The 2nd LEWIS, Volume 2
The 2nd Lawang Sewu International Symposium
November 27th – December 05th, 2023
E – ISSN : 2987 - 2685
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Exploration of Local Wisdom in the Shape of the Character Facade of the Bola Soba Building in Learning to Improve Students' Logical Thinking Ability

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ABSTRACT

The ability that students need to face increasingly complex learning challenges is the ability to think logically. This logical thinking ability is part of High Order Thinking Skills (HOTS), which involves a scientific and sequential analysis process before generalizing a problem. However, currently, students' logical thinking abilities are still low, as can be seen from the results of national and international surveys. The aim of this research is to see how to improve students' logical thinking abilities through the application of local wisdom to the character facade of the Bola Soba building. The research method used was quasi-experimental with a nonequivalent control group design. This research was carried out at UPT SMP Negeri 1 Kahu with a population of all class VIII students. The sample consisted of two classes, namely 30 students from class VIII B as the experimental group and 30 students from class VIII A as the control group. Samples were taken using nonprobability sampling methods, especially purposive sampling. The research results showed a significant increase in the experimental group with a gain value of 0.70 or 70%, which is in the high category. This indicates that the application of the Bola Soba building character facade design can improve students' logical thinking abilities.

Keywords: *Façade of Bola Soba, Logical Thinking, Local Wisdom*

1. INTRODUCTION

Local wisdom is a culture or tradition of each region which becomes an identity that forms character and national identity. Local wisdom is an inseparable part in all aspects of life, including the world of education. The value of local wisdom in education will lead to the emergence of an independent attitude, full of initiative, polite and creative [1][2]. One effort to revitalize culture through education is by integrating authentic patterns full of local wisdom into learning which can function as a learning medium [3].

One of the local wisdoms that is full of the philosophy of life of the Bugis people is depicted in the facade of Bola Soba. Bola Soba or commonly called Saoraja is a traditional

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Bugis house with unique architecture that reflects the community's view of the spatial layout of the universe (macrocosm). The unique shape and pattern facade of Bola Soba consists of Boting-Langi (upper world), Ale Kawa (middle world), and Buri Liung (underworld) [4]. Apart from that, Bola Soba has a value philosophy in accordance with Bugis culture, namely Lempu (honest), Getteng (firm), Sipakatau (humanizing humans), Sipakalebbi (mutual respect), Assitinajang (properness), Siriq (self-respect) and Mappesona ri Dewata Seuwae (surrender to Allah) [5]. The cultural values reflected in the concept of this traditional house are the nation's cultural heritage which should be known and inherited by future generations. The concept of the Bola Soba traditional house is reflected in the shape of the building's character facade which can be seen from each division and spatial arrangement. The shape of the facade of the character of the Bola Soba building has not yet been explored, so it has the potential for novelty as a medium in the learning process based on local wisdom. Therefore, in this research, the form of the facade of the Bola Soba building character will be integrated into the mathematics learning process, especially the material on the Pythagorean theorem.

So far, the Pythagorean theorem is still the material that is most difficult for students to understand, as can be seen from the low National Mathematics Examination results in the geometry aspect, namely 47.71 [6]. This is one of the factors causing students' low ability to solve mathematical problems. The AKM results obtained from the 2022 Public Education Report Card show that numeracy skills are below minimum competency with the learning quality index still not supported by thinking activities [7]. The same problem also occurred in Bone Regency students with a mathematics score of only 46.15 in the low category [6]. This is in line with the results of observations during the Introduction to School Field (PLP) activities at SMP Negeri 1 Kahu, where problems were found that students were not able to understand concrete material concepts in the Pythagorean theorem, such as difficulty distinguishing square operations and the longest side of a triangle, and difficulty determines the slanted side when the image position changes. This statement is strengthened from the results of interviews with the Deputy Head of Curriculum, subject teachers as well as the results of summative assessments of students who still show below the AKM (<50%).

The problem of students' low mathematics learning outcomes in the Pythagorean theorem material occurs because students have not been able to translate the concept of each side of a triangle and have difficulty making decisions in determining answers. As a result, the difficulties experienced by students will have implications for logical thinking abilities, especially in connecting problems with solution formulations which require a coherent analysis process before generalizing the problem [8][9]. Logical thinking skills are needed to gain perception and visualization of a problem based on a comparison between previous information and new information to reach conclusions [10][11][2][13][14]. So, logical thinking skills need to be improved, especially in mathematics subjects.

