THE EFFECTIVENESS OF LOCAL CULTURE-INTEGRATED SCIENCE LEARNING THROUGH PROJECT-BASED ASSESSMENT ON SCIENTIFIC ATTITUDES AND SCIENCE PROCESS SKILLS OF ELEMENTARY SCHOOL STUDENTS

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ABSTRACT

This study aims to analyze the effect of project-based assessment based on local culture on students' scientific attitudes and science process skills in science learning in elementary schools. This research is a quasi-experimental study with a non-equivalent post-test-only control group design. The population in this study was 151 participants, while the sample selected through random sampling technique was 61 participants divided into two classes. The data collection methods in this research were test and non-test methods. The instruments used were scientific attitude questionnaires and performance tests, and observation sheets. A validation process measured the validity and reliability of the instrument. The data obtained were analyzed using the MANOVA test assisted by the IBM SPSS Statistics 21.0 application. The hypothesis test results show a significance value of 0.003 (Sig <0.05) so that Ho is rejected and Ha is accepted. Thus, it can be concluded that there are simultaneous effects in scientific attitudes and science process skills between students' learning with local culture-based Project-based Assessment and students' learning with conventional assessment applied.

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Keywords: scientific attitude; process skill; project-based assessment; local culture; science learning

INTRODUCTION

Essentially, science includes process, product, and attitude (Chen et al., 2012; Dewi & Rati, 2017; Sumarti et al., 2018; Sukmawa et al., 2019). As a process, science focuses on the process of acquiring knowledge. As a product, science focuses on the outcome of knowledge. On the other hand, as an attitude, science seeks to equip, train, and instill positive values for students (Desstya et al., 2019; Muliani & Wibawa, 2019; Redhana et al., 2019). It is important to instill positive values in the students because it shapes their character. One of the ways to instill positive values is through culture. Character is the manifestation of one's understanding and knowledge about positive values in life, originating from culture, manifested in daily attitudes or behavior. Science integrated with culture will also shape scientific attitudes. These scientific attitudes are openness, curiosity, objectivity, critical thinking, respect for other people's work, and courage to defend the truth. According to the anthropological perspective, science teaching is considered cultural transmission, and science learning is considered cultural mastery. The culture in this context is a system or order of symbols and meanings applied to the social interactions of society. Based on this definition, science can be considered as a sub-culture of Western culture, and science from the West (western science) is a sub-culture of science. In the science learning process, students must be fa-

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cilitated in developing their potential knowledge, skill, and attitude as a way to solve the problems they encounter in everyday life (Hosnan, 2016; Amir, 2018).

Today's science learning in schools tends to develop intellectual aspects with only information from textbooks and teachers as the primary learning source. Based on the observations, this fact is a general description of what is happening in schools in the Karangasem District. Based on the results of a preliminary study conducted in Karangasem District, it was found that the students' scientific attitude on the indicator of curiosity is low. The observation results showed that students tend to be passive in learning and only listen to the teacher's lecture. In addition, only 3% of the students asked the teacher in the question and answer session. The lack of student involvement in learning causes students' less-trained science process skills. The scientific attitude on the cooperation indicator is low due to the lack of interaction among classmates and the distribution of study groups that are not heterogeneous. In addition, the scientific attitude on the indicator of positive attitudes towards failure is low. Based on the students' interview results, students found it difficult to find why they failed in learning so that students' self-confidence decreased. All these data prove that the science process skills and scientific attitudes of the fifth-grade elementary school students are not optimum and considerably low.

School-based learning has a greater social standing (social prestige) than meaningless and lower (discredited) local cultural traditions. The community also considered that the formal education process is separated from the acculturation process and the context of cultural society. Currently, many people work in the field of local culture. As a profession, local culture can be expressed as part of the culture, because according to culture, it is a way of life that is developed, owned, and shared by a group of people, and passed down from generation to generation. However, this way of life or culture of a society cannot cultivate a positive scientific character in students' hearts. Students' lack of scientific character stems from a lack of awareness that scientific principles exist in the local culture. Local culture, according to the community, is passed down from generation to generation and has nothing to do with learning activities at school or college.

