



# Project-Based Learning Model Increases Student Creativity and Learning Outcomes in Pancasila and Citizenship Education Learning

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## ABSTRAK

Fenomena generasi yang hilang (lost generation) akibat kurang optimalnya pelayanan pendidikan anak-anak selama musim pandemi. Hal ini menyebabkan hasil belajar siswa rendah. Penelitian ini bertujuan menganalisis model pembelajaran berbasis proyek terhadap kreativitas dan hasil belajar peserta didik pada pembelajaran pendidikan pancasila dan kewarganegaraan di SMA. Penelitian ini merupakan quasi eksperimen atau penelitian eksperimen semu dengan desain penelitian pretest-posttest control group design. Populasi dalam penelitian ini yaitu peserta didik kelas XI yang berjumlah 386. Pemilihan sampel untuk kelompok eksperimen dan kelompok kontrol menggunakan teknik sample random sampling yang berjumlah 70 siswa. Metode pengumpulan data menggunakan kuesioner dan tes. Instrumen pengumpulan data menggunakan lembar kuesione dan soal tes. Uji analisis menggunakan uji analisis independent sample T-test dan analisis deskriptif. Hasil penelitian menunjukkan terdapat perbedaan yang signifikan kreativitas peserta didik antara kelas eksperimen dan kelas kontrol. terdapat perbedaan yang signifikan antara hasil post-test kelas eksperimen dengan kelas kontrol. Disimpulkan terdapat pengaruh yang signifikan penerapan model pembelajaran berbasis proyek terhadap kreativitas dan hasil belajar peserta didik kelas XI MIPA-1 di SMA. Implikasi penelitian ini guru dapat menerapkan model-model pembelajaran yang aktif dan reflektif seperti pembelajaran berbasis proyek sehingga pembelajaran lebih bermakna.

## ABSTRACT

The phenomenon of a lost generation results from less than optimal education services for children during the pandemic season. It causes low student learning outcomes. This research aims to analyze the project-based learning model on students' creativity and learning outcomes in learning Pancasila and citizenship education in high school. This research is quasi-experimental or quasi-experimental with a pretest-posttest control group design. The population in this study was 386 class XI students. The sample selection for the experimental and control groups used a random sampling technique, totaling 70 students. Data collection methods use questionnaires and tests. Data collection instruments use questionnaires and test questions. The analysis test uses the independent sample T-test and descriptive analysis. The research results showed that there was a significant difference in student creativity between the experimental class and the control class. There is a significant difference between the experimental and control classes' post-test results. It was concluded that applying the project-based learning model significantly influenced the creativity and learning outcomes of class XI MIPA-1 students in high school. This research implies that teachers can apply active and reflective learning models, such as project-based learning, to make learning more meaningful.

## 1. INTRODUCTION

The Industrial Revolution 4.0 and Civilization 5.0 have had a major influence on various areas of life, resulting in technological disruption and innovation, including education (Kim, 2020; Sepulveda-Escobar & Morrison, 2020; Teo, Unwin, Scherer, & Gardiner, 2021). The 21st century is centered on the development of the 4.0 Industrial Revolution Era, which emphasizes knowledge as the main thing (Bartell, Cho, Drake, Petchauer, & Richmond, 2019; Domingo & Gallinaro, 2021). The demands of 21st-century skills indicate a holistic view of learning needed to realize graduates with comprehensive competencies (Handini & Mustofa, 2022; Salmia & Yusri, 2021). These competencies include basic skills (language, arts, mathematics, social, science), learning and innovation skills (creativity, innovation, critical thinking, communication, and collaboration), the ability to manage information, media and technology, and life and career skills (Supriyoko, Nisa, & Uktolseja, 2021). Competence is a form of limited achievement. Competence to improve quality can be achieved by improving student learning outcomes (Sholikah & Pertiwi, 2021; Sumarwati, Fitriyani, Setiaji, Amiruddin, & Jalil, 2020). Learning outcomes (*Learning outcomes*) and

