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THE EFFECT OF *THE PROJECT-BASED LEARNING MODEL* CONTAINING SUBAK LOCAL WISDOM ON STUDENTS' CREATIVE THINKING ABILITIES AND SCIENCE LEARNING OUTCOMES

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Abstract

This study aims to (1) describe and explain the effect of implementing the PjBL model containing local wisdom of Subak on students' creative thinking skills and science learning outcomes, (2) describe and explain the effect of implementing the PjBL model containing local wisdom of Subak on students' creative thinking skills, and (3) describe and explain the effect of implementing the PjBL model containing local wisdom of Subak on students' science learning outcomes. The population in this study were 287 students of class VII of SMP Negeri 14 Denpasar. The sample was determined using the *cluster technique. random sampling* from the population and obtained a sample of 164 students (4 classes). The research design used *a nonequivalent pretest-posttest control group design* . Data collection used a test instrument. Data were analyzed using descriptive statistics and inferential *Multivariate Analysis of Covariance* (MANCOVA) with a significance level of 5%. To determine the magnitude of the influence obtained, after the MANCOVA test, it was continued with an *effect size test* . The results of the study were: (1) students who learned using the PjBL model containing local wisdom of Subak had better creative thinking skills and science learning outcomes than students who learned with the PjBL model, (2) students who learned using the PjBL model containing local wisdom of Subak had better creative thinking skills than students who learned with the PjBL model, (3) students who learned using the PjBL model containing local wisdom of Subak had better science learning outcomes than students who learned with the PjBL model.

Keywords: PjBL contains local wisdom of Subak; creative thinking skills; science learning outcomes

INTRODUCTION

21st-century learning refers to the 4Cs: *Creative Thinking* , *Critical Thinking* , *Communicative Thinking* , and *Collaborative Thinking* . These 4Cs can be categorized as *High Order Thinking Skills* (HOTS), which are highly needed in the 21st century (Amri *et al* ., 2022) . Higher-order thinking encompasses the ability to analyze, evaluate, and be creative. Therefore, creative thinking is a component of higher-order thinking (Budiarti *et al* ., 2017). Creative thinking is a person's ability to analyze new information and combine unique ideas to solve a problem. According to Ningsih *et al* ., (2021) , creative thinking is one of the goals that must be achieved in science learning in schools. Science learning is a learning that applies many higher-order thinking skills, so that in solving a problem in science, applying creative thinking will produce many useful ideas in finding solutions.

In relation to creative thinking, practical reality shows that the creative thinking ability of students in Indonesia is still relatively low. This is consistent with the results of research by Kurnia et al., (2021), which stated that students in Indonesia have creative thinking abilities in science learning with scores for the indicators Fluency, Flexibility, Originality, and Elaboration of 39.81%, 45.87%, 38.02%, and 35.67%, respectively, these scores are still categorized as low. The low creative thinking ability of students in Indonesia is caused by students who still view science as a difficult and abstract subject (Nadia et al., 2021). Furthermore, the teaching method by teachers is predominantly the lecture method, which makes students' minds less able to grasp the material explained. This is in line with research by Indrawati and Nurpatni (2022), which stated that 20% of teachers experience problems in using monotonous teaching methods and teachers tend to use the lecture method to explain science material. Furthermore, the assessment methods are predominantly multiple-choice, resulting in a very low level of creative thinking among students (Hartati et al., 2021). This finding is also supported by research by Istiyono et al. (2018), which states that multiple-choice questions are generally incapable of measuring students' creative thinking abilities. Research by Mulyadi et al. (2016) indicates that students' lack of creativity in answering science questions. This finding is also supported by the 2015 *International Mathematics and Science Study (TIMSS) and the downward trend in Indonesia's PISA (Programme for International Student Assessment*) results from 2015 to 2022. The decline in PISA scores and Indonesia's drop from the TIMSS rankings are due to several factors, including a changing curriculum and teachers' lack of preparedness in addressing the dynamics of learning strategies and student development. A significant leap in educational change was felt in 2013 (Wiyogo, 2020). In that year, the Ministry of Education and Culture issued a curriculum that had a different educational direction from the previous curriculum. The K13 curriculum is a refinement of the KTSP (Currently Underdeveloped School-Based Curriculum) with an emphasis on assessing attitudes and skills. Therefore, K13 requires teachers to implement multiple learning models that can measure students' attitudes and skills, while at that time teachers still struggled to adapt to the new learning models (Wiyogo, 2020). Based on this, it can be concluded that teachers' lack of ability to present learning that aligns with the curriculum can impact student performance. Undeniably, in 2015, Indonesia experienced a decline in TIMSS and PISA scores, indicating that the quality of education in Indonesia continues to decline every year.

