



## Implementation Of Project-Based Learning In Improving Critical Thinking Skills And Communication Skills Of Public Health Students

**Adila Solida**

Department of Public Health, Faculty of Medicine and Health Science, University of Jambi

**Andy Amir**

Department of Public Health, Faculty of Medicine and Health Science, University of Jambi

\*Corresponding author. Email : [adilasolida@unja.ac.id](mailto:adilasolida@unja.ac.id)

**Abstract.** The project-based learning (PjBL) model is understood to improve student's abilities in the learning process. The use of conventional learning methods is still dominant in the Jambi University Public Health Department. Student-centered learning innovation is needed through the application of project-based learning models. The purpose of this study was to identify differences in critical thinking skills and student communication skills between the application of project-based learning and conventional learning in the National and Regional Health Development System courses. The research was conducted at the Jambi University Public Health Science Study Program for semester V students with a total of 36 students. The research design was a quasi-experiment involving an experimental class and a control class. The instruments used were test sheets with indicators of measuring critical thinking skills and oral communication skills test sheets and report assessment sheets. Data collection was done twice with pre-test and post-test. Data processing used statistical software. Data analysis was carried out in stages using the T-test. The results showed that there were differences in the critical thinking skills ( $p=0,002$ ) and communication skills ( $p=0,004$ ) of students between the application of project-based learning and the application of conventional learning. There is an effect of project-based learning on students' critical thinking skills and communication skills in the National and Regional Health Development System course. Project-based learning is recommended to be applied to every course in various study programs in higher education, especially case-based study materials. The PjBL method provides opportunities for students to be directly involved in completing projects to solve problems that are examined so that it is expected to be able to increase students' thinking power to think critically and hone communication skills by being actively involved in a complex learning process.

**Keywords:** Communication Skills; Critical Thinking Skills; Project Based Learning; Health Development System

### INTRODUCTION

Public health is the science and art of maintaining and improving public health. National and Regional Health Development System is one of the courses that are part of the learning of Public Health Science. The studies discussed include national and regional health development; the National Health System, the National Health Sub-System, and case studies on the

implementation of the health system. This course aims to prepare students who are able to design ideas, the results of thinking, and scientific arguments responsibly and based on academic ethics, and communicate through the media to academic circles and the wider community in order to support development activities in the health sector in achieving health status indicators. In achieving these learning objectives, the case study process on the implementation of the health system that students go through includes complete and careful analysis activities in connecting one phenomenon with other phenomena related to health problems that exist on a national and regional scale so that students are able to view problems from various perspectives.

Project-based learning is understood as a learning model that promises to improve students' abilities even at the tertiary level. Some empirical evidence focuses on student learning outcomes that project-based learning has an influence on cognitive outcomes about thinking strategies as well as behavioral outcomes that include skills and student engagement in the learning process (Guo et al., 2020). Project-based learning as an alternative to traditional teaching for teachers has been shown to influence student achievement positively (Chen & Yang, 2019). Project-based learning significantly improves critical thinking skills compared to conventional learning (Azizah & Widjajanti, 2019). The implementation of project-based learning can significantly improve students' creative thinking, especially related to fluency and flexibility. Because in this approach, the use of various creative thinking tools is provided to develop creative thinking habits (Mutakinati et al., 2018).

In practice, project-based learning models direct students' thinking skills and provide ample opportunities for them to make decisions in selecting topics, making observations, and completing a specific project. The learning model is useful for lecturers who want to condition student-centered active learning where students can have a more interesting learning experience and produce work based on reality (contextual) that occurs in life. Things that must be considered in project-based learning include several principles according to; examining specific or centralized concepts, leading to understanding, investigating, free creativity, and realism in the form of real project production (Dewi, 2015).

In changes in student cognitive outcomes, the application of project-based learning is believed to improve critical thinking skills (Bezanilla et al., 2019). Critical thinking is a systematic

process that empowers students' logic in formulating and evaluating their beliefs and judgments based on inquiry and problem-solving which is the basis for decision-making. In addition to being required to think critically, students must also be able to convey ideas or views as a product of the results of this thinking both in writing and orally through communication skills. The application of project-based learning also improves aspects that support students in thinking such as communication skills, negotiating, expressing interdisciplinary that must be explained, and collaborating (Vogler et al., 2018).

In the field of public health, students' skills in communicating, and presenting case studies or problems in the implementation of national and regional health systems are needed. This skill will support critical thinking skills because communication skills are a contributing factor in determining student success in solving and resolving problems (Dogara et al., 2020). The application of project-based learning has a positive influence on improving students' communication skills (Lestari et al., 2016).