The majority of research that studies logical thinking abilities which are connected to local wisdom does not explain in detail how they are applied in mathematics learning [15][16]. Thus, this research will explore the character of the Bola Soba building facade which

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will be integrated into learning, especially in overcoming weak cognitive domains in the Pythagorean theorem material. Therefore, this research will complement several previous research results regarding improving students' logical thinking abilities which are integrated with local wisdom in the form of the character facade of the Bola Soba building.

2. METHODOLOGY

This research is a quantitative descriptive study using a quasi-experimental method using non-equivalent control group design. The research design can be seen in Figure 1.

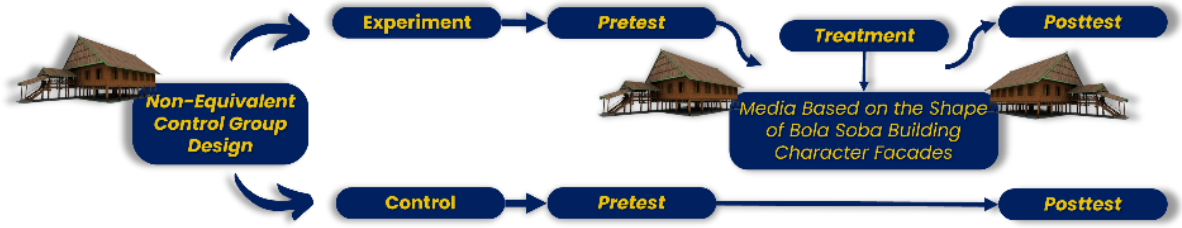

Figure 1. Non-Equivalent Control Group Design

The subjects in this research were students of UPT SMP Negeri 1 Kahu, Kahu District, Bone Regency. The population in this study was all students in class VIII, with the research sample being class VIII A totaling 30 students as the control class and class VIII B totaling 30 as the experimental class. The sampling technique is non-probability sampling, namely purposive sampling or a technique for determining samples with certain considerations, in this case subject teachers. The instruments used in this research include a logical thinking ability test which consists of 3 indicators, namely Continuous Thinking, Arguing Ability, and Drawing Conclusions. The data analysis used in this research is the normality and homogeneity test, the gain score test to determine the increase in students' logical thinking abilities before and after the application of the media in the form of the Bola Soba building character facade. The data collection technique was carried out in several steps, namely pretest, treatment and posttest. An explanation of data collection techniques can be seen in Table 1.

Table 1. Data Collection Technique Steps

No	Technique	Description
1	*Pre-test*	The pre-test is a test given to the control and experimental classes in the form of a 5-item essay with indicators of logical thinking ability to determine students' initial abilities. In this case, the teacher functions as a facilitator who monitors students in working on pre-test questions.
2	*Treatment*	Treatment is the process of applying media in the form of a Bola Soba character facade which will be applied/applied to the experimental class. Before implementation, consultation was carried out with mathematics teachers regarding the instruments and learning tools that would be used.
3	*Post-test*	The post-test is the re-administration of tests in the control and experimental classes to determine the increase in students' logical thinking abilities after carrying out the treatment.

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3. FINDINGS AND DISCUSSION

Exploration of the shape of the Bola Soba building's character facade in improving students' logical thinking abilities. Normality and homogeneity tests are carried out at the beginning of research data processing to determine the statistical tests that will be used. Table 1 shows the results of the normality test, and these results refer to the Shapiro Wilk test with a significance level of 0.05.

Table 1. The Result of Normality Test

	Class	Shapiro-Wilk		
		Statistics	df	Sig.
Learning outcomes Learners	Experiment Pretest	0,917	30	0,053
	Experiment Posttest	0,932	30	0,056
	Control Pretest	0,968	30	0,488
	Control Posttest	0,953	30	0,204

Following data analysis using the Shapiro-Wilk test in the experimental group, the pretest data exhibited a significance value of 0.053, signifying the normal distribution of the pretest data. Similarly, the posttest data also showed a significance value of 0.056, confirming its normal distribution. In contrast, the control group's pretest data yielded a significance value of 0.488, and the posttest data showed a value of 0.204, both indicating normal distribution for both datasets. In light of these test outcomes, it can be concluded that both the experimental and control group datasets adhere to parametric assumptions. Consequently, the process of formulating hypotheses will utilize parametric statistics.

