3rd Multidiscipline International Conference 2025
November 13 2025, Page. 195 - 202
ISSN 2809-6142

Enhancing Students' Creative Thinking Skills in Mathematics Using The Missouri Mathematics Project Based on Local Wisdom

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ABSTRACT
The development of creative thinking skills is one of the government's focuses in learning mathematics. Creative thinking is also one aspect of the Profil Pelajar Pancasila. Creative values can be integrated with the value of global diversity through local wisdom-based learning. This study aims to see the improvement of students' creative thinking skills through Missouri Mathematics Project learning based on local wisdom, especially through the Batik Jombangan project. The instruments used were observation sheet, Batik Jombangan project, questionnaire, and tests (pretest and posttest). The research subjects were SMPN 1 Tembelang students as many as 32 students. The results of the pretest and posttest T test show that the resulting significance value of 0.000 is smaller than the error rate used which is 0.05. The questionnaire results also show that students can express according to their creativity, can answer differently with friends through the open ended Batik Jombangan project, feel challenged, and are not bored when working on local wisdom-based projects. The resulting conclusion is that there is an increase in students' creative thinking skills in mathematics learning geometry transformations implemented through MMP learning based on local wisdom.

Keywords: *Missouri mathematics project; Local wisdom; Creative thinking skills.*

INTRODUCTION
Education is a conscious process to prepare individuals to play their respective roles in the future. Education serves as a means of developing human potential (Pristiwanti et al., 2022). Education is essentially an effort to impart values that serve as guidelines and instructions for daily life, thereby creating a clear distinction between previous, present, and future generations, and determining whether the quality of life has improved significantly or declined (Afsari et al., 2021). To develop high-quality human resources, an understanding of education, especially in mathematics, is necessary. Mathematics plays a central role in learning because it helps students develop logical and systematic thinking skills that are very much needed in everyday life (Ariawan & Ayuni, 2022).

On the other hand, there are many concerns regarding students' interest and ability in mathematics in Indonesia. Many students have not yet achieved the appropriate mathematical skills (Marliani, 2015). This illustrates the need for a more effective approach to teaching mathematics that focuses not only on cognitive aspects but also on developing students' creativity. One of the goals of studying mathematics is to develop the ability to think creatively, which is one of the most important skills of the 21st century (Mahanal, 2017). Creative thinking in mathematics and other fields is *a life skill* that needs to be honed, especially considering that we are now in an era of information and increasingly competitive competition (Andiyana et al., 2018). Creativity is the ability to generate new ideas and concepts through a combination of innovations that enable a person to create new things in their thinking and successfully change what already exists. In addition, creativity is the ability to generate new ideas that are developed through a thinking process (Hidayat dkk., 2020). For example, creative thinking in mathematics learning is relevant to how students think about solving mathematical problems.

Students process information and associate new things with existing information, which is also part of creative thinking (Permata & Trisiana, 2023). There are four indicators of creative thinking ability, namely flexibility, originality, elaboration, and fluency (Fasya, 2021). Creativity in thinking is essential in mathematics learning. One mathematics learning model designed to train creativity is the *Missouri Mathematics Project* (MMP). MMP is specifically designed by applying real-life concepts and contexts in solving mathematical problems (projects).

The MMP model emerged as an innovative solution to improve students' skills in solving mathematical problems. Kole et al., (2021) stated that the learning syntax of MMP consists of five stages, namely 1) introduction, including activities to present previous material; 2) development, including discussion and demonstration activities using real examples, or discussion of new material that is a continuation of the previous material; 3) cooperative work or controlled exercises, where students work in groups and answer questions under the supervision of the teacher to prevent misunderstandings of concepts during learning activities; 4) *seatwork* or independent work, where students are independently given several questions as exercises from the material studied so that the teacher can assess how well the students understand the material; 5) assignment, where students and teachers together draw conclusions from the material studied. This model aims to improve mathematical concept understanding through the development of ideas and applications in real-life contexts (Ervinasari & Astuti, 2023). Creative thinking skills are one of the characteristics that must be formed and honed to improve academic skills. In the independent curriculum, creative character values are part of Profil Pelajar Pancasila.