One of the learning models that emphasizes creative thinking skills is the *Project Based Learning* (PjBL) learning model or project-based learning model. This learning model allows students to develop their creativity in designing and creating a project that can be used to solve problems (Chasanah *et al* ., 2016) . In its application, the PjBL model is not always effective in improving creative thinking skills and student learning outcomes. This is because science learning does not provide enough opportunities for students to provide ideas (Chasanah *et al* ., 2016) . In its application, the PjBL model is not always effective in improving creative thinking skills and student learning outcomes. Learning science is not enough just by memorizing facts, but also applying the basic principles of science in everyday life, so the implementation of contextual learning is very necessary to be applied in the science learning process (Rusnadi, 2018). Contextual learning can be implemented by integrating science concepts that exist in everyday life, one of which is local wisdom. Local wisdom is an idea that arises and develops continuously within a society in the form of customs, values, rules/norms, culture, language, beliefs, and daily habits (Pingge, 2017). Local wisdom that exists around students can help students understand lessons more easily. Local wisdom-based learning is a planned effort that uses local potential intelligently to create a learning environment in the educational process so that students can actively improve their expertise and skills (Widyaningrum 2018). The integration of local wisdom in science learning can improve creative thinking skills and student learning outcomes, this is proven by the results of research by Sumintono *et al.* (2018), which states that local wisdom-based science learning can increase students' desire to learn and improve their understanding of the concepts in science learning.

Bali is an island rich in art and culture. The Balinese people still hold fast to their traditions and preserve their local cultural wisdom. The study of Balinese local wisdom can be a source of science learning for students. One of Bali's local wisdoms recognized as a world heritage is Subak. Subak is a water management system for agricultural land in Bali and is a Balinese cultural heritage recognized internationally. Subak itself was designated a world cultural heritage by UNESCO in 2012 (Setyawati, 2013).

Subak has many cultural values that can be a source of science learning, Subak is a concrete learning source for students that is easy to understand because it is close to students' daily lives, so that subak becomes a complete learning source to be studied and is substantially able to support science learning, especially on Ecosystem material. Based on research, the PjBL model is considered less effective in improving creative thinking skills, therefore the need for the PjBL model to be integrated with Subak local wisdom in order to improve creative thinking skills and science learning outcomes. The addition of Subak local wisdom content will make learning more contextual, more interesting, and more real for ecosystem material taught in grade VII of junior high school. However, until now there has been no research related to this so it is necessary to conduct experimental research related to the influence of the Subak-loaded PjBL model to improve creative thinking skills and student learning outcomes on ecosystem material .

RESEARCH METHODS

This research is a quasi-experimental research type , this is based on the researcher wanting to prove the effect of learning treatment by applying the PjBL model containing local wisdom of subak on creative thinking skills and science learning outcomes in ecosystem study materials. The research design used in this study is *a nonequivalent pretest-posttest control group design* . *A nonequivalent pretest-posttest control group* design was used because the researcher used a quasi-experimental research design. This design was chosen because it was not possible to create new groups because the groups had been formed without the researcher's intervention. This design consisted of two test groups, namely the experimental and control groups. Each group was given an initial test (*pretest*), then given treatment (*treatment*). In each experimental group, the PjBL model containing local wisdom of Subak was applied, while in the control group, learning was carried out using the PBL model. After the treatment, the study concluded with a final test (*posttest*) given to both groups.

