

Missouri Mathematics Project Integrated with Culture: a Solution to Enhance Student Learning Motivation

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ABSTRACT

This research aims to analyze the use of the MMP learning model integrated with culture in enhancing learning motivation. The instruments used in this study are teaching modules, Jombangan batik projects, tests, and questionnaires. The subjects of the research were 32 students from SMPN 2 Perak. The research results show that MMP learning integrated with culture has a positive impact on increasing students' learning motivation. The conclusion is based on the results of the pre-test and post-test T-tests, where the significant value obtained, 0.000, is smaller than the error margin used, which is 0.05. The test results also showed high scores as a sign of increased student learning motivation.

Keywords: *Missouri mathematics project; culture; learning motivation.*

INTRODUCTION

Mathematics is one of the most important subjects in education, therefore mathematics is a mandatory subject to be taught to students as preparation to face global challenges. The goal of mathematics education is to engage students in the process of formulating, solving problems, and discovering mathematical ideas (Febrian dkk., 2023). Mathematics is an abstract subject, which is why the majority of students become lazy and quickly bored with classroom learning. Furthermore, the students have not yet directly experienced the benefits of mathematics lessons because they have not been able to think and realize it in their daily lives (Ariawan & Ayuni, 2022). Mathematics learning requires an activity or action that can encourage students to understand the general achievements of mathematics learning so that it can improve students' attitudes and mathematical abilities. One of these activities is using the project-based learning model or the Missouri Mathematics Project (Prihandhika dkk., 2022).

Missouri Mathematic Project (MMP) emphasizes exercises that actively, structuredly, and guidedly involve students, both in group and individual project tasks. MMP helps students achieve improvement because they can think freely and focus on the projects they are working on (Kole dkk., 2021). Characteristics of the learning model The Missouri Mathematics Project involves active participation from students, with the teacher acting only as a facilitator who accompanies the students and helps them discover the foundational material (Gunadi dkk., 2020). The Missouri Mathematics Project learning model often uses media assistance that can enrich students' learning experiences. In addition, learning media is also considered to enhance students' learning motivation. There are 2 factors that influence learning motivation, namely internal factors and external factors. Learning motivation does not only come from teacher involvement, but also from the enthusiasm of students to delve into the material being studied (Umardiyah dkk., 2023). According to Listya & Widodo (2023) stated Efforts to increase students' learning motivation involve innovations in both the methods and media used in teaching, thereby creating learning that is correct, good, and engaging. The use of innovative methods and media aims to provide students with the opportunity to actively interact by utilizing their abilities.

Husna & Supriyadi (2023) state the benefits of learning media as follows: (1) lesson materials can be delivered uniformly; (2) the learning process becomes more interesting and clear; (3) the learning process becomes more interactive; (4) efficiency in time and effort; (5) students' learning outcomes improve; (6) learning media can be used anywhere and anytime; (7) the learning process fosters a more positive attitude among students; (8) it transforms the role of teachers to be more positive and productive.

The benefits of learning media are very extensive and can be seen in the increased motivation of students, which significantly affects their learning outcomes and academic achievements.

The researcher conducted interviews with the mathematics teacher at SMP Negeri 2 Perak to gather preliminary information before conducting the study. The result of the interview revealed issues with the geometry transformation material that affect students' learning motivation. The use of textbooks without accompanying variations in teaching methods makes students feel bored and fatigued. These conditions allowed the researcher to identify and implement more innovative teaching methods to enhance students' learning motivation. One of the proposed innovations is the use of the Missouri Mathematics Project (MMP) Learning Model, which has proven effective in increasing students' learning motivation in studying mathematical concepts, especially in the topic of geometric transformations.

Based on the above background, the researcher is interested in conducting a study titled "Implementation of the Missouri Mathematics Project (MMP) Learning Integrated with Local Culture to Enhance Student Learning Motivation." In connection with this, the researcher feels the need to develop learning media that aligns with the Missouri Mathematics Project (MMP) learning model based on local culture, which is engaging, efficient, and interactive.

METHOD

This research uses a quantitative approach of the pre-experimental design type: one group pretest-posttest design, which is conducted using only one class without a comparison class. Based on the research objectives, the experimental research type is considered the most relevant because the researcher will test the level of student learning motivation after the implementation of the Missouri Mathematics Project (MMP) learning model. the hypothesis in this study is:

Ho : There is no influence of MMP learning integrated with local culture on student learning motivation

Ha : There is an influence of MMP learning integrated with local culture on student learning motivation

The subjects in this study are 32 students from the 9th grade of SMP 2 Perak. The instruments used in this study are teaching modules, Jombang batik project media, learning motivation questionnaires, and tests.