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assessment criteria can determine the requirements for awarding credit to learners (Lavi, Tal, & Dori, 2021; Yudha, Dafik, & Yuliati, 2018). If students can show good learning results at the end of the learning process, these students are said to be achievers. Increased learner achievement illustrates that the quality of education is getting better. Vice versa, declining learner achievement or learning outcomes illustrate the low quality of education (Hamilton-Ekeke, 2013). Generation Z learners are very familiar with technology, which can be used as a learning resource. Therefore, teachers must also spur themselves to keep up with the times and guide students to use technology wisely and responsibly.

However, many people are concerned about the phenomenon of lost generation (*lost generation*) due to less than optimal education services for children during the pandemic season (Hafstad & Augusti, 2021; Lowe et al., 2021). The phenomenon of *lost generation* is the loss of opportunities for students to obtain maximum learning (*lost learning*) (Hafstad & Augusti, 2021). Several surveys by domestic and foreign institutions state that distance learning during this pandemic is considered ineffective. The UNICEF survey suggests that 66 percent of students are uncomfortable with distance learning. Based on several data owned by the Ministry of Education and Culture in recent years, Indonesian education has shown poor results. Some data on the poor results achieved by Indonesian education in recent years include the results of the TIMSS survey (*Trends in International Mathematics and Science Study*) in 2011, which shows that Indonesia ranks 40th out of 42 countries. In a report from the IEA (*International Association for Evaluation of Education Achievement*) in collaboration with TIMSS in 2011, the science ability of Indonesia is still low, so Indonesia is classified as a low benchmark.

The results from PISA (*Programme for International Student Assessment*) data in 2018 regarding the secondary education system where Indonesia occupies 74th out of 79 countries. Thus, Indonesia occupies the sixth lowest position from various other countries. Third, regarding *the Learning Curve*, Indonesia ranks 40th out of 40 countries in education quality mapping. In mapping higher education, Indonesia is ranked 49th out of 50 countries studied (Amalia & Purwanto, 2017). These facts show that the achievement of student learning outcomes still needs to be higher. To improve the achievement of these learning outcomes, efforts are needed to improve students' thinking skills through the learning process. Higher-order thinking Skills include thinking critically, logically, reflectively, and metacognitively (Nguyễn & Nguyễn, 2017; Sumarwati et al., 2020). This ability is activated when learners face unusual problems, uncertainties, questions, or dilemmas. Successful application of this ability can be seen in explanations, decisions, performances, and outcomes that apply to the knowledge and experience (Saepuloh, Sabur, Lestari, & Uâ, 2021; Zulfiani, Suwarna, & Sumantri, 2020). This ability can continue to develop forward in other intellectual abilities. In Bloom's Taxonomy, higher-order thinking skills include cognitive abilities in the domains of analyzing (C4), evaluating (C5), and creating (C6) (Netriwati, 2018). The assessment conducted at SMAN 1 Cibingbin mostly assesses the cognitive aspects of students through written test results. In contrast, students' affective, psychomotor, and other skills still receive less attention from teachers.

One way to improve the quality of learning can be achieved by applying various appropriate learning models. The model is always used in every teaching and learning process. Applying various learning models is very important because students have differences in ability, talent, interest, resilience, and enthusiasm (Rati, Kusmaryatni, & Rediani, 2017; Wibowo, Armanto, & Lubis, 2022). Differences in learning styles are also an important factor in the teaching and learning process in the classroom. For this reason, various teaching models are needed to achieve maximum learning outcomes. The project-based learning model uses practical activities to present basic concepts students must learn, understand, and apply to complete a specific project (Prabawati & Ambara, 2022). This model helps students to visualize concepts, collect and interpret data, and associate theory with the real world. This set of competencies, linked to real projects, encourages students to learn (Fernandes, 2017). In project-based learning, learners are at the center of learning activities, take social responsibility in groups, and acquire scientific knowledge. Project-based learning is among the most considered learning models and disciplines. Previous research findings state that successful learning outcomes are obtained with project-based learning practices (N. P. L. K Dewi, Astawan, & Suarjana, 2021; Triana, Anggraito, & Ridlo, 2020). Project-based learning can improve students' higher-order cognitive abilities (Agasi & Desyandri, 2022; Triana et al., 2020). Project-based learning can significantly improve student outcomes (Suryaningsih & Koeswanti, 2021).