Profil Pelajar Pancasila is part of the process of character building and strengthening students' identity to support academic achievement (Susilawati et al., 2021). According to Irawati et al., (2022) there are six core competencies that form the basis of the teacher-driven program to realize Profil Pelajar Pancasila, namely: 1) Faith and devotion to God Almighty and noble character, 2) Independence, 3) Mutual cooperation, 4) Global diversity, 5) Critical thinking, and 6) Creativity. These six aspects need to be viewed as a whole so that students can grow into competent lifelong learners with character and behavior in line with Pancasila values.

In an effort to strengthen student character, project-based learning known as P5 is implemented (Ulandari & Rapita, 2023). Through this approach, students are encouraged to be more active, directly involved in the learning process, develop their potential and skills, practice critical thinking skills, especially in the context of solving mathematical problems, and appreciate each learning process and feel proud of the results achieved (Mery et al., 2022).

The integration of cultural context in mathematics learning is also important. This can be done by aligning the mathematical concepts taught with student learning behaviors through relevant examples (Fauza et al., 2023). This project provides space for students to develop positive character, deepen their competence, and increase active participation in the learning process. In addition, mathematics material presents many concepts that can be developed in creative projects, one of which is geometric transformation material. Transformations such as translation, rotation, reflection, and dilation can be linked to projects based on local wisdom.

According to Fitriyah et al., (2018) , Indonesian cultural values that contain morals need to be incorporated into learning. Therefore, mathematics should be taught using a contextual approach that is interesting and relevant to everyday life, including through local wisdom. For example, batik motifs from various regions in Indonesia have unique characteristics ( ). Jombangan batik, which is typical of Jombang Regency, features repeating geometric patterns that can be linked to the concept of geometric transformation (

Based on the preliminary analysis conducted at SMPN 1 Tembelang, it was found that Profil Pelajar Pancasila Strengthening (P5) project implemented in the school was not entirely focused on mathematics learning. This resulted in a lack of development of students' creative thinking skills, which are essential skills in facing challenges in this modern era. Students seem to have difficulty applying mathematical concepts innovatively, and this situation greatly affects their learning outcomes and interest in mathematics.

Amid these challenges, it is important to identify and implement learning methods that can improve students' creative thinking skills. One proposed approach is to use the *Missouri Mathematics Project* (MMP) Learning Model, which can encourage students to think creatively and apply mathematical concepts in everyday contexts. MMP is designed to create an active and participatory learning experience, where students not only receive information but are also involved in the process of exploring and applying concepts. The main objective of this study is to evaluate the extent to which students' creative thinking skills can improve after the application of the MMP learning model based on local wisdom in the context of Strengthening Profil Pelajar Pancasila.

METHOD

This study used a *Pre-Experimental: One Group Pretest-Posttest Design*, which was carried out using only one class without a comparison class. Through experimental research, the researcher will test

students' *creative thinking skills* in solving mathematical problems after applying the Missouri Mathematics Project (MMP) learning model. The hypothesis in this study is:

H_0 : There is no effect of MMP learning based on local wisdom on *creative thinking skills*

H_a : There is an effect of local wisdom-based MMP learning on *creative thinking skills*

The subjects in this study were thirty-two ninth-grade students at SMP Negeri 1 Tembelang. The instruments used in this study were the MMP observation sheet, the Batik Jombangan project media, a creativity questionnaire, and a test.

- MMP observation sheet
  The observation sheet was used to observe the implementation of MPP learning. Learning was conducted in three meetings on the subject of geometric transformation. The learning model involved the creation of a Batik Jombangan project on paper.
- Batik Jombangan Project Media Instrument
  The batik motifs were designed according to the unique culture of Jomabang, namely the Ringin Contong and Candi Arimbi motifs. These motifs were cut according to the students' creativity and made into batik on the paper provided. The batik created had to contain elements of geometric transformation, namely translation, reflection, rotation, and dilation.

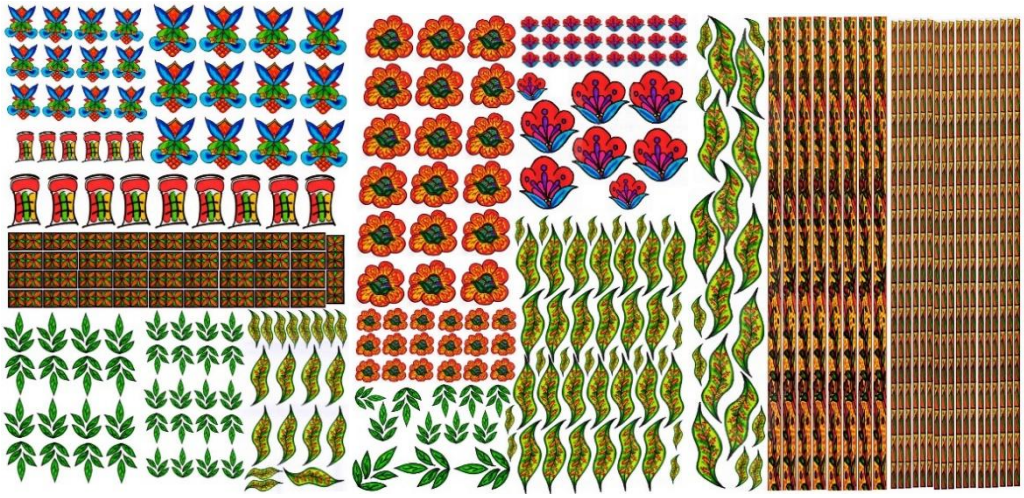

Figure 1. Jombangan Batik Design

- Creativity Questionnaire Instrument
  The questionnaire contains ten items regarding creativity (based on the indicators of flexibility, originality, elaboration, and fluency), cognitive ability in geometric transformation, and knowledge of the local wisdom of Jombangan batik.
- *Pretest* and *Posttest*
  The pretest and posttest questions are in essay form. The rubric for assessing the answers to these questions not only looks at the mathematical correctness of the answers but also uses *creative thinking skill* indicators. The following is a table of *creative thinking skill* indicators.

Table 1. *Creative Thinking Skill* Indicators

Aspect	Indicators
Flexibility	The number of ways, alternatives, or perspectives offered to solve different problems
Originality	The ability to present unique new ideas/concepts in solving different problems.
Elaboration	The ability to develop an idea or concept into greater detail
*Flu*ency	The number of solutions encountered in solving different problems.

RESULT AND DISCUSSION

This study was conducted on July 22, 26, and 29, 2025, at SMP Negeri 1 Tembelang, with 32 ninth-grade students as subjects. The material taught was geometric transformations.

- Results of the Observation of Learning Implementation

  Learning using *the Missouri Mathematics Project* (MMP) learning model was carried out in 5 phases, namely: first, the Introduction phase, in which the teacher explained the learning objectives and motivated the students to learn about geometric transformations. Based on this, the researcher also briefly explained geometric transformations to the students in terms of their real-life applications.

Figure 2. Introduction

The second phase is development. In this phase, the teacher asks the students questions to help them understand the initial concepts of geometric transformation. Next, the teacher explains the material on geometric transformation using PowerPoint (PPT). Then, the teacher distributes a pre-test to the students to find out how well they have learned before applying the *Missouri Mathematics Project* (MMP) learning model.

Figure 3. Material Explanation (Not Based on Local Wisdom)

Figure 4. Completing the Pre-test

The third phase is training guidance, in which students are asked to form groups. The teacher guides the students to join their groups according to the division. The teacher distributes project media and supporting worksheets to each group. The teacher explains the rules for working on the project media and worksheets. The teacher gives students the opportunity to ask questions about anything they do not understand in this learning process.

Figure 5. Guiding Groups (Materials Based on Local Wisdom of Jombang Batik)

Figure 6. Project Media Results

The fourth phase is Seatwork or independent work. At this stage, the teacher distributes *a Post Test* to students to assess their response after the learning process using the *Missouri Mathematics Project* (MMP) learning model. The teacher also distributes a creativity questionnaire to students.

Figure 7. Completing *the Post Test* and Questionnaire

The final phase is the summary, where students create a simple summary about geometric transformations. The teacher and students draw conclusions from the geometric transformation material.

Figure 8. Creating *Mind Mapping*

The research activity was observed by two people to monitor that the learning was carried out in accordance with *the* Missouri *Mathematics Project*.