The conventional learning model is the most widely used learning method in the Jambi University Public Health Department. The learning model applied mostly uses old methods developed based on peer experience or intuition doesn't in the form of lecture methods centered on lecturers as teachers. Meanwhile, the interaction between lecturers and students and between students is still lacking, so the learning process tends to be passive. This condition is actually realized by lecturers that the use of learning methods will affect students in their way of thinking, expressing ideas, creativity, various skills, and abilities in solving everyday life problems. The problem of weak application in the use of innovative learning methods implies that effective learning has not yet been developed for community health students.

The results of the observational assessment of the lecturer in applying conventional methods in the National and Regional Health Development System course, students' ability to think critically and be skilled in communicating the results of the study of the problems of implementing the national and regional health systems is not optimal. Assessment of the cognitive, affective, and psychomotor aspects, of the 30 students in semester V of the 2021/2022 academic year, 7 students (23%) were included in the group with excellent category assessments, 10 students (34%) in the good category, 12 students (40%) and 1 student (3%) were insufficient. Based on an

initial survey of 7 students who were tested for critical thinking skills assessment, only 2 students were able to fulfill the assessment indicators, namely formulating problem formulations, giving opinions, deducing, inducing, evaluating, and making decisions.

Lecturers as educators and facilitators in the learning process play a role in the success of the above learning outcomes. Therefore, lecturers are also required to be able to create a conducive and enjoyable learning atmosphere for students so that students' ability to think critically and students communication skills can be honed and the achievement of the learning outcomes set. Based on several previous studies, the learning model that can support these achievements is the application of project-based learning models. Therefore, lecturers must make improvements to classroom learning and innovate in the teaching and learning process.

There has been no special study or previous research that discusses the significance of differences in the application of conventional methods and the application of project-based methods in the National and Regional Development System courses to be the main basis for the application of this learning model. Learning innovation using a project-based model is applied because it allows students to be directly involved in making decisions to select case study topics, conduct an assessment of the problem and complete a project to solve the problem being studied. This learning model is expected to increase students' thinking power to think critically and hone communication skills by being actively involved in the complexity of the learning process.

## **RESEARCH METHODS**

The research was conducted at the Public Health Science Study Programme, Jambi University, on fifth-semester students specializing in Health Policy Administration with a total of 36 students. The research design was a quasi-experiment involving an experimental class and a control class. The sample was divided into two groups, namely the experimental class consisting of 18 students with even absences and the control class group consisting of 18 students with odd absences. The instruments used were test sheets with measurement indicators of critical thinking skills and communication skills test sheets.

The research instruments used were in the form of a description test sheet with set indicators and presentation and report assessment sheets. Descriptive test sheets with indicators

were used to measure critical thinking ability variables, using criteria adapted from Ennis (1985), namely: formulating problem formulations, giving opinions, deducing, inducing, evaluating, and making decisions with a total of 20 questions. Meanwhile, presentation and report assessment sheets were used to measure communication skills variables, consisting of oral communication skills sheets by observing students when making presentations.

The research implementation stage includes the following steps: a) determining the fundamental question; b) designing the project; c) preparing the schedule; d) monitoring the progress of the project; e) testing the results and f) evaluating the student experience. Students were divided into collaborative groups consisting of 5-6 students. During teamwork, students are provided with project worksheets. Assessment and data collection were carried out by collecting test results conducted at two meetings. The experimental class was conducted with a project-based learning model and the control class was conducted with a conventional learning model. The collected data was continued to the stage of processing and gradual data analysis using the T-test.

## **RESULTS AND DISCUSSION**

In the early stages of determining fundamental questions, essential questions were raised that explored knowledge to examine cases about the position of the National Health System in the implementation of national and regional health development systems. Students are divided into groups (6 people) that are diverse or heterogeneous based on their level of knowledge (cognitive). Each group is tasked with completing the project and establishing rules to be mutually agreed upon in the process of completing the project which is equipped with a project worksheet containing project tasks with bills: 1) writing information explicitly stated as a task, 2) writing several questions related to the problem given, 3) filling in the answers on the project worksheet 4) determining conclusions. Lecturers conducted assessments during monitoring guided by an assessment rubric that aims to measure critical thinking skills and communication skills by holding presentations in front of the class and submitting reports.

Based on the experiment, the results of descriptive statistical analysis produced a description of the frequency distribution of scores obtained by students from the pre-test (test before the application of the method) and post-test (test after the application of the method) in general from two classes with the application of different learning methods as shown in Table 1.