Many studies have proposed project-based learning as a suitable methodology for effective competency-based education. A distinct design of project-based learning is to let students determine, or determine with the instructor, the objectives of the project and the technology to be used. One of the conclusions of this work is that project-based learning greatly enhances the link between school or university education and the professional world (Tous & Freitag, 2020). So, overcoming the problem of lack of skills, be it critical reasoning, creativity, collaboration, or communication, as 21st-century skills possessed by students in civics subjects, can be done by changing how the learning process encourages

creativity. For this reason, teachers must be exposed to learning models that can make students practice skills that will later become provisions for students to live in the 21st century until the future. This study aimed to analyze the project-based learning model on students' creativity and learning outcomes in Pancasila and citizenship education learning in senior high schools. Project-based learning, or PjBL, aims to deepen students' knowledge and skills by creating projects or works related to teaching materials and student competencies.

## 2. METHODS

The type of research used in this study is experimental research. This research is pseudo-experimental (*quasi-experiment*). Pseudo-experiments are used because of the limited population, and samples are used because pure experiments require large samples. The appropriate design for this research is *the pretest-posttest control group design*. Experimental and control groups are randomly selected in this design because the class population is homogeneous. The experimental group uses a project-based learning model, class XI MIPA-1. At the same time, A control group is a group treated with a conventional learning model with a discussion method, namely class XI MIPA-2. This research begins with giving a pre-test to the experimental and control classes. The experimental class was treated by applying the Project-Based Learning model, while the control class continued to use conventional learning, namely the discussion method. After giving different treatments, a post-test was given to determine students' learning creativity and learning outcomes related to the material provided. Based on the tests and questionnaires distributed it is used to compare creativity and learning outcomes between experimental and control classes before and after treatment.

This research was conducted at SMA Negeri 1 Cibingbin in Jl. Sukamaju No. 34a Sukamaju Village, Cibingbin District, Kuningan Regency, West Java Province. SMA Negeri 1 Cibingbin was chosen as a research site because it has many students, up to 33 rombel, to support the research. The population in this study were students of grade XI of SMAN 1 Cibingbin in the 2022-2023 school year. Eleventh grade at SMAN 1 Cibingbin consists of two departments and eleven classes with details of MIPA 5 classes and IPS 6 classes, namely XI MIPA-1 totaling 36 people, XI MIPA-2 totaling 34 people, XI MIPA-3 totaling 36 people, XI MIPA-4 totaling 36 people, XI MIPA-5 totaling 34 people and XI IPS-1 totaling 35 people, XI IPS-2 totaling 35 people, XI IPS-3 totaling 34 people, XI IPS-4 totaling 35 people, XI IPS-5 totaling 35 people, XI IPS-6 totaling 36 people. The consideration of using the eleventh grade as the research population is that the eleventh grade still needs to have a heavy learning load, such as the School Examination and several graduation exams conducted by the twelfth grade. The eleventh grade tends to have maturity in learning and has been familiarizing with school rules longer than the tenth grade. The selection of samples for the experimental and control groups used the technique of *sample random sampling* or random system, namely by selecting classes randomly without seeing differences because the class population is homogeneous in creativity and learning outcomes. The classes that were drawn were XI MIPA-1 and XI MIPA-2. The reason was that the characteristics of the class were almost the same in terms of creativity and learning outcomes. Based on the learning outcomes document, the average knowledge score of XI MIPA 1 is 79.5, while the average knowledge score of XI MIPA 2 is 79.7. The average skill score of the XI MIPA 1 class is 79.6, while the average skill score of the XI MIPA 2 class is 80.3.