Integrating local cultures and enhancing scientific literacy in science learning can help to foster students' scientific character. Based on these issues, the integrated local culture of science learning is being investigated as a possible solution. The local culture-integrated science learning is a strategy to create a learning environment and design a learning experience as a part of the learning process. The constructivist view of local culture-integrated scientific learning emphasizes the construction of meaning. Using environmental and cultural concepts, particularly local culture, as a learning resource to develop science process skills and students' scientific attitudes, local culture-integrated science learning highlights the value of learning.

Students' characteristics are used to bundle local culture-integrated science learning. This statement is pertinent to science learning objectives, which are geared towards mastery of knowledge, skills, values, and attitudes that will enable students to play an active part in the environment. Today's education and culture are mutually beneficial. If culture is integrated into the learning process, it can become a component of the educational process. Cultural integration in learning activities is also referred to as culture-based learning. Learning that integrates local culture has various benefits (Shen et al., 2012; Parmin et al., 2015; Khusniati et al., 2017). Previous research has shown that local culture-integrated learning increases students' science process skills as well as their appreciation of the developing local culture. There has been no comprehensive study of integrating local culture in higher education that demonstrates scientific literacy and scientific character. Hence, one of the efforts that could be applied to overcome this problem is applying local culture-integrated science learning to scientific attitudes and science process skills through project-based assessment.

Project-Based assessment is an assessment development sourced from project-based learning. A project-based assessment is performed on a task that must be completed within a specific time frame. As a result, project tasks begin with planning, data gathering, organizing, processing, and presenting data (Majid, 2014; Marzuki & Basariah, 2015; Safaruddin et al., 2020). Project-based assessment includes assignment assessments containing investigative activities and must be completed within a specific time for students in groups. Project-based assessment requires students to solve various problems (Amri & Tharihk, 2018). In addition, this assessment can guide students in carrying out an inquiry activity to gain new insights and solve problems with the knowledge they construct by themselves (Sukmasari & Rosana, 2017). The use of project-based assessment is suitable for science learning because it increases students' self-efficacy, namely students' confidence in doing assignments (Effendi-Ha-

sibuan et al., 2020). In the Project-based assessment, students are actively involved in learning activities, and teachers can observe their activities during the learning process. During the project, psychomotor students can be assessed optimally. Students can improve their science process skills and scientific attitudes. Projects given to students must be in the form of scientific process skills and scientific attitudes.

There are several relevant studies related to Project-based assessment. The first one is the research conducted by Sumarni et al. (2016) which found that Project-based learning improves psychomotor skills. In addition, Widiana (2016) developed project assessments on science subjects in elementary schools. Furthermore, Purwaningsih et al. (2020) found that STEM-PjBL positively influences students' problem-solving skills on impulse and momentum material. Some of the relevant research shows that no research has conducted a study on the use of Project-based assessment, which is integrated with local wisdom values and their effect on science learning outcomes of elementary school students. In addition, the assessment process tends to only measure knowledge without measuring students' social attitudes.

Based on many previous research studies, this study aims to analyze the effect of project-based assessment based on local culture on students' scientific attitudes and science process skills in science learning in elementary schools. This project-based assessment includes assessing learning carried out on a task completed within a specific time. In addition, the learning is integrated with a local culture which is an aspect close to students' daily lives. Learning science through a project-based assessment based on local culture is expected to improve students' scientific attitudes (objective attitudes towards fact-findings, not hastily taking experimental conclusions, carefulness, and respecting others' work/opinions) and science process skills (observing, formulating hypotheses, performing simple experiments, classifying data, interpreting data, summarizing, and communicating).

METHODS

This research is conducted on online learning due to the COVID-19 pandemic. This research is educational research using a quantitative approach. This research belongs to quasi-experiment using non-equivalent post-test only control group design (Sugiyono, 2012; Daniel, 2016). The treatment given to the experimental class was learning that applied a project-based assessment based on local culture. The control class was not given special treatment, meaning that the teacher in daily learning usually applied the learning to the control group. After the treatment, both the experimental and control classes were given a post-test to determine each group's scientific attitude and science process skills.

The population of this research is 5th-grade elementary school students, consisting of 151 students. A study population comprises students of a community that highly upholds local customs, traditions, and culture. The local culture is used as norms/guidelines for behavior in everyday life. Thus, the local culture has become an inseparable part of life. The sample selection in this study used the random sampling technique. This technique is carried out because students have been formed into study groups/classes. This random sample selection was carried out through a lottery system twice. Based on the lottery result, 28 students were selected as experimental group members and 33 as control group members. The entire sample consists of 61 students.

The data collected in this study were the scores of scientific attitudes and science process skills of 5th-grade elementary school students. The students' scientific attitude data were obtained using a questionnaire containing 25 statements with the choice of SL (Always) having a score of 4, OF (Often) having a score of 3, RR (Rarely) having a score of 2, and NV (Never) having a score of 1. Science process skills data were obtained through performance tests and observations in experimental and control classes. The measured science process skills include observing, constructing hypotheses, conducting simple experiments, data grouping, data interpreting, summarizing, and communicating, equipped with an assessment rubric for each indicator of science process skills.

The two instruments were tested for validity and reliability before their usage. The validity of the instruments was tested using Aiken's V formula. The analysis results showed that all instrument items were declared valid with an average coefficient of 0.85 for scientific attitude questionnaires and performance tests. The reliability of the instrument was calculated using the Alpha-Cronbach formula and showed a coefficient of 0.907 for the scientific attitude questionnaire and 0.882 for the performance test. Both instruments belong to the very high category of reliability. The data in this study were analyzed using descriptive and inferential statistical analysis. The hypothesis was tested using the Manova test. Before the analysis, the analysis prerequisite test was carried

out, including the data distribution normality test, variance homogeneity test, multivariate homogeneity test, and multicollinearity test for the dependent variable. The data were analyzed using the IBM SPSS Statistics 21.0 application.

RESULTS AND DISCUSSION

The local culture available to be integrated into project-based assessments for science learning is presented in Table 1.

Table 1. Local Culture Integration in Science Learning in 5th Grade Elementary School

Local Culture	Description	Correlation to Science
Tri Hita Karana	*Tri Hita Karana* etymologically means the three relations that cause harmony. *Tri Hita Karana* consists of *Parahyangan* (human and God relationship), *Pawongan* (human and human relationship), and *Palemahan* (human and environment relationship).	*Tri Hita Karana* can be correlated with cultivating the concept of ecosystem balance, the interaction between living things, and efforts to conserve the environment
Tri Kaya Parisudha	*Tri Kaya Parisudha* means three good deeds. *Tri Kaya Parisudha* consists of *Manacika* (think good), *Wacika* (talk good), and *Kayika* (do good).	*Tri Kaya Parisudha* is correlated to the cultivation of scientific attitude, namely objective to fact-findings, not hastily taking conclusions upon experiments, carefulness, and appreciating others' work/opinion.
Catur Pramana	Etymologically, *Catur Pramana* means the four-way of acquiring knowledge. *Catur Pramana* consists of *Pratyaksa* (observation), *Anumana* (reasoning), *Upamana* (comparison), dan *Sabda* (explanation).	*Catur Pramana* can be correlated to scientific methods in observing, fact collecting, and result presenting.

After giving treatment, the data were taken in the form of scientific attitudes and scientific process skills. Furthermore, the data were analyzed descriptively and inferentially. The analysis results of the descriptive data in the experimental group and control group are presented in Table 2.

Table 2. Descriptive Analysis Result of Experiment and Control Group Data

Descriptive Statistics	Experiment Group		Control Group	
	X1	X2	X1	X2
N	28	28	33	33
Mean	86.59	84.68	76.87	78.54
Maximum Value	100	95	90	90
Minimum Value	75	75	55	70
Standard Deviation	8.49	7.20	1.01	6.80

The analysis prerequisite tests consisted of data distribution normality test, variance homogeneity test, multivariate homogeneity test, and dependent variable multicollinearity test. The first prerequisite test performed was the Kolmogorov-Smirnov normality test. The results of the analysis showed that all data came from normally distributed data. It can be indicated by the Sig.>0.05. After the normality requirements are met, the following prerequisite test is the homogeneity test. In this study, the homogeneity test was carried out by two analyses: variance homogeneity using Levene's Test of Equality and multivariate homogeneity test using Box's Test of Equality of Covariance Matrices. The results of the homogeneity analysis showed the same. The research data came from a homogeneous data group, which can be seen from the sig value. Each test shows a value greater than 0.05 Sig value. Levene's Test of Equality test is 0.264 for learning outcomes, while the Sig. Social attitude of 0.565. Meanwhile, the homogeneity test with the Box's Test of Equality of Covariance Matrices was obtained an F value of 0.271 with Sig. 0.846. The following prerequisite test is the multicollinearity test which aims to determine the presence or absence of multicollinearity symptoms in each dependent variable analyzed. The multicollinea-

rity test uses the Tolerance and VIP values. The analysis results showed that the Tolerance value is 0.759 and VIP is 1.317, which means that there are no symptoms of multicollinearity between scientific attitude data and science process skills. Based on the prerequisite test analysis result, all the prerequisites needed to carry out the Manova test have been fulfilled, so that hypothesis testing with Manova can be carried out. The results of the MANOVA test analysis are presented in the following Table 3 and Table 4.

Table 3. Multivariant Analysis Result

	Effect	Value	F	Hypothesis df	Error df	Sig.
	Pillai's Trace	0.994	3.458E3[a]	2.000	43.000	0.000
	Wilks' Lambda	0.006	3.458E3[a]	2.000	43.000	0.000
Intercept	Hotelling's Trace	160.852	3.458E3[a]	2.000	43.000	0.000
	Roy's Largest Root	160.852	3.458E3[a]	2.000	43.000	0.000
	Pillai's Trace	0.234	6.582[a]	2.000	43.000	0.003
	Wilks' Lambda	0.766	6.582[a]	2.000	43.000	0.003
A	Hotelling's Trace	0.306	6.582[a]	2.000	43.000	0.003
	Roy's Largest Root	0.306	6.582[a]	2.000	43.000	0.003

Based on the results of the MANOVA analysis presented in Table 3 and Table 4, several findings were obtained. First, the significance value of Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root is 0.003 (<0.05). It shows simultaneous differences in scientific attitudes and science process skills between students who take learning with project-based assessments based on local culture and groups of students who take learning by applying conventional assessment.

Table 4. Tests of Between-Subjects Effects Analysis Result

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	X1	1083.535[a]	1	1083.535	12.300	0.001
	X2	285.654[b]	1	285.654	5.727	0.021
Intercept	X1	306711.796	1	306711.796	3.482E3	0.000
	X2	307736.088	1	307736.088	6.170E3	0.000
A	X1	1083.535	1	1083.535	12.300	0.001
	X2	285.654	1	285.654	5.727	0.021
Error	X1	3875.943	59	88.090		
	X2	2194.716	59	49.880		
Total	X1	310666.000	61			
	X2	309983.000	61			
Corrected Total	X1	4959.478	60			
	X2	2480.370	60			

Notes:
X1: Scientific Attitude
X2: Science Process Skill

Second, the results of the Tests of Between-Subjects Effects analysis showed a significance value of 0.001 (<0.05) for variable X1 (Scientific Attitude). It means that there is a significant effect of learning with local culture-based Project-based Assessment on the scientific attitudes of fifth-grade elementary school students. Third, the results of the Tests of Between-Subjects Effects analysis showed a significance value of 0.021 (<0.05) for variable X2 (Science Process Skills). It means that there is a significant effect of learning with local culture-based Project-based Assessment on science process skills of fifth-grade elementary school students.

Based on the comparison of the mean post-test scores in the control group and the experimental group, the mean score of the experimental group shows a higher score than the score in the control group. The comparison of these means is presented in Figure 1.
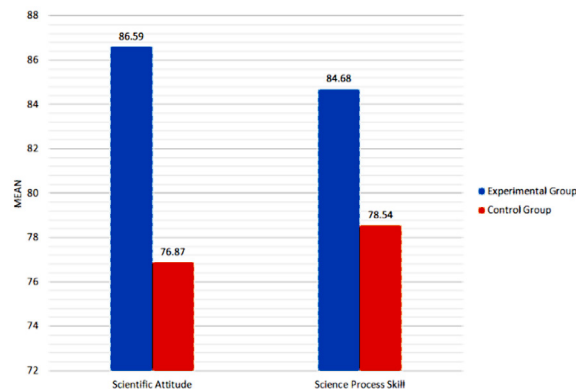

Figure 1. Comparison of Post-test Means

The results showed simultaneous differences in scientific attitudes and science process skills between students who took learning with a project-based assessment based on local culture and groups of students who applied conventional assessment. In addition, based on the results of the follow-up tests, it can be interpreted that partially, there was a significant effect of learning with a local culture-based Project-based Assessment on the scientific attitudes and science process skills of 5th-grade elementary school students. First, there were simultaneous differences in scientific attitudes and science process skills between students who take learning with local culture-based Project-based Assessment and groups of students who apply conventional assessment. Learning activities in the experimental class refer to the project appraisal stages that orientate local cultural values. This treatment impacts a learning climate that becomes more active and provides opportunities for students to be more independent and responsible in completing the projects that have been given. In addition, planting local cultural values also provides opportunities for students to learn based on a culture close to their daily lives. It contributes to the development of students' knowledge, skills, and attitudes simultaneously (Sukmasari & Rosana, 2017).

Second, partially there was a significant effect of learning with the Project-based Assessment based on local culture on the scientific attitudes of fifth-grade elementary school students.

The difference in scientific attitudes obtained by students who take learning with Project-based Assessment based on local culture with students who take learning by applying conventional assessment is how they condition students in solving various problems (Amri & Tharihk, 2018; Antara et al., 2020). It can guide students in carrying out an inquiry activity to gain new insights and solve problems with the knowledge they construct (Sukmasari & Rosana, 2017). Project-based assessments are suitable for science learning because they can increase students' self-efficacy, namely students' confidence in doing assignments (Morimoto et al., 2010; Effendi-hasibuan et al., 2020). Project assessment emphasizes research assignments in the form of problems related to the material starting from the planning stage, data collection, data processing, data presentation, and report preparation (Bressane et al., 2020). By giving project assignments, students will have the ability to understand, apply, investigate, and inform their knowledge. Based on the stages of the assessment activities, it appears that students become more active, creative, independent, and able to establish relationships between the knowledge they must apply in their lives. Thus, students become trained and accustomed to developing their scientific attitude. Third, partially there is a significant effect of learning with a Project-based Assessment based on local culture on the process skills of 5th-grade students. Project-based learning is a method of learning. Students

can be more involved and creative in the learning process when assessments are based on local culture. Students are free to be inventive with their project work once it has been done. Students will gain experience and develop emotional intelligence, and the learning process will be performed constructively, resulting in meaningful learning (Angela, 2014; Kostiainen et al., 2018). Children may obtain experience through problem-solving activities or activities carried out by a scientific process to produce evidence of the learning process through experiences used in social life.

It aligns with Chiang & Lee (2016), which states that project learning will help students improve their motivation and ability to solve problems. Giving projects to students will make students more active in the learning process, and by giving projects, students will foster a greater sense of collaboration, confidence and by giving projects, students will be more motivated to complete the given project. Project learning is applied effectively in the learning process (Chiang & Lee, 2016). Various activities carried out by students in learning will familiarize students with working under scientific methods, improving students' science process skills.

Integrating local culture, which is close to students' daily lives, has a positive contribution to improving learning quality. Elementary school students, who are still at the concrete operational cognitive level, will find it easier to accept learning content if linked to their daily lives. This finding aligns with research conducted by Morris et al. (2019), who found that cultural internalization in learning impacted knowledge acquisition. By integrating local culture in science learning and students' understanding of concepts in science, students also have the opportunity to explore the cultures that exist in their daily lives. As a result, the student learning experience entails more than merely grasping the material's concepts. Nevertheless, it can also help students learn more about the culture around them (Lee et al., 2012; Atmojo et al., 2018).

Based on these findings and discussion, this study contributes to science learning research in elementary schools, focusing on integrating science concepts with local culture through project-based assessments. Furthermore, recommendations that can be given based on the results of this study are: (1) encouraging other researchers to study further about local cultures that can be linked or integrated with science learning; and (2) inviting education practitioners in primary schools to integrate local cultures into science learning through project-based assessment.

CONCLUSION

Learning with Project-based Assessment based on local culture has a significant effect on elementary school students' scientific attitudes and science process skills. It happens as learning with local Project-based Assessments provides opportunities for students to learn actively. Moreover, by optimizing local cultural values in the learning process, students can link culture to their daily lives to construct new learning knowledge. By integrating local culture in science learning and students' ability to understand concepts in science, students also have the opportunity to explore the cultures that exist in their daily lives. Thus, the students' learning experiences include not only comprehension of the material being taught, but also comprehension of the surrounding culture. Learning with Project-based Assessment based on local culture has contributed to the development of science learning at the basic education level to improve the quality of learning.

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