**Table 1. Frequency Distribution of Pre-Test and Post-Test Values of the Application of Project-Based Learning Method and Conventional Learning Method**

Assessment Score	Experiment Class (%)		Control Class (%)	
	Pre-Test	Post-Test	Pre-Test	Post-Test
41 – 60	5 (27,8)	4 (22,2)	7 (38,9)	6 (33,3)
61 – 80	12 (66,7)	11 (61,1)	11 (61,1)	11 (61,1)
81 – 100	1 (5,6)	3 (16,7)	0 (0)	1 (5,6)

In the experimental class, the highest pre-test score was in the 61-80 range, which was 66,7%. In the post-test score, the highest score was still in the 61-80 range, which was 61,1%. However, based on the percentage of values in the experimental class, it is known that there is an increase in frequency distribution between pre-test scores and post-test scores, especially in the highest score range 81-100 from 5,6% to 16,7% so that if calculated there is an increase of 11,1%. This means that in the application of project-based learning methods (PjBL) there is an increase in the percentage of value achievements that can be achieved by students by 11.1% in the highest value range.

In the control class, the most pre-test scores were in the 61-80 score range of 61,1%. It is the same with the acquisition of post-test scores in the control class that the most values are still in the 61-80 score range, which is 61,1%. The increase in the percentage of scores in the 81-100 score range from 0% to 5,6%. This means that the percentage increase in the acquisition of values in the highest score range of the application of conventional learning methods (5,6%) is lower than the application of project-based learning methods (11,1%).

This finding is similar to previous research in that there is a significant percentage increase when comparing the application of project-based learning with traditional or conventional learning (Kristanti & Subiki, 2017). The use of project-based learning methods is proven to improve student learning outcomes simultaneously (Rati et al., 2017).

Furthermore, the measurement of critical thinking skills in this study uses a description test sheet with a total of 20 questions that must be answered in each experimental class and control class. The questions were designed based on the requirements for assessing critical thinking skills adapted from Ennis (2006) that the answers of students will show their ability to formulate problem

formulations, give opinions, deduce, infer, evaluate, and make decisions in problem-solving from a discourse case presented (Hidayat et al., 2014).

**Table 2. Frequency Distribution of Critical Thinking Ability Scores**

Assessment Score	Experiment Class (%)		Control Class (%)	
	F	(%)	F	%
41 – 60	0	0	4	22,2
61 – 80	8	44,4	11	61,1
81 – 100	10	55,6	3	16,7

The results of measuring students' critical thinking skills in the experimental class that the most value scores were in the 81-100 value range, which was 55,6%, while in the control class, the most value scores were in the 61-80 value range, which was 61,1%. This means that in the assessment of student communication skills, the values that can be achieved with the highest score range (81-100) are more in the application of project-based learning methods compared to the application of conventional learning.

Measurement of student communication skills in experimental and control classes was carried out by assessing the answers to the description test sheets distributed and then compiled with the assessment of student skills in presenting their description test answers in front of the class.

**Table 3. Frequency distribution of communication skills scores**

Assessment Score	Experiment Class (%)		Control Class (%)	
	F	(%)	F	%
41 – 60	0	0	1	5,6
61 – 80	9	50	14	77,8
81 – 100	9	50	3	16,7

The results of the assessment of communication skills obtained data that in the experimental class the most values were in 2 score ranges, namely 61-80 by 50% and in the 81-100 score range by 50%. While in the control class, the highest score was in the 61-80 score range, which was 77,8%. The percentage in the 81-100 score range is only 16,7%. This means that in the assessment of student communication skills, the values that can be achieved with the highest score

range are more in the application of project-based learning methods compared to the application of conventional learning.

**Table 4. Recapitulation of Calculation Results of Critical Thinking Ability and Communication Skills Scores**

Statistics	Critical Thinking Skills		Communication Skills	
	Experiment	Control	Experiment	Control
Mean	84,72	73,06	85,00	74,72
Modus	80	75	80	80
Std. Deviation	10,357	10,451	11,246	8,484
Minimum Score	65	55	65	60
Maximum Score	100	90	100	90

The results of the calculation of critical thinking skills scores in the experimental class obtained an average student score of 84,72 with a minimum score of 65 and a maximum score of 100. While in the control class, the average score obtained by students is 73,06 with a minimum score of 55 and a maximum score of 90. The data shows that in the acquisition of critical thinking skills the score produced is higher in the application of project-based learning methods compared to the application of conventional learning methods. The calculation of the communication skills score in the experimental class obtained an average student score of 85,00 with a minimum score of 65 and a maximum score of 100. In the control class, the average score obtained by students was 74,72 with a minimum score of 60 and a maximum score of 90. The calculation results also show that the achievement of the scores obtained is higher in the application of project-based learning methods compared to the application of conventional learning methods.