The data collection technique in this study is to give questionnaires or questionnaires and tests. Giving a questionnaire or questionnaire is to obtain data on students' learning creativity. The function of giving tests is to determine the variable learning outcomes of students through cognitive understanding or knowledge. Tests for learning outcome variables were carried out twice: pre-test and post-test. The pre-test was conducted in the experimental and control groups before treatment, while the post-test was conducted at the end after treatment in the experimental and control groups. Test instruments and questionnaires will be tested first on students (other than research samples) who get the same material in eleventh grade, namely class twelve. MIPA-3. This questionnaire contains self-assessment statements. The questionnaire specification consists of four answer options, namely never, sometimes, often, and always. The questionnaire and test grids can be seen in [Table 1](#), and [Table 2](#).

**Table 1.** Self-Assessment Questionnaire Grid for Student Creativity Variables

No.	Aspect	Indicator	Item Number		
			Positive	Negative	Total
1	Fluency/alertness, fluency, and the human ability to generate many ideas	Students can produce many ideas or answers in solving PPKn problems	1, 2, 3	4	4

No.	Aspect	Indicator	Item Number		
			Positive	Negative	Total
		Students can generate ideas or answers from various statements	5, 6	7, 8	4
2	Flexibility/ability to find solutions using various approaches to solving a problem	Students can solve a Civics problem or question from a different perspective.	9, 10, 11	12	4
		Students can look for practical ways or methods of learning PPKn	13, 14, 15	16	4
3	Originality/human ability to come up with original ideas	Students can think of unconventional ways to solve learning problems to show themselves	17, 18, 19	20	4
		Students can try to solve a Civics problem	21, 22, 23	24	4
4	Elaboration/ability to work on and observe objects diligently and carefully, the development of which is carried out through experimental activities	Students can recognize the basis of a problem.	25, 26, 27	28	4
		Students can solve problems in detail	29, 30, 31	32	4
<b>Total</b>			<b>23</b>	<b>9</b>	<b>32</b>

Table 2. Question Grid

No.	Basic competencies	Material	Question Number
1.	Describe Indonesia's legal and judicial system by the 1945 Constitution of the Republic of Indonesia	Legal System in Indonesia	1, 2, 3, 4
		Paying close attention to the justice system in Indonesia	5, 6, 7, 8
2.	Presents the results of reasoning about the legal and judicial system in Indonesia by the 1945 Constitution of the Republic of Indonesia	Displaying an Attitude by the Law	9, 10, 11, 12, 13, 14, 15

The instruments used in research must meet the requirements to be said to be good instruments. A good instrument must be valid and reliable. The analysis technique uses quantitative analysis. Quantitative data will be calculated with a statistical formula using *an independent-sample t-test*. Before testing the hypothesis, the data from the beginning to the end of the meeting will be tested for prerequisite analysis, namely the data normality and homogeneity tests. The research data to be tested are questionnaire and test data. Categorization is carried out with the ideal mean value and standard deviation value in determining the tendency of creativity variables. The Minimum Completion Criteria value in Civics subjects in the eleventh grade of SMA Negeri 1 Cibingbin is 77. At the same time, the desired value consists of five aspects: very less, less, enough, good, and very good. Predicates of learning outcome variables can be seen in Table 3.

