

## Effectiveness of Implementing Project Based Learning in Improving Students' Problem Solving Abilities

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**Abstract.** *The ability to analyze problems is one of the learning outcomes that students must master. The majority of student learning outcomes still fall into the category of requiring a project-based learning innovation that can provide maximum opportunities for students to be directly involved in creating real and active projects in the learning process through the application of case method project-based learning. The aim of this research is to analyze the effectiveness of implementing project-based learning on problem-solving abilities in health ethics and law courses. The research was conducted at the Public Health Science Study Program at Jambi University on first semester students. The research design was a quasi-experiment involving 200 students. The instruments used are assessment sheets and observation sheets. Data collection was carried out before and after implementing the learning. Data processing and analysis used the T test. The research results showed that there was significant effectiveness in implementing project-based learning in increasing students' problem-solving abilities. The application of project-based learning contributes to honing problem-solving skills so that it is recommended that project-based learning methods be used in every course in higher education.*

**Keywords:** *Learning Effectiveness; Problem Solving Ability; Project Based Learning*

**Abstrak.** Kemampuan untuk menganalisis permasalahan merupakan salah satu capaian pembelajaran yang harus dikuasai mahasiswa. Hasil belajar mahasiswa yang sebagian besar masih termasuk kategori memerlukan suatu inovasi pembelajaran berbasis proyek yang dapat memberikan peluang sebesar-besarnya pada mahasiswa untuk terlibat langsung dalam membuat proyek secara nyata dan aktif dalam proses pembelajaran melalui penerapan pembelajaran berbasis proyek case method. Tujuan penelitian ini untuk menganalisis efektivitas penerapan pembelajaran berbasis proyek terhadap kemampuan pemecahan masalah pada mata kuliah etika dan hukum kesehatan. Penelitian dilakukan di Prodi Ilmu Kesehatan Masyarakat Universitas Jambi pada mahasiswa semester I. Desain penelitian berupa kuasi eksperimen yang melibatkan 200 mahasiswa. Instrumen yang digunakan adalah lