning model. The research was conducted in third grade A at SD Kanisius Wirobrajan, with 26 students as research subjects. Three indicators of creative thinking abilities were used in this research, and for each indicator, there were four criteria. The three indicators and criteria are as follows: 1) Generating many and varied ideas, with the criteria: not running out of ideas in solving problems, being free to express opinions and feelings, being flexible in thinking and responding, and having broad interests; 2) Originality of thinking, with the criteria: having original ideas, thoughts that are different from general ideas, being confident and independent, and having responsibility and commitment to tasks; 3) Able to detail the main idea, with the criteria: rich in initiative, interested in creative activities, has great curiosity, and is critical of other people's opinions.

Based on the indicators and criteria for creative thinking, researchers obtained data through observation. The researchers obtained the percentage results of each student's creative thinking ability, which then obtained the average creative thinking ability of students in one class. The indicators and criteria that appeared for each student were certainly different. From the data obtained at the pre-cycle stage, students' creative thinking abilities in one class were at a percentage of 27%. It indicates that the average creative thinking ability of students in one class was still low. For this reason, the researcher applied a project-based learning model to mathematics learning content so that in cycle 1, meeting 1, the average data obtained for students' creative thinking ability was 55%. It denotes that students' creative thinking abilities increased by 28%. Then, towards cycle 1, meeting 2, the data obtained on students' creative thinking abilities was 66%, indicating that students' creative thinking abilities increased by 11%.

From these data, starting from the pre-cycle stage to cycle 1, students' creative thinking abilities increased. Likewise, from cycle 1 to cycle 2, meeting 1, students' creative thinking abilities increased by 12%. Cycle 2 from meeting 1 to meeting 2 increased by 2%. Based on data about creative thinking abilities, information was obtained that students' creative thinking abilities increased at each stage by using the project-based learning model. Through this learning model, students can be trained to find ways to solve problems they encounter, either independently or in groups so that students' creative thinking abilities can increase. It is supported by Amirun et al. (Kristanti, Subiki, and Handayani, 2016).

In project-based learning, learning activities take place collaboratively in heterogeneous groups. In the project-based learning model, students also design a problem and find its solution. The project-based learning model has the advantage of its characteristics, i.e., helping students design a process to determine an outcome, training students to be responsible in managing information carried out in a previous project, and then students generating ideas.

At the pre-cycle stage, the average student learning outcome score was 46; in cycle 1, the average student learning outcome score was 68; in cycle 2, the average student learning outcome score was 88.

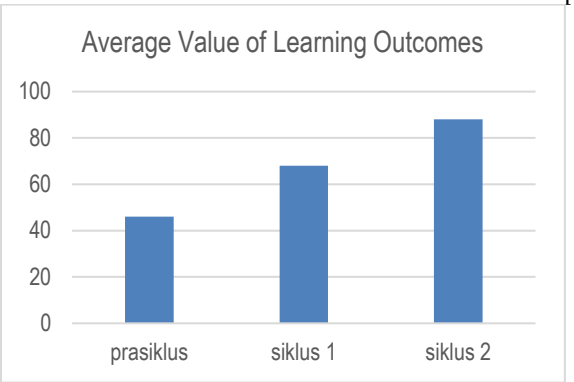

Figure 3. Average Value of Learning Outcomes

In Figure 3, the increase in the average learning outcome scores of third-grade students can be seen. At the pre-cycle stage, the average student score was 46, and at the cycle 1 stage, the average student score was 68. The increase in the average score from the pre-cycle stage to cycle 1 was 22 points. In cycle 1, the average student score was 68, while in cycle 2, it was 88. The increase in the average score from cycle 1 to cycle 2 was 20 points.

Table 3. Data Analysis of Mathematics Learning Results Using the Project-Based Learning Model

	Pre-cycle		Cycle 1		Cycle 2	
Category	The number of students	%	The number of students	%	The number of students	%
Complete	4	15%	6	23%	23	88%
Not Completed	22	85%	20	77%	3	12%

Table 3 displays the analysis of mathematics learning outcomes data from the pre-cycle stage to stage 2. In this table, the number of students and the percentage of students who completed and did not complete can be observed. The determination of student completion based on the school's KKM (Minimum Completeness Criteria) was 75. At the pre-cycle stage, out of 15 students, two students completed, or 13%; in cycle 1, six students completed, or 40%; and in cycle 2, 11 students completed, or 73%.