Table 3. Conversion of Scores and Predicate Learning Outcome Variables

Score	Predicate
≥ 93	Very good
93 – 83	Good
82 – 72	Enough
71 – 61	Not enough
≤ 60	Very less

Prerequisite test analysis consists of a normality test and a data homogeneity test. After going through the prerequisite test, hypothesis testing will be carried out to determine the average difference test between the initial and final learning creativity results and the average difference test between the initial and final student learning outcomes. The analysis prerequisite test consists of a normality test and a homogeneity test. The data normality test in this study was carried out using the SPSS 16.0 statistical application. for Windows, namely Kolmogorov-smirnov. Hypothesis testing consists of an independent sample t-test of creativity and initial learning outcomes in the experimental and control groups. /The independent sample t-test is used to determine whether or not there is a difference in the average creativity and initial learning outcomes of the experimental and control groups. The average difference test using the help of IBM SPSS software version 16.0 through independent sample t-test has criteria. If the significance value is 0.05, then the two sample means are not significantly different. If the significance value is 0.05, the two sample means are significantly different.

### 3. RESULT AND DISCUSSION

#### Results

Based on the data analysis of learning creativity results, at this stage, the *pre-test* learning creativity was conducted in the experimental class and control class before treatment. The experimental class learning creativity results showed that out of 36 people, there was 1 person with a very low creativity category, or 2.77%, 31 people in the low category, or 86.11%, and 4 people in the high category, or 11.11%. At this stage, the questionnaire results generally show that creativity needs to be improved. This is understandable because the questionnaire was conducted before the project-based learning model treatment was given. In the control class, it was found that out of 34 people, there were 4 people with a very low creativity category, or 11.76%, 29 people in the low category, or 85.29%, and 1 person in the high category, or 2.94%. The results of the questionnaire generally show that more than creativity is needed. It is understandable because the questionnaire was conducted before being given the treatment of the conventional learning model of discussion method.

The results of *post-test* creativity in the experimental class showed that out of 36 people, there were 26 people in the low category, or 72.22%, and 10 people in the high category, or 27.77%. After treatment in the experimental class, the post-test results showed a difference in the low category, of 1 person to none, which means an increase. Likewise, in the low category, there were 31 people to 26 people, which means there is also an increase. As for the high category, there was an immediate increase from 4 to 10 people. The questionnaire results show a significant increase in creativity before and after treatment. Creativity did not appear at the first meeting because students were still adapting to the project-based learning model. Besides that, there was no project assignment at the first meeting. The second meeting had a group project *crime index* with media display products. In the third meeting, there was an individual anti-crime campaign project with poster products uploaded on their respective social media. Based on the reflection during the project, students had a more interesting and holistic learning experience. Their creativity has increased in critical reasoning to relate the material to the context, communicating with learning resources directly, collaboration with group mates and the community, and creativity in making the final product.

The results of *post-test* creativity in the control class showed that out of 34 people, 1 person with a very low creativity category, or 2.94%, and 33 people in the low category, or 97.05%. After treatment with a conventional model, namely the discussion method, there is a difference in the very low category, where there were originally 4 people to 1 person, which means an increase. As for the low category, there was an increase from 29 to 33 people. It happened because there was a movement from the very low category to the low category of 3 people, and 1 person who was originally from the high category decreased to the low category. However, it has generally increased after treatment, although there was a more significant increase in the experimental class. Learning activities with conventional learning models of discussion methods consist of 3 meetings. At the first meeting, creativity did not appear. It was because students were still adapting to the conventional model of the discussion method. In the second meeting, creativity was significantly increased in presenting material, asking, answering, and responding. In the third meeting, it tended to remain the same.