This study used a population of 287 seventh-grade students at SMP N 14 Denpasar. From this population, a sample was determined using a *cluster random sampling technique* and obtained 164 students. The sample selection was carried out by drawing lots from the study population, namely seven seventh-grade classes. All populations with different characteristics have an equal opportunity to be sampled. The sample selected in this study was four classes, namely two classes as the experimental group, which implemented the PjBL model containing local wisdom of Subak, and two classes as the control group which implemented the PjBL model in their learning. This study used creative thinking ability test instruments in the form of essay tests and science learning outcomes tests in the form of multiple-choice tests.

This study has three types of research variables, namely independent variables , dependent variables , and covariate variables. Independent variables are variables that influence the dependent variable. The independent variables in this study are the PjBL model containing local wisdom of Subak and the PjBL model. The dependent variable is a variable whose value is influenced by the independent variable (Sugiyono, 2014). The dependent variables in this study are creative thinking skills and student learning outcomes. Covariate variables are variables that can influence the dependent variable. The covariate variable in this study is students' prior knowledge (*pretest*).

This research stage begins with (1) Conducting orientation and initial observations of the school; (2) Designing research instruments; (3) Instrument trials. Before the instrument trials, validation tests were carried out by *expert judges* , followed by revisions, after which field trials were conducted; (4) *Pretest administration stage* ; (5) Providing treatment for the PjBL learning model containing local wisdom of the subak (experimental class) and the PjBL model (control class); (6) Data Analysis.

The data analysis technique in this study uses descriptive analysis techniques and inferential analysis techniques. Descriptive analysis techniques are used to describe the pretest and posttest scores of creative thinking skills and student learning outcomes. The score description is carried out in each group, both the control group (using the PjBL learning model) and the experiment (using the PjBL model containing local wisdom of Subak). The creative thinking ability test scores use benchmark assessment (PAP). The processing of learning evaluation results uses the PAP approach based on absolute standards or predetermined criteria (Sukiman, 2012). using SPSS ver23, namely the Multicovariate Analysis of Covariance (Mancova) test in the form of a hypothesis test with an assumption test, namely the normality test, the homogeneity of variance test, the homogeneity of covariance version test, the linearity test, the multicollinearity test, the homogeneity of the slope of the regression line test. In addition, researchers use a further test, namely the effect size test. Effect size is used to determine the difference in the incidence of effects between the control class and the experimental class. Effect size is used to determine the magnitude of the effect after being given treatment (Cohen, 1988).

RESULTS AND DISCUSSION

RESULTS

The results of this study indicate that students who learn using a project-based learning model incorporating local Subak wisdom have better creative thinking skills and science learning outcomes than students who learn using a conventional project-based learning model. This is evidenced by the descriptive test in Table 1 below.

Table 1. Pretest and posttest scores of students' creative thinking abilities

Statistics	***Pretest***		***Posttest***	
	Ex	**Ktr**	**Ex**	**Ktr**
Amount	82	82	82	82
Min	38	38	60	45

Max	65	60	88	78
Average	47.29	47.93	72.47	60.64
Elementary School	6,727	5,268	6,821	6,606
Variance	45,247	27,748	46,527	43,644

The data in Table 1 above shows the pretest and posttest results of students' creative thinking abilities in the experimental group. Based on these data, it can be seen that the average pretest scores of the experimental and control groups have almost the same average, so it can be said that the experimental and control groups have the same initial abilities. Furthermore, the average pretest and posttest data in both groups increased, but a significant increase in the average score was experienced by students in the experimental group. The experimental group obtained an increase of 25.18 while the control group only obtained an increase of 12.71. This shows that a significant increase occurred in the experimental group that learned using the PjBL model containing local wisdom of Subak, so it can be said that students in the experimental group had a better increase in creative thinking abilities than the control group. This illustrates that the posttest results of creative thinking abilities in the experimental group that learned with the PjBL model containing local wisdom of Subak had better creative thinking abilities than the control group that learned using the PjBL model.
The measurement results per indicator of students' creative thinking abilities can also be seen in the form of a bar chart presented in Figure 1 below.