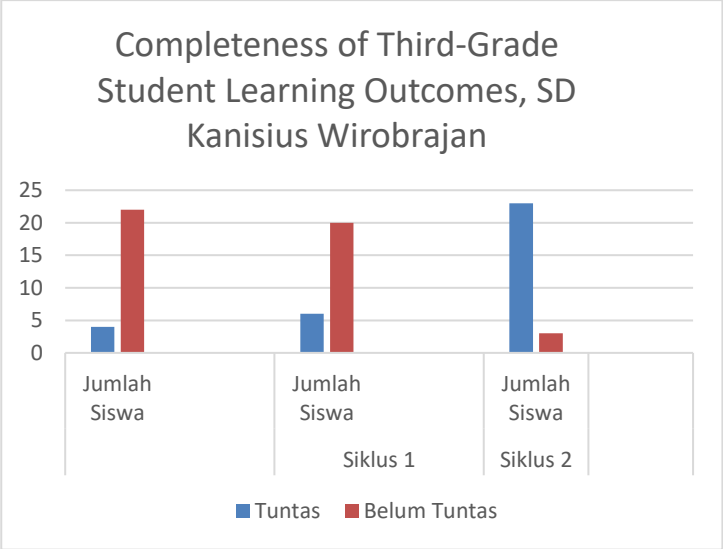

Figure 4. Data Analysis of Mathematics Learning Outcomes

Figure 4 depicts a comparison of the percentage and average increase in student mathematics learning outcomes, starting from the pre-cycle stage to cycle 2. In the pre-cycle stage to cycle 1, the completeness of student learning outcomes in one class increased by 25%, and in the cycle 1 stage towards cycle 2, the percentage rose by 28%.

Data on student learning outcomes were obtained from teacher data as pre-cycle data, and data on the results of each cycle were obtained from test questions completed by students. The test questions consisted of ten multiple-choice questions in each cycle. Data were obtained by calculating the average completeness of students in one class in each cycle. Data on student learning outcomes starting from the pre-cycle stage could be seen from the percentage of completion, namely 15% of students completed, and then in cycle 1, there were 23% of students completed. This data indicates that the average completion of student learning outcomes increased by 8%. In cycle 2, the average completeness of students in one class was 88%; compared with cycle 1, the completeness of student learning outcomes increased by 65%. Based on the data on the completeness of student learning outcomes, there was an increase in student learning outcomes at each stage with the project-based learning model because students could understand the material by observing the teaching aids made.

The results of this research are consistent with previous research (Wati, 2018), showing that learning by implementing PjBL could actually increase students' creativity in creating a craft product. Apart from that, the application of PjBL is starting to be frequently applied to ICT-based learning activities, such as in a study (Sumarmi et al., 2021), revealing that the application of PjBL could be integrated with e-learning to support learning in the current digital era. The results of this research also align with other research, which has succeeded in proving that implementing PjBL could improve students' creative thinking abilities (Astriani, 2020).

Therefore, implementing this learning model is vital, considering the urgency of facilitating students to achieve the competencies needed in the 21st century.

CONCLUSIONS AND RECOMMENDATIONS

Classroom action research using a project-based learning model in mathematics subjects with the help of Simlitar (Folding and Rotating Symmetry) media could improve students' creative abilities and learning outcomes. Based on the research results, it can be concluded that implementing the project-based learning model could improve students' creative thinking abilities and learning outcomes. From that conclusion, the mathematics learning process using the project-based learning model assisted by Simlitar media could run well and increase the experience for educators. To develop student learning outcomes and creativity to be achieved in this research, the researcher has several suggestions: 1) The PjBL learning model is better applied over a long period so that student creativity can be maximally consistent; 2) for assessing projects carried out by students, it is best for each lesson/subtheme; 3) the PjBL learning model is better applied to subjects related to practice so that students can deal with problems independently.

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How to cite: Pramesti, T.A., Hadiyanti, A. H. D., & Ernawati. (2023), Implementation of Project-Based Learning Assisted by Simlitar Media to Improve Creative Thinking Abilities and Student Learning Outcomes. *Teknodika, 21 (2)*, 140-150. DOI: https://doi.org/10.20961/teknodika.v21i2.74021