Subsequently, an analysis for homogeneity testing will be conducted to evaluate if there are disparities in variance between the data sets of the control and experimental groups, employing a significance level (α) of 0.05. The findings of the homogeneity test are presented in the following Table 2.

Table 2. The Result of Homogeneity Test

		Levene Statistics	df1	df2	Sig.
Learning outcomes	Based on Mean	1,728	1	58	,194
	Based on Median	1,196	1	58	,279
	Based on Median and with adjusted df	1,196	1	57,634	,279
	Based on trimmed mean	1,692	1	58	,198

The outcomes of the homogeneity test serve the purpose of ascertaining whether there is uniform variance between the data sets of the control and experimental groups, employing a significance level (α) of 0.05. As per the results, the significance value based on the Mean is 0.194, which is greater than 0.05. Consequently, it can be inferred that the variance of the posttest data in both the experimental and control groups is equivalent or homogeneous.

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Subsequently, gain score analysis was conducted to assess the enhancement in students' logical thinking abilities within both classes. The research findings indicated that after the incorporation of the Bola Soba building character facade as a teaching medium, students exhibited improved comprehension and problem-solving skills related to the Pythagorean theorem material. Below are the results of the data analysis regarding the enhancement of students' logical thinking abilities in both the control and experimental groups.

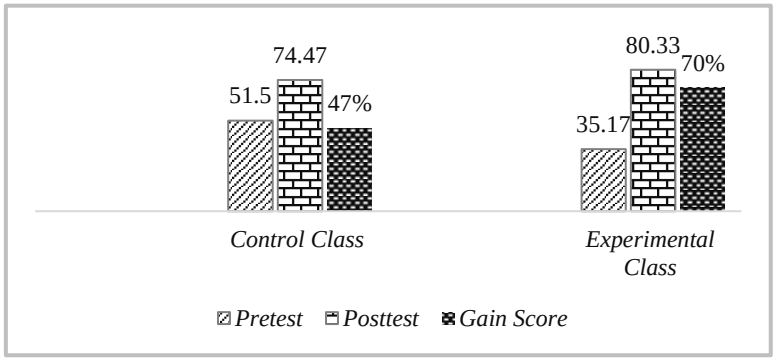

Figure 2. Comparison of Control Class and Experimental Class

According to the findings from the gain score test presented in Figure 1, there was a percentage increase of 47% in the control class and 70% in the experimental class. These percentages were calculated by comparing the pretest scores, which were 35.17 in the experimental class and 51.50 in the control class. Notably, the control class initially had higher scores than the experimental class. However, after the experimental class received treatment involving the Bola Soba building character facade, their posttest scores increased to 80.33, while the control class only reached 74.47. Consequently, it can be concluded that both the control and experimental classes demonstrated an improvement in their logical thinking abilities based on this analysis. Nonetheless, the experimental class experienced a significantly greater improvement, indicating that the integration of the Bola Soba building character facade proved more effective in the experimental class.

Exploration of local wisdom in the form of the Bola Soba building's character facade in learning refers to four learning stages, namely Sipatudang (Exploration), Sipattuju (Connection), Sipalolongeng (Problem Solving), and Sipalempu (Review). The Sipatudang stage is the stage where students and teachers explore and identify flat shapes contained in Soba Balls, so that they can be used in the Pythagorean theorem material. At this stage, the teacher introduces the cultural values contained in the form of the Bola Soba facade which is an embodiment of the macrocosmic beliefs of the Bugis community. Students' activities in this stage are in line with indicators of logical thinking ability, namely coherent thinking, where students are expected to be able to say all the information from what is known and asked appropriately through the teacher's facilitator. The next stage is Sipattuju, which is the stage where students carry out connection activities/connect the pattern of parts of the Bola Soba with the concept of the Pythagorean theorem, as well as carrying out the process of determining the formula used in the process of solving the given problem. This stage is very important in supporting the learning process so that students have the same perception

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regarding the pattern of the parts of the Bola Soba and its relation to the Pythagorean theorem, so that later an effective and enjoyable learning process can be created. The third stage is Sipalolongeng, namely the problem solving stage, at this stage students are given various questions that require a thinking process, so that they are able to apply arithmetic operations correctly in solving problems together with their group members. The various questions in this stage are given in accordance with the concept of the Pythagorean theorem, such as calculating the length of one of the triangles in the facade of the Bola Soba. At this stage, the teacher monitors the student discussion process and gives students the opportunity to share knowledge by visiting other groups, then invites each group representative who has successfully solved the problem to explain the solution provided. Then, the final stage is Sipalempu, at this stage students carry out a presentation process of the results of group work to find out the overall solution provided by each group through identifying the shape of the character facade of the Bola Soba building using the concept of the Pythagorean theorem. This is in line with the two indicators of logical thinking ability, namely the ability to argue and draw conclusions, where students are expected to be able to solve questions/problems correctly at each learning step taken by providing arguments at each step used, then being able to find and draw conclusions. an appropriate conclusion at the end of the answer, in this case it is a problem solving solution to the question given in identifying patterns in the facade of the Bola Soba. Visually, the learning stages carried out in exploring the shape of the facade of the Bola Soba building character in learning the Pythagorean theorem material can be seen in Figure 3 below.

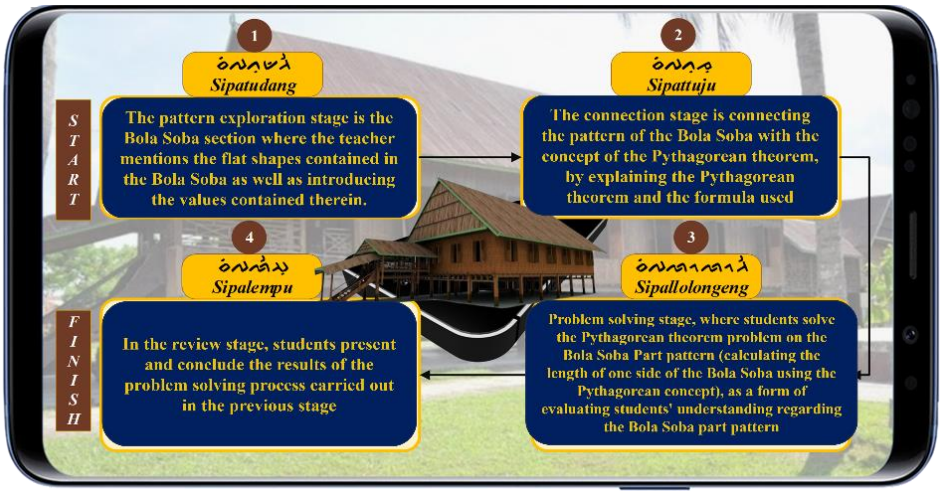

Figure 3. Learning Stages Exploration of the Shape of the Character Facade of a Bola Soba Building

This study explores the Bola Soba building's character facade as a tool for active learning and problem-solving motivation among students. Bola Soba, a traditional Bugis community house, embodies unique forms and philosophical values crucial for preservation. These values are expressed through the building's distinctive elements, such as Boting-Langi (upper world), Ale Kawa (middle world), and Buri Liung (underworld), comprising Timpa Laja, Indo Bola, Lego-lego, and Lari-larian, setting it apart from other South Sulawesi traditional houses. The research investigates the integration of the Bola Soba character facade in education, aiming to uphold Bugis pangaddereng (customs). It emphasizes

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students' ability to solve contextual problems rooted in the Pythagorean theorem material, fostering coherent thinking, argumentation skills, and logical reasoning. Logical thinking, a key determinant of students' learning success, equips them to make informed decisions, solve problems, and analyze situations using logical criteria.

4. AUTHORS' CONTRIBUTIONS

Sartika Sari Dewi, Andi Muhammad Irfan Taufan Asfar, Andi Muhamad Iqbal Akbar Asfar, Andi Nurannisa, Wiwi Damayanti, and Nining Wahyuni contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript.

5. ACKNOWLEDGMENTS

We thank to Kementerian Pendidikan, Kebudayaan, Riset dan Teknologi, Universitas Muhammadiyah Bone and UPT SMP Negeri 1 Kahu for supporting the implementation of our research to complete it on time.

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