Data on the results of *pre-test* learning outcomes show the value of Minimum Completeness Criteria in Civics subjects in class XI SMAN 1 Cibingbin, which is 77. From the *pre-test results* in the control class with 34 students, 34 people have yet to reach the Minimum Completion Criteria. This is understandable because the students have not received any material or treatment. If we look at the comparison before the experimental class pre-test treatment, the average score was 51 and 47, and the control class pre-test had an average score of 53.24. The conclusion shows that neither the experimental nor control classes can reach the Minimum Completeness Criteria. It shows that both classes are equal and have no significant difference

in learning outcomes before treatment. Even the control class has a slightly better average difference of 1.77. The data on the experimental class learning results of the Minimum Completion Criteria value in Civics subjects at SMA Negeri 1 Cibingbin is 77. From the results of the post-test in the experimental class with 36 students, 35 people reached the Minimum Completion Criteria, and 1 person did not reach the Minimum Completion Criteria. A comparison of learning outcomes through the experimental class pre-test before treatment had an average score of 51.47, and after treatment, through the post-test, the average score was 83.28. Likewise, the pre-test conclusion showed that no one reached the Minimum Completeness Criteria. However, the post-test showed that out of 36 people, 35 reached the Minimum Completeness Criteria, and only 1 had yet to reach the Minimum Completeness Criteria. It significantly increases learning outcomes after treatment with a project-based learning model.

Data on learning outcomes of the control class shows the value of Minimum Completeness Criteria in Civics subjects at SMAN 1 Cibingbin, which is 77. From the results of the acquisition of *the post-test* in the control class with 34 students, 33 people reached the Minimum Completeness Criteria, and 1 person reached each of the Minimum Completeness Criteria. If the comparison of learning outcomes through the control class pre-test before treatment has an average score of 53.24 and after treatment through the post-test has an average score of 78.65. Likewise, the pre-test conclusion shows that no one has reached the Minimum Completeness Criteria. However, the post-test shows that out of 34 people, 33 reached the Minimum Completeness Criteria, and only 1 person has yet to reach the Minimum Completeness Criteria. It shows that there is also an increase in learning outcomes in the control class after treatment, namely with the conventional model of the discussion method. The results can be seen from the average post-test value of the experimental class, which is 83.28, while the average post-test value of the control class is 78.65, meaning that the experimental class has more significant results than the control class. The results of the prerequisite test data analysis consist of a normality test. Normality test results are used to determine whether the data is normally distributed; this test uses the Kolmogorov-Smirnov formula with the help of IBM SPSS software version 16.0. The criteria used is that the data is normally distributed if the significant value is 0.05. The normality test was conducted twice on the *pre-test and post-test* creativity and learning outcomes in the experimental and control classes. The normality test results can be seen in [Table 4](#).

**Table 4. Normality Test Results**

Class	Variable	Asymp. sig (2-tailed)	
		Pre-test	Posttest
Experiment	Creativity	0.877	0.153
Control		0.707	0.356
Experiment	Learning Outcomes	0.037	0.010
Control		0.020	0.014

Based on [Table 4](#), the results of the normality test of data *pre-test, post-test* creativity variables, and learning outcomes variables sig value > 0.05, it can be stated that the data is normally distributed. A homogeneity test is carried out using the One-way ANOVA formula with the help of IBM SPSS software version 16.0 to determine whether the data of the two groups are homogeneous. The test criterion is if the data is homogeneous, the significance value is  $gt; 0.05$ . The homogeneity test was conducted twice on *the pre-test, post-test* creativity, and *pre-test and post-test* learning results in both experimental and control classes. The homogeneity test results can be seen in [Table 5](#).

**Table 5. Homogeneity Test Results**

Class	Variable	Levene statistic	DF1	DF2	Sig.
Experiment	Creativity Pre-test	0.642	1	68	0.426
Control					
Experiment	Creativity Posttest	1.534	1	68	0.220
Control					
Experiment	Pre-test Learning Outcomes	0.050	1	68	0.824
Control					
Experiment	Post-test Learning Outcomes	3.189	1	68	0.079
Control					