- Questionnaire Results

  A total of 32 students filled out the creativity questionnaire. The results showed that 90% of students were able to answer questions differently from their friends, indicating a high level of creative thinking. When given *open-ended* tasks, 94% of students felt happy, showing that they valued freedom of expression and innovation. In addition, 95% of students felt challenged by difficult questions and 94% did not get bored when using media based on local wisdom, indicating that the local context can stimulate student creativity. Students also showed a desire to actively participate in the learning process, with 95% disliking learning methods where the teacher directly discussed questions without giving them the opportunity to think for themselves. This shows that students are more motivated to learn when they are given freedom and challenges, which can increase their creativity in understanding and applying mathematical concepts. *The Missouri Mathematics Project* (MMP), the Merdeka Curriculum, and local wisdom not only deepen students' mathematical understanding but also strengthen their sense of attachment to their culture and environment and improve *their creative thinking skills.* As evidence of the improvement in students' *creative thinking skills*, the results of the questionnaire show that students' *creative thinking skills* have increased.

- Pretest and posttest results

  The next step was to test the results using *a Paired Sample t-Test* to measure students' *creative thinking skills* by looking at the pretest and posttest scores. The data obtained from the students' answers was then tested for normality using *the Paired Sample t-Test*.

Table 2. Normality Test Results

Question	Shapiro-Wilk		
	Statistics	**Df**	**Sig.**
Pre-Test	.941	32	.082
Post-Test	.954	32	.188

Based on the results of the normality test above, it can be concluded that the data is normally distributed because the Shapiro-Wilk significance value is 0.05. Data that has been proven to be normally distributed is then tested using *a Paired Sample t-Test*.

Table 3. Results of the *Paired Sample t-Test*

Paired Differences					**t**	**Df**	**Sig. (2-tailed)**
Mean	**Std. Deviation**	**Std. Error Mean**	**95% Confidence Interval of the Difference**				
			Lower	**Upper**			
-11.25000	3.81000	.67352	-12.62365	-9.87635	-16.703	31	.000

Based on the results of the *paired* t-test, the significance value is 0.000. A significance value of 0.000 is t at a significance level of 0.05, so it can be concluded that Ho is rejected. The rejection of Ho results in the acceptance of Ha, thus having a positive impact, which means that there is an effect of the Missouri Mathematics Project (MMP) learning using project media on students' creative thinking skills in junior high school on the subject of geometric transformation. This result is in line with research by , which

states that the Missouri Mathematics Project (MMP) learning model makes students more active in interacting and also more active in completing the exercises given.

In the Merdeka Curriculum, there are six profiles that constitute the basic skills in the Merdeka Curriculum, namely: the Pancasila learner profile, which is first*, being faithful, devoted to God Almighty, and having noble character*, as seen in learning, where students make it a habit to start and end learning with prayer to foster a spiritual attitude in students. Second, *global diversity* is seen in the process of local wisdom-based project learning. Through learning based on local wisdom projects, students can explore the rich culture of Indonesia and understand the contribution of this culture to global diversity (Firmansyah et al., 2023). The Merdeka Curriculum, which is integrated with local cultural wisdom, can make a very significant contribution to realizing Profil Pelajar Pancasila (Utami et al., 2024). Third*, independence* is seen when students take tests and work on project media. Students are encouraged to be independent in problems related to geometric transformation. Fourth*, mutual cooperation* is seen when working on projects in groups, where students are taught the values of cooperation and mutual assistance. where students must form small groups to work together in overcoming a problem (Kharisma & Yusuf, 2023). Fifth, critical thinking is seen when students are trained to think critically to distinguish and apply geometric transformations, such as translation, rotation, reflection, and dilation. Sixth, creativity is seen when students create project media according to their respective creativity. The locally-based projects produced provide space for students to freely express their creativity according to their own desires.

CONCLUSION

Based on the research results and discussion presented, the conclusion that can be drawn is that there is an influence of the *Missouri Mathematics Project* (MMP) learning model based on local wisdom on students' *creative thinking skills* in geometric transformation material. This is shown in *the paired t-test*, where the significance value of 0.000 is smaller than the error rate used, which is 0.05. The questionnaire results also show that students can express themselves according to their creativity, can answer differently from their friends through the *open-ended* Batik Jombangan project*,* feel challenged, and do not get bored when working on projects based on local wisdom.

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