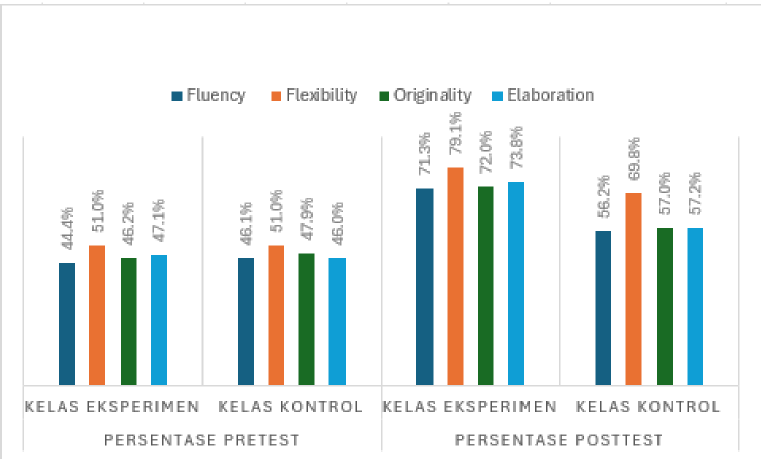

Figure 1. Results of measuring creative thinking ability indicators

Figure 1 shows that both groups experienced an increase in creative thinking ability indicators. A significant increase in the value of each indicator occurred in the experimental group, which was in the high category on average, compared to the control group, whose increase was still in the medium category. In the experimental group, the highest increase occurred in the flexibility indicator with a value of 79.1% in the high category. In the control group, the highest increase occurred in the flexibility indicator with a value of 69.8% in the medium category. This illustrates that students who studied with the PjBL model containing local wisdom of Subak experienced an increase in creative thinking ability in each indicator higher than the group of students who studied with the PjBL model.

The science learning outcome variable was measured using multiple-choice questions with cognitive learning outcome indicators for students in the experimental and control groups, including minimum, maximum, average, standard deviation, and variance. A statistical summary of the pretest and posttest data on students' science learning outcomes is presented in Table 2 as follows.

Table 2. Students' Science Learning Outcomes

Statistics	***Pretest***		***Posttest***	
	Ex	**Ktr**	**Ex**	**Ktr**
Amount	82	82	82	82
Min	30	40	50	50
Max	70	70	90	75
Average	51.04	53.05	76.04	63.78
Elementary School	9,154	9,961	7,016	7,352
Variance	99,221	83,800	49,221	54,050

Based on Table 2. above, it shows that in the experimental and control groups, the pretest scores of students' science learning outcomes have a difference of 2.01, the difference in values is still categorized as low, thus indicating that both groups have the same initial abilities. In the posttest data, it can be seen that both groups experienced an increase, but a significant increase was seen in the experimental group with an increase in the pretest posttest score of 25.00 while the control group only obtained an increase of 10.73. Although seen in the data, the control group had a higher average pretest score than the experimental group, after being given the PjBL model treatment containing local wisdom of Subak, the experimental group experienced a much higher increase than the control group. This illustrates that the posttest scores of students' science learning outcomes in the experimental group who learned with the PjBL model containing Local Wisdom of Subak had better science learning outcomes than the control group who learned using the PjBL model.

The measurement results per indicator of science learning outcomes can also be seen in the form of a bar chart presented in Figure 2 below.