Based on the homogeneity test results in [Table 5](#), the significance value obtained is more than 0.05. It can be concluded that the data from each variable declared homogeneous hypothesis testing in this study

used the independent sample t-test with the help of IBM SPSS software version 16.0. This test was conducted to determine the effect of project-based learning models on students' creativity and learning outcomes compared to conventional learning models. After analysis, the results of hypothesis testing for the pre-test and control classes obtained the data from the *pre-test* experimental class with 36 respondents. At the same time, the control class amounted to 34 people. It is known that the average or *mean* for the experimental class is 65.86, while for the control class, it is 64.12; thus, descriptively, statistics can be concluded that there is an average difference between the experimental class and the control class. Furthermore, in the table *Independent Sample Test*, based on the output above, it is known that the value of *Sig. Levenes Test for Equality of Variances* is  $0.426 > 0.05$ . It can be interpreted that the data variance between the experimental and control classes is homogeneous or the same, so the interpretation of the output table *Independent Samples Test* above is guided by the value contained in *Equal variances assumed*. It is known that the value of *Sig. (2-tailed)* is  $0.444 > 0.05$ , then as the decision-making in the *independent sample t-test* can be concluded that  $H_0$  is accepted, namely there is no significant difference between the *pre-test* experimental class and control class results.

After analysis, the results of hypothesis testing in the *post-test* experimental class and control class obtained the number of data results in the *post-test* experimental class with 36 respondents. At the same time, the control class amounted to 34 people, with a known average or *mean* for the experimental class of 74.94. In contrast, for the control class of 64.85, descriptive statistics can be concluded that there is an average difference between the experimental class and the control class. Furthermore, in the table *Independent Sample Test*, based on the output above, it is known that the value of *Sig. Levenes Test for Equality of Variances* is  $0.220 > 0.05$ ; it can be interpreted that the data variance between the experimental class and the control class is homogeneous or the same, so the interpretation of the output table *Independent Samples Test* above is guided by the value contained in *Equal variances assumed*. It is known that the value of *Sig. (2-tailed)* is  $0.000$  equal to  $0.05$ , then as decision-making in the independent sample test, it can be concluded that  $H_0$  is rejected and  $H_a$  is accepted. Thus, there is a significant difference between the results of the *post-test* experimental class and the control classes' results.

*Test independent sample t-test pre-test* learning results of experimental class and control class obtained the data results in *pre-test* experimental class with 36 respondents. In contrast, the control class amounted to 34 people; it is known that the average or *mean* for the experimental class is 53.24, while for the control class, it is 51.47; thus, descriptive statistics can be concluded that there is an average difference between the experimental class and the control class. Furthermore, in the table *Independent Sample Test*, based on the output above, it is known that the value of *Sig. Levenes Test for Equality of Variances* is  $0.824 > 0.05$ , so it can be interpreted that the data variance between the experimental class and the control class is homogeneous or the same, so the interpretation of the output table *Independent Samples Test* above is guided by the value contained in *Equal variances assumed*. It is known that the value of *Sig. (2-tailed)* is  $0.337 > 0.05$ , then as decision-making in the independent sample test, it can be concluded that  $H_0$  is rejected and  $H_a$  is accepted. Thus, there is a significant difference between the results of the *pre-test* experimental class and the control classes' results. The results of the independent sample t-test *post-test* learning results of the experimental class and the control class obtained the amount of data on the *pre-test* results of the experimental class with 36 respondents. In contrast, the control class amounted to 34 people; it is known that the average or *mean* for the experimental class is 83.28, while for the control class, it is 78.65. Thus, descriptive statistics can conclude that there is an average difference between the experimental class and the control class. Furthermore, in the table *Independent Sample Test*, based on the output above, it is known that the value of *Sig. Levenes Test for Equality of Variances* is  $0.079 < 0.05$ , which means that the data variance between the experimental class and the control class is homogeneous or the same, so the interpretation of the *Independent Samples Test* output table above is guided by the value contained in *the Equal variances assumed*. It is known that the value of *Sig. (2-tailed)* is equal to  $0.01 < 0.05$ , then as decision-making in the independent sample test, it can be concluded that  $H_0$  is rejected and  $H_a$  is accepted. Thus, there is a significant difference between the results of the *post-test* experimental and control classes.