1. Teaching module instrument

The teaching module is structured for three sessions on the topic of geometric transformations. The learning model used is the Missouri Mathematics Project combined with the creation of Batik Jombang projects on paper.

2. Jombang batik media instrument

The batik motifs are designed according to the unique culture of Jombang, namely the Ringin Contong and Candi Arimbi motifs. This motif will be cut according to the students' creativity and made into a batik on the provided paper. The batik created must contain elements of geometric transformation, namely translation, reflection, rotation, and dilation.

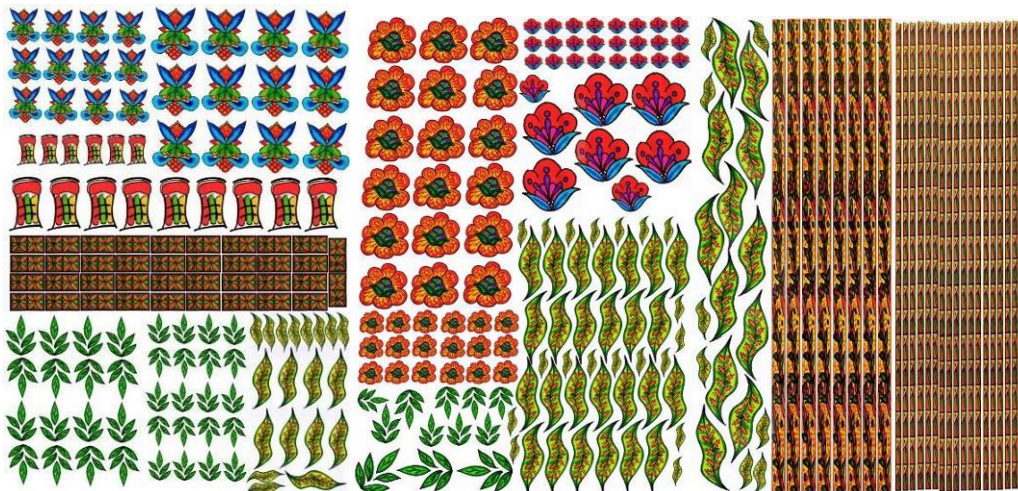


Figure 1. Jombang Batik Design

3. Learning motivation questionnaire instrument

The questionnaire contains ten statements regarding learning motivation in the subject of geometric transformations.

Table 1 Statement Items on The Learning Motivation Questionnaire

No	Statement
1.	I was present in class when the lesson started
2.	I feel like I'm missing out if I don't attend the classes.
3.	I continue to follow the mathematics lessons regardless of the material being taught.
4.	I feel the need to study again at home.
5.	I feel challenged to be able to complete difficult tasks.
6.	I invite friends to discuss if they encounter difficulties in studying.
7.	I pay close attention to the lessons taught by the teacher.
8.	I always concentrate my attention on my studies.
9.	I have a desire to achieve high academic performance.
10.	I want better achievements than before.

4. Test instrument

The type of test question is an essay. The rubric for assessing the answers to the question not only considers the mathematical correctness of the answers but also uses indicators of learning motivation. Here is the table of learning motivation indicators.

Table 2 Learning Motivation Indicators

Aspect	Indicators
Perseverance	Attendance at school follows learning at home.
Facing Difficulties	Attitude towards difficulties, efforts to overcome difficulties.
Interest	Habit in attending lessons, enthusiasm in attending lessons.
Achieving	Desire to achievement, qualification results.
Independent	Completion of assignments, using opportunities outside of class hours.

This research was conducted in three stages: 1) Pre-Implementation, which consists of instrument preparation; 2) Implementation, during which the research is carried out; 3) Post-Implementation, which consists of testing the effectiveness of MMP learning integrated with local culture on improving students' learning motivation.

RESULT AND DISCUSSION

This research begins with the creation of research instruments. The instruments created in this study include a teaching module with the Missouri Mathematics Project (MMP) model, project media integrated with local culture, a learning motivation questionnaire, and tests. According to (Mulya & Lengkana, 2020), there are 5 indicators in learning motivation, namely perseverance, facing difficulties, interest, achievement, and independence. This research was conducted on October 1, 2, and 3, 2024, at SMP Negeri 2 Perak, with a total of 32 ninth-grade students as subjects. The material taught is geometric transformations.