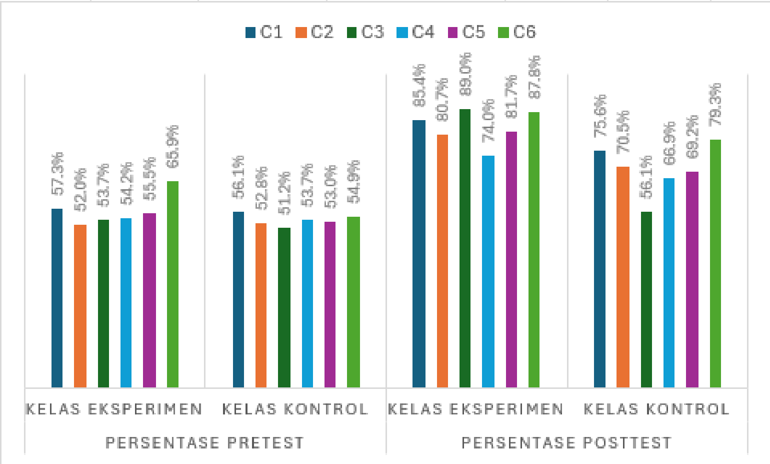

Figure 2. Results of measuring science learning outcome indicators

Based on Figure 2, it is shown that there was an increase experienced by both groups on the science learning outcome indicators. A significant increase in the value per indicator occurred in the experimental group which was in the high and very high category on average compared to the control group whose increase was still in the medium and high categories. In the experimental group, the highest increase occurred in indicator C3 (applying) with a value of 89.0% in the very high category. In the control group, the highest increase occurred in indicator C6 (creating) with a value of 79.3% in the high category. This illustrates that students who learned with the PjBL model containing local wisdom of Subak experienced an increase in science learning outcomes in each indicator higher than the group of students who learned with the PjBL model.

The same thing is shown by the results of the inferential statistical test, MANCOVA. This test begins with an assumption test, namely the normality test and the homogeneity test, as can be seen in Table 3.

Table 3. Normality Test Results

Data	**Category**	**Kolmogorov-Smirnov**		
		Stat	**df**	**Sig.**
Guidance and Counseling *Pretest*	Subak PjBL	0.073	82	0.200*
	PjBL	0.058	82	0.200*
***Posttest* Guidance and Counseling**	Subak PjBL	0.061	82	0.200*
	PjBL	0.080	82	0.074
HB Science *Pretest*	Subak PjBL	0.069	82	0.200*
	PjBL	0.080	82	0.200*

HB Science *Posttest*	Subak PjBL	0.071	82	0.200*
	PjBL	0.094	82	0.200*

Table 4. Results of Homogeneity Test

	Levene Stat	df1	df2	Sig.
Pretest BK	3,638	1	163	0.058
Posttest BK	0.005	1	163	0.944
HB **Pretest** Science	0.913	1	163	0.341
Posttest HB Science	1,146	1	163	0.286

BK: Creative thinking skills

HB IPA: Science learning outcomes

Based on the data in Table 3 and Table 4, all sig. (p) values of the dependent variable are greater than the α value (0.05) so that H0 is accepted and it can be concluded that the sample comes from normally distributed data and the population variance is homogeneous or identical. Furthermore, the homogeneity of variance-covariance test obtained a sig value > 0.05, meaning it has an identical covariance matrix. The results of the linearity test obtained a *deviation of linearity result* > 0.05, meaning the data is linear. The multicollinearity test obtained a value of $r^2 < 0.8$, meaning that no multicollinearity was detected between the dependent variables. Finally, the regression line slope test obtained a sig value > 0.05, meaning that there is a slope of the regression line for both creative thinking skills and science learning outcomes is homogeneous. After all assumption tests were carried out, the analysis was carried out with a hypothesis test. Furthermore, the hypothesis test was carried out using the Mancova Test. There are 3 (three) hypotheses in this study, namely:

Hypothesis I:

The first hypothesis proposed in this study reads "The creative thinking ability and science learning outcomes of students who learn with the PjBL model containing Subak local wisdom are higher than students who learn with the PjBL model". For the purposes of hypothesis testing, H0 which reads: "The creative thinking ability and science learning outcomes of students who learn with the PjBL model containing Subak local wisdom are not different from students who learn with the PjBL model", was tested. The results of the H0 test with MANCOVA are presented in Table 5.