## Discussion

The study showed significant results in project-based learning affecting creativity in students before and after treatment. Project-based learning (PjBL) is one platform that promotes deeper learning of the knowledge used. PjBL uses meaningful driving questions for learners (Ismail, 2018; Sudana, Apriyani, & Nurmasitah, 2019). PjBL encourages student exploration and maintains motivation over time. PjBL can reshape education by engaging all learners in meaningful and powerful knowledge-building experiences. The ability to demonstrate creative thinking skills is becoming increasingly necessary. As the school learning environment evolves in reaction to cultural changes and actively works to promote the development of skills related to creativity, it is important to recognize the need for creative thinking skills (Antika & Nawawi, 2017; Mamahit, Aloysius, & Suwono, 2020). Moreover, the ability to act in creative and

innovative ways is almost always cited as one of the most important "21st Century Skills" or competencies for learning that humans need to thrive in modern society, regardless of nationality, due to ubiquitous technology, rapid communication, and collaborative social networks (Lavi et al., 2021; Muazaroh & Surya Abadi, 2020). Therefore, it is important to establish a data collection approach in which children can describe their creativity meaningfully.

Project-based learning significantly affects student learning outcomes before and after treatment. Learning outcomes result from what students are expected to do after participating in an activity (R. Dewi, 2020; Simbolon & Koeswanti, 2020). The college or university accreditation process motivates the focus on learning outcomes. The accreditation process requires all college or university services to describe that their practices are sound, performance is met, and learning outcomes are achieved (Ni Putu Linda Krisna Dewi, Astawan, & Suarjana, 2021; Lestari et al., 2021). Program coordinators, namely programming staff, are interested in learning outcomes based on the information they provide regarding program effectiveness. Learning outcomes are best achieved when established during the program planning process, designed with learning outcomes in mind, and when assessments are conducted to ensure learning outcomes are achieved (M. S. A. Dewi & Lestari, 2020; Rati et al., 2017). Thus, the project-based learning model affects improving student learning outcomes.

This finding is reinforced by previous research findings stating that teachers and the community have accepted project-based learning as a refreshing approach that motivates students to learn (Sutamrin & Khadijah, 2021; Wibowo et al., 2022). PjBL enhances students' learning of challenging content and other skills, such as problem-solving and self-confidence (Lestari et al., 2021). Project-based learning can be designed for coherence and to inform the persistence necessary for students to build strong scientific understanding over time (Sari, Suryana, Bentri, & Ridwan, 2023). Differences in learning activity distribution patterns do not influence cognitive learning outcomes (correctness of answers). However, students who shared their access continuously throughout the semester were more confident in their exam answers than students who primarily accessed the material at the end of the semester. More specifically, students in the sustained access group tended to show more accurate and less biased self-confidence assessments than students in the late access group.

Additionally, students in the sustained access group were significantly more confident in the correct answer than students in the late access group. This research has attempted to obtain maximum results in such a way. However, in reality, this research still has limitations, namely that not all students are active and fully participate in the project activities given to the group, thereby affecting the individual learning process. The project-based learning model is only applied to one class, so it cannot be generalized. Controlling external variables indirectly influencing student creativity and learning outcomes is impossible. Time allocation and school ecosystem are limited. This research implies that teachers can apply active and reflective learning models, such as project-based learning, to make learning more meaningful. Student-centered project-based learning involves developing civic competencies to meet students' needs regarding these dimensions.

#### 4. CONCLUSION

Applying a project-based learning model can better increase learning creativity and student learning outcomes than conventional learning models. Implementing the learning process encourages and supports applying innovative learning models so that the learning process becomes meaningful and students have an enjoyable learning experience. The research results show that the project-based learning model has successfully influenced increased creativity and student learning outcomes compared to conventional learning models. Therefore, schools should encourage and support teachers to develop this learning model.

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