Learning with the Missouri Mathematics Project (MMP) model is conducted in 5 phases: First, the **introduction phase**, in this phase the teacher explains the learning objectives and motivates the students so that they are interested in studying geometric transformations. Based on this, the researcher also briefly explained to the students about geometric transformations and their applications in real life.



Figure 2. Introduction

Second, the **development phase**. In this phase, the teacher provides prompting questions to the students so that they understand the initial concepts of geometric transformation material. Next, the teacher will explain the material on geometric transformations using PowerPoint (PPT). Then the teacher distributes a pre-test to the students so that the teacher can understand the students' learning outcomes before applying the Missouri Mathematics Project (MMP) learning model.



Figure 3. Explanation of The Material (Not Integrated With Local Culture)



Figure 4. Filling Out a Pre-Questionnaire

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



Figure 5. Guiding A Group (Integrated Local Culture Batik Jombang)



Figure 6. Project Media Results

Fourth, the **independent work phase**. In this phase, teacher distributes a post-questionnaire to the students to understand their responses after the learning process using the Missouri Mathematics Project (MMP) learning model. The teacher also distributed test questions to the students.



Figure 7. Filling Out A Post-Questionnaire and Test

The final phase is a **summary**. The teacher directed the students to create a simple mind map about the geometric transformations they had learned. Then the teacher and students together draw conclusions from the geometry transformation material.



Figure 8. Make A Simple Mind Map

The research activities were conducted with observation by two people to ensure that the learning was carried out according to the teaching module.

In the Merdeka Curriculum, there are 6 profiles that serve as basic skills in the Merdeka Curriculum, namely: Pancasila student profile, namely first, being faithful, devout to God Almighty, and having noble character, which is evident in learning, where students are accustomed to starting and ending their lessons with prayer to foster a spiritual attitude. Secondly, global diversity is evident in the process of learning through local wisdom-based projects. With project-based learning rooted in local wisdom, students can explore the richness of Indonesian culture and understand its contribution to global diversity (Firmansyah dkk., 2023). The Merdeka Curriculum, integrated with local cultural wisdom, can make a very significant contribution to realizing the Pancasila Student Profile (Utami dkk., 2024). Thirdly, independence is evident when students work on tests and project media. students are encouraged to be independent in solving problems related to geometric transformations. The four forms of mutual cooperation are evident when working on group projects, where students are taught the values of teamwork and mutual cooperation. where students must form small groups to collaborate in solving a problem (Kharisma dkk., 2023). Fifth, critical thinking, it is evident Students are trained to think critically

to differentiate and apply geometric transformations, such as translation, rotation, reflection, and dilation. The sixth aspect of creativity is evident when students create project media according to their individual creativity. The local wisdom-based projects produced provide space for students to express their creativity freely according to their individual desires.

Then, an effectiveness test was conducted to measure students' learning motivation by examining data from questionnaires supported by test scores according to the Missouri Mathematics Project (MMP) learning model. The data obtained from the students' answers were then tested for normality using the Paired Sample t-Test.

Table 3 Normality Test Results

	Shapiro-Wilk		
	Statistic	Df	Sig.
Pre-questionnaire	,947	32	,115
Post-questionnaire	,951	32	,150

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

Table 4. Results of the Paired Sample t Test.

Paired Differences								
Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)	
			Lower	Upper				
			Pair 1	-9,18750				3,37388

Based on the calculation results obtained using IBM SPSS Statistics, the pre-questionnaire significance value is $0.115 > 0.05$ and the post-questionnaire significance value is $0.150 > 0.05$. According to the requirements for detecting normality using the Shapiro-Wilk test, it means that both data sets are normally distributed. Next, the data were tested with a paired sample t-test using the IBM SPSS Statistics application to test the proposed hypothesis. Based on the results obtained, the significance value is 0.000. Where the significance value < 0.05 , H_a is accepted, meaning there is an influence of the Missouri Mathematics Project (MMP) learning model based on local culture in increasing students' learning motivation.

CONCLUSIONS

Based on the research results and the discussion presented, the conclusion that can be drawn is that there is an influence of the Missouri Mathematics Project (MMP) learning model integrated with local culture on the increased learning motivation of students in the subject of geometric transformations. This is shown in the paired t-test where the significance value obtained is 0.000, which is smaller than the error level used, namely 0.05, so H_a is accepted, meaning there is an influence of the Missouri Mathematics Project (MMP) learning model integrated with local culture in increasing students' learning motivation. The difference in the data can be seen from the increased post-survey results compared to the pre-survey, as well as supported by the test scores.

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