Table 5. The Influence of the PjBL Model Containing Subak Local Wisdom on Creative Thinking Skills and Science Learning Outcomes

Effect	Value	F	Hyp df	Error df	Sig.
Pillai's Trace	0.697	183,020 [b]	2.00	159,000	0,000
Wilks' Lambda	0.303	183,020 [b]	2.00	159,000	0,000
Hotelling's Trace	2,302	183,020 [b]	2.00	159,000	0,000
Roy's Largest Root	2,302	183,020 [b]	2.00	159,000	0,000

The data in Table 5 shows that the sig. (p) values obtained for the four Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root in the group aspect are less than the α value (0.05). This means that H0 is rejected or Ha is accepted. Thus, it can be concluded that there is a significant influence on creative thinking skills and science learning outcomes between the group of students taught with the Subak Local Wisdom-based PjBL model and the group of students taught with the PjBL model.

Hypothesis II

The second hypothesis proposed in this study reads "The creative thinking ability of students who learn with the PjBL model containing Subak local wisdom is higher than students who learn with the PjBL model". For the purposes of hypothesis testing, H0 which reads: "The creative thinking ability of students who learn with the PjBL model containing Subak local wisdom is not different from students who learn with the PjBL model" was tested. The results of testing H0 with ANOVA can be seen in Table 6.

Table 6. Results of the Analysis of the Influence of the PjBL Model Containing Subak Local Wisdom on Creative Thinking Skills Compared with the PjBL Model

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	Creative Thinking Skills	6107,517	1	6107,517	158,197	0,000

The data in Table 6 shows that the sig. (p) value obtained for the creative thinking ability variable is less than the α value (0.05). This means that H0 is rejected or Ha is accepted, where the creative thinking ability for the group of students taught with the PjBL model containing Subak local wisdom is higher than the group of students taught with the PjBL model. Thus, it can be concluded that there is a significant influence on creative thinking ability between the group of students taught with the PjBL model containing Subak Local Wisdom and the group of students taught with the PjBL model.

Hypothesis III

The third hypothesis proposed in this study reads "The science learning outcomes of students who learn with the PjBL model containing Subak local wisdom are higher than students who learn with the PjBL model". For the purposes of hypothesis testing, H0 which reads: "The science learning outcomes of students who learn with the PjBL model containing Subak local wisdom are not different from students who learn with the PjBL model" was tested. The results of testing H0 with ANOVA can be seen in Table 7.

Table 7. Results of the Analysis of the Influence of the PjBL Model Containing Subak Local Wisdom on Science Learning Outcomes Compared with the PjBL Model

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	Science Learning Outcomes	6884,659	1	6884,659	184,357	0,000

The data in Table 7 shows that the sig. (p) value obtained for the science learning outcomes variable is less than the α value (0.05). This means that H0 is rejected or Ha is accepted, where the science learning outcomes for the group of students taught with the PjBL model containing Subak local wisdom are higher than the group of students taught with the PjBL model. Thus, it can be concluded that there is a significant influence on science learning outcomes between the group of students taught with the PjBL model containing Subak Local Wisdom and the group of students taught with the PjBL model.

After knowing the research results from the hypothesis test using the MANCOVA and ANOVA tests, it was continued with testing the effect size as follows.

1. *Effect size* of hypothesis test I (Creative thinking ability and science learning outcomes)

   $t = \sqrt{f}$

   $t = \sqrt{183{,}020}$

   $t = 13{,}529$

   $$ES = t\sqrt{\frac{1}{N_1} + \frac{1}{N_2}}$$

$$ES = 13,529\sqrt{\frac{1}{82}+\frac{1}{82}}$$
$$ES = 13,529\ x\ 0,156$$
$ES = 2,11$ **(very high effectiveness category)**

2. *Effect size* of hypothesis test II (Creative thinking ability)

$$t = \sqrt{f}$$
$$t = \sqrt{158,197}$$
$$t = 12,578$$
$$ES = t\sqrt{\frac{1}{N_1}+\frac{1}{N_2}}$$
$$ES = 12,578\sqrt{\frac{1}{82}+\frac{1}{82}}$$
$$ES = 12,578\ x\ 0,156$$
$ES = 1,964$ **(very high effectiveness category)**

3. *Effect size* of hypothesis test III (Science learning outcomes)

$$t = \sqrt{f}$$
$$t = \sqrt{184,357}$$
$$t = 13,578$$
$$ES = t\sqrt{\frac{1}{N_1}+\frac{1}{N_2}}$$
$$ES = 13,578\sqrt{\frac{1}{82}+\frac{1}{82}}$$
$$ES = 13,578\ x\ 0,156$$
$ES = 2,11$ **(very high effectiveness category)**

Based on the calculation of *effect size* on the three hypotheses, the results obtained are, namely hypothesis I obtained *the effect size results* of students' creative thinking abilities and science learning outcomes of 2.11. Hypothesis II obtained *the effect size results of* students' creative thinking abilities of 1.964, and Hypothesis III obtained *the effect size results* of students' science learning outcomes of 2.11. From the three tests obtained values in the very effective category. Based on the results of these tests, it shows that the PjBL model containing local wisdom of subak has a large influence (very effective) to improve the creative thinking abilities and science learning outcomes of junior high school students.

DISCUSSION

Based on the research results, it is clear that Subak local wisdom can be used as learning content in PjBL and this encourages the development of creative thinking skills and student learning outcomes. Learning containing Subak local wisdom has syntaxes that are integrated with local wisdom concepts, thus positioning Subak local wisdom not only as a learning resource but as a real example of science concepts in everyday life. By integrating local wisdom concepts, science learning makes it very close to students' daily lives, thus making science learning more contextual and not abstract. The PjBL model containing Subak Local Wisdom is an innovative model and is suitable for improving students' creative thinking skills and science learning outcomes. The PjBL model containing Subak Local Wisdom is a project-based learning model that has local wisdom content in its learning implementation, the local wisdom used is Subak. Learning that can combine science and culture makes the learning very close to students' daily lives, so that learning is student-centered. By integrating the Subak concept that emphasizes the maintenance and preservation of the rice field environment, students are invited to learn about the components in rice fields that implement the Subak system and understand how the patterns of interaction of creatures in the Subak rice fields directly. Through the PjBL model, students can directly discuss and compile projects that can improve students' creative thinking skills so that they can improve their science learning outcomes. This is in line with research from Pamungkas, et al (2017) which states that the application of the PjBL model based on local wisdom provides opportunities for students to be creative and experiment. Students can actively participate in the learning process and are directed to discuss material that is close to their daily lives. Learning that is close to students' lives can easily increase students' curiosity and make students actively seek solutions to these problems through creative ways.

The PjBL model is a learning model that can increase students' curiosity, train students to work in groups, organize projects according to their wishes through discussions, and train creative thinking skills in compiling project plans. According to Lim et al (2023), the PjBL model will be very good if integrated with local wisdom. This is because the concept of local wisdom integrated in the PjBL model not only makes students remember the concepts learned but invites students to understand science concepts through the creative thinking process owned by each student which is applied in everyday life. In addition, according to Faidin, et al (2024) the PjBL model integrated with the concept of local wisdom can improve students' creative thinking skills through the stages of (1) determining basic questions that are close to students' daily lives (local wisdom), (2) creating project designs containing local wisdom, (3) preparing schedules, (4) monitoring project progress, (5) evaluating project results, and (6) evaluating student experiences. Local wisdom can encompass various aspects such as knowledge, skills, intelligence, resources, social processes, values, norms, and customs. Creative thinking skills enable students to use their imagination to solve problems, applying innovative and inventive approaches (Chaejalern, et al., 2023; Apriwanda & Hanri, 2022; Awa & Palahudin, 2023; Poedjiastuti & Prahani, 2017). The concept of local wisdom embedded in the PjBL model will make it easier for students to imagine science concepts applied in everyday life so that students do not just memorize concepts, but understand and comprehend how these concepts can be applied in everyday life.