**Table 5. Results of Normality Test and Homogeneity Test**

	Critical Thinking Skills		Communication Skills	
	Experiment	Control	Experiment	Control
<b>Kolmogorov-Smirnov (Sig)</b>	0,200	0,105	0,171	0,139
<b>Based of mean (Sig)</b>	0,841	1,000	0,161	0,179

Based on the prerequisites for conducting the T test analysis, the normality and homogeneity of the data were tested. The results of the normality test use the *Kolmogorov-Smirnov* sig value with a significance level of  $> 0,05$  while the homogeneity test by looking at the sig value based on the mean in the homogeneity variant test output. From Table 5. it can be concluded that



each data has a sig value > 0,05 so it is proven that the data is normally distributed. In the homogeneity test results obtained in each data sig value > 0,05 so it is concluded that the data is homogeneous.

**Table 6. Differences in Average Critical Thinking Ability between the Application of Project-Based Learning (Experimental) and Conventional (Control)**

Critical Thinking Ability	n	Mean	SD	db	T(t-test)	P-value
Experiment Class	18	84,72	10,357	34	3,364	0,002
Control Class	18	73,06	10,451			

Based on the acquisition of a significance value of P-value <0,005 in Table 6, it can be concluded that there is a significant difference in the average critical thinking skills of students between the application of project-based learning methods (M = 84,72; SD = 10,357) with the application of conventional learning methods (M = 73,06; SD = 10,451),  $t(34) = 3,364$ ;  $p = 0,002$ .

**Table 7. Mean Difference of Students' Communication Skills Between the Implementation of Project-Based Learning (Experiment) and Conventional (Control)**

Communication Skills	n	Mean	SD	db	T(t-test)	P-value
Experiment Class	18	85,00	11,246	34	3,095	0,004
Control Class	18	74,72	8,484			

In the results shown in Table 7. it can also be concluded that there is a significant difference in the mean student communication skills between the application of project-based learning methods (M = 85,00; SD 11,246) and the application of conventional learning methods (M = 74,72; SD = 8,484),  $t(34) = 3,095$ ;  $p = 0,004$ .

**Table 8. The Effect of Project-Based Learning Implementation on Critical Thinking Skills and Communication Skills of Students**

Variabel	P-value
Critical Thinking Ability	0,002
Communication Skills	0,004

At the significance limit of P-value <0,05, it can be concluded that there is an effect of the application of project-based learning on critical thinking skills ( $p=0,002$ ) and student communication skills ( $p=0,004$ ). The findings of this study are in line with previous research which shows that there is a relationship between the application of project-based learning methods and critical thinking skills (Rachmawati et al., 2018) (Sastrika et al., 2013). In addition, previous

research also proved that project-based learning affects students' communication skills (Kurniawati et al., 2021) (Putri et al., 2019).

Based on the results of the study, it is evident that project-based learning is a preferred learning model that can be applied in the field of Public Health. This learning model gives students experience in gathering new information and integrating it with experience based on the problem statement in the first step related to the implementation of the health system. The process of designing the project also uses complex problems that need to be observed or examined by students. Through this process, various critical questions are generated that direct students to develop collaborative projects and integrate with many concepts or materials that have been learned.

Project-based learning can provide renewal in the repertoire of public health science. It places a strong emphasis on collaborating to solve the health problems discussed. The process involves many things such as the way students think in integrating concepts and cases, focusing on problems, and working in teams in heterogeneous groups so that critical thinking skills emerge in the learning process. Critical thinking skills are a form of higher-order thinking with a complex process and if students can do it, it will help in examining complex studies in a sequential manner and with good understanding (Dewi, 2015). Therefore, the application of project-based learning can provide results scores obtained by students higher in the assessment of critical thinking skills compared to the application of conventional methods (Anita, 2017). Based on the process, students gain direct experience with various principles in public health studies that are being examined. Each topic in project-based learning is based on reality or realistic things that provide valuable lessons for students.

The application of project-based learning is also influential in improving students' communication skills because this method is based on teaching students to interpret each process, step by step through the learning practice (Hrp & Rahma, 2020). Communication skills for public health students are skills that can support student success in applying public health science. Students are required to be skilled in communicating, informing, and educating the public about disease prevention, health promotion, health policy analysis, and even at the stage of changing or

renewing the quality of public community health. Mastery of communication skills helps students in describing the results of interpretation and observation, being able to answer questions logically and communicatively, and being able to draw conclusions from existing health problems through project-based learning. Because project-based learning frees students in planning, organizing designs, and conducting scientific investigations into the projects given. So that the level of understanding and success of learning is easier to achieve (Tinenti, 2018).

Students' ability to think critically and communicate skills will increase if the application of project-based learning methods is applied not only in one course but in every course that has case study materials. Assessment of communication skills is based on indicators of the ability to a) describe the results of observations, b) describe the research data scientifically, c) master the material well, c) display data from observations communicatively, d) answer friends' questions logically and scientifically, e) draw conclusions from observations, f) respect other people's opinions and, g) cooperate with group colleagues. The study material of the Health Development System course comes from case studies or health problems faced at the national and regional levels. So based on the results of this study, the application of project-based learning is a learning innovation that can help students achieve the expected end-of-course abilities, and hone critical thinking skills and communication skills.

The application of project-based learning in three previous studies showed that project-based learning improved students' skills in their field. There was an increase in marketing skills among hospitality students after the implementation of project-based learning (Vogler et al., 2018). There was an increase in nursing communication skills in nursing students after the implementation of project-based learning (Wu et al., 2018). Skills in communicating through writing after the application of project-based learning in EFL learners (Sadeghi et al., 2016).

## **CONCLUSIONS**

The percentage of scores with the highest value range on the assessment of students' critical thinking skills is more in the class that applies project-based learning methods (55,6%) compared to the class with conventional learning methods (16,7%). The percentage of scores with the highest value range in the assessment of communication skills is more in the class that applies project-based learning methods (50%) compared to the class with conventional learning methods (16,7%).

There is a significant difference in the average critical thinking skills of students between the application of project-based learning methods ( $M = 84,72$ ;  $SD = 10,357$ ) and the application of conventional learning methods ( $M = 73,06$ ;  $SD = 10,451$ ),  $t(34) = 3,364$ ;  $p = 0,002$ . 4) There is a significant difference in the average communication skills of students between the application of project-based learning methods ( $M = 85,00$ ;  $SD = 11,246$ ) and the application of conventional learning methods ( $M = 74,72$ ;  $SD = 8,484$ ),  $t(34) = 3,095$ ;  $p = 0,004$ . 5) There is an effect of project-based learning on the critical thinking skills ( $p=0,002$ ) and communication skills ( $p=0,004$ ) of students in the National and Regional Health Development System course.

The application of project-based learning is recommended to be applied to every course in various study programs in higher education, especially case-based study materials. The application of the PjBL method provides opportunities for students to be directly involved in completing projects to solve the problems being studied so that it is expected to be able to increase students' thinking power to think critically and hone communication skills by being actively involved in a complex learning process.

## LITERATURE

- Anita, I. W. (2017). Implementasi pembelajaran berbasis proyek untuk menumbuhkan kemampuan berpikir kreatif matematis mahasiswa. *JPPM (Jurnal Penelitian Dan Pembelajaran Matematika)*, 10(1).
- Azizah, I. N., & Widjajanti, D. B. (2019). Keefektifan pembelajaran berbasis proyek ditinjau dari prestasi belajar, kemampuan berpikir kritis, dan kepercayaan diri siswa. *Jurnal Riset Pendidikan Matematika*, 6(2), 233–243.
- Bezanilla, M. J., Fernández-Nogueira, D., Poblete, M., & Galindo-Domínguez, H. (2019). Methodologies for teaching-learning critical thinking in higher education: The teacher's view. *Thinking Skills and Creativity*, 33, 100584.
- Chen, C.-H., & Yang, Y.-C. (2019). Revisiting the effects of project-based learning on students' academic achievement: A meta-analysis investigating moderators. *Educational Research Review*, 26, 71–81.
- Dewi, F. (2015). Proyek buku digital: Upaya peningkatan keterampilan abad 21 calon guru sekolah dasar melalui model pembelajaran berbasis proyek. *Metodik Didaktik: Jurnal Pendidikan Ke-SD-An*, 9(2).