To create meaningful learning, project-based learning is combined with local wisdom. Local wisdom is a highly effective tool for building connections between learning and students' daily lives. Prasetyo (2019) demonstrated that PjBL helps students develop creativity in solving problems through a contextual approach. Projects that involve students in activities such as environmental conservation or learning about natural phenomena provide them with the opportunity to learn not only theory but also practical applications relevant to their lives. Given the characteristics and advantages of the PjBL model, this model is very effective when integrated with local wisdom, especially Subak, to improve creative thinking skills and science learning outcomes. This is in line with research by Nurhikmayati and Sunendar (2020), which stated that the PjBL learning model based on local wisdom has met the criteria of validity, practicality, and effectiveness for students' creative thinking skills and science learning outcomes.

This study used a PjBL model containing local wisdom of Subak. The learning strategy used is project learning in which the concept of local wisdom of Subak is integrated in ecosystem material. In ecosystem learning, the Subak concept is one of the learning resources that can improve science concepts and also students' creative thinking skills because Subak is a concrete learning resource that exists around students. Based on the explanation of subak in this study, subak is a representative learning resource used in science learning. In its implementation, students can learn about the ecosystem in the rice fields, which includes various concepts such as biotic factors (plants & animals) and abiotic factors (rocks, minerals, water, air, sunlight) (Setyawati, 2013). Creative thinking skills are built through projects that are compiled and use the concept of subak that is close to students' daily lives, this is in line with research from Maduriana and Surata (2022) Subak can be used as a natural laboratory, because it can be used as a contextual and actual learning medium and can improve creative thinking skills when combined with PjBL learning. This can be implemented by incorporating local content into schools. Students can learn science in a context relevant to their surroundings by discovering for themselves the benefits of science in everyday life, fostering a stronger understanding. This contextual learning model makes learning more meaningful for students.

The integration of Subak local wisdom into learning was chosen because Subak possesses various concepts that can be applied to science learning. In practice, science learning that integrates the Subak system can be carried out through various methods, such as field trips to Subak areas, research projects on ecosystems, and discussions on the impact of climate change on traditional irrigation systems. With this approach, students not only learn theory but also gain hands-on experience that enriches their understanding of the interaction between humans and the environment (Trigunasih & Wiguna, 2022; Febriana et al., 2021). Overall, the Subak system in Bali offers many opportunities for holistic and contextual science learning. Through understanding Subak, students can learn about the importance of sustainability, collaboration, and cultural preservation, all of which are essential aspects of modern science education. Based on this, it can be proven that the Project-based Learning (PjBL) model containing Subak local wisdom has a very positive influence on students' creative thinking skills and science learning outcomes.

CONCLUSION

Based on the results of the hypothesis testing that have been included in the discussion, the findings show that the PjBL model containing Subak Local Wisdom has a significant influence on the creative thinking skills and science learning outcomes of students at SMP Negeri 14 Denpasar. Based on the findings in this study, the following conclusions can be drawn.

1. There is an influence of the use of the PjBL model containing local wisdom of Subak on creative thinking skills, namely students who learn with the PjBL model containing local wisdom of Subak have higher creative thinking skills than students who learn with the PjBL model.
2. There is an influence of the use of the PjBL model containing local wisdom of Subak on science learning outcomes, namely students who learn with the PjBL model containing local wisdom of Subak have higher science learning outcomes than students who learn with the PjBL model.
3. There is an influence of the use of the PjBL model containing local wisdom of Subak on creative thinking skills and science learning outcomes, namely students who learn with the PjBL model containing local wisdom of Subak have higher creative thinking skills and science learning outcomes than students who learn with the PjBL model.

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