- Dogara, G., Saud, M. S. Bin, Kamin, Y. Bin, & Nordin, M. S. Bin. (2020). Project-based learning conceptual framework for integrating soft skills among students of technical colleges. *IEEE Access*, 8, 83718–83727.
- Guo, P., Saab, N., Post, L. S., & Admiraal, W. (2020). A review of project-based learning in higher education: Student outcomes and measures. *International Journal of Educational Research*, 102, 101586.
- Hidayat, S., Susilawati, S., & Soeprianto, H. (2014). PENGARUH MODEL PEMBELAJARAN BERBASIS PROYEK TERHADAP PENGUASAAN KONSEP DITINJAU DARI KETERAMPILAN BERPIKIR KRITIS PADA MATA KULIAH OPTIK. *Lensa: Jurnal Kependidikan Fisika*, 2(2), 220–226.
- Hrp, N. A., & Rahma, I. F. (2020). Keefektifan Penerapan Model Pembelajaran Berbasis Proyek Dalam Pencapaian Aspek Kemampuan Representasi dan Komunikasi Matematis Siswa Kelas VI SD Negeri 118296 Beringin Jaya Pinang Damai. *PHI: Jurnal Pendidikan Matematika*, 4(2), 113–120.
- Kristanti, Y. D., & Subiki, S. (2017). Model Pembelajaran Berbasis Proyek (Project Based Learning Model) pada Pembelajaran Fisika Disma. *Jurnal Pembelajaran Fisika*, 5(2), 122–128.
- Kurniawati, W., Harjono, A., Gunawan, G., Busyairi, A., & Taufik, M. (2021). Pengembangan Perangkat Pembelajaran Fisika Berbasis Proyek untuk Meningkatkan Kemampuan Komunikasi Peserta Didik. *Jurnal Pendidikan Fisika Dan Teknologi*, 7(2), 141–146.
- Lestari, I. D., Leksono, S. M., Hodijah, S. R. N., & Agustina, W. (2016). Pengaruh penerapan model pembelajaran berbasis proyek (project based learning) terhadap kecakapan komunikasi siswa pada konsep biodiversitas. *Emasains: Jurnal Edukasi Matematika Dan Sains*, 5(2), 83–87.
- Mutakinati, L., Anwari, I., & Kumano, Y. (2018). Analysis of Students' Critical Thinking Skill of Middle School through STEM Education Project-Based Learning. *Jurnal Pendidikan IPA Indonesia*, 7(1), 54–65.
- Putri, A. D., Syutaridho, S., Paradesa, R., & Afgani, M. W. (2019). Peningkatan Kemampuan Komunikasi Matematis Mahasiswa Melalui Inovasi Pembelajaran Berbasis Proyek. *JNPM (Jurnal Nasional Pendidikan Matematika)*, 3(1), 135–152.
- Rachmawati, I., Feranie, S., Sinaga, P., & Saepuzaman, D. (2018). Penerapan pembelajaran berbasis proyek untuk meningkatkan keterampilan berpikir kreatif ilmiah dan berpikir kritis ilmiah siswa SMA pada materi kesetimbangan benda tegar. *WaPFI (Wahana Pendidikan Fisika)*, 3(2), 25–30.
- Rati, N. W., Kusmaryatni, N., & Rediani, N. (2017). Model pembelajaran berbasis proyek, kreativitas dan hasil belajar mahasiswa. *JPI (Jurnal Pendidikan Indonesia)*, 6(1), 60–71.
- Sadeghi, H., Biniiaz, M., & Soleimani, H. (2016). The impact of project-based language learning on Iranian EFL learners comparison/contrast paragraph writing skills. *International Journal*

*of Asian Social Science*, 6(9), 510–524.

Sastrika, I. A. K., Sadia, W., & Muderawan, I. W. (2013). Pengaruh model pembelajaran berbasis proyek terhadap pemahaman konsep kimia dan keterampilan berpikir kritis. *Jurnal Pendidikan Dan Pembelajaran IPA Indonesia*, 3(2).

Tinenti, Y. R. (2018). *Model Pembelajaran Berbasis Proyek (PBP) dan Penerapannya dalam Proses Pemelajaran di Kelas*. Deepublish.

Vogler, J. S., Thompson, P., Davis, D. W., Mayfield, B. E., Finley, P. M., & Yasseri, D. (2018). The hard work of soft skills: augmenting the project-based learning experience with interdisciplinary teamwork. *Instructional Science*, 46(3), 457–488.

Wu, T.-T., Huang, Y.-M., Su, C.-Y., Chang, L., & Lu, Y. C. (2018). Application and analysis of a mobile e-book system based on project-based learning in community health nursing practice courses. *Journal of Educational Technology & Society*, 21(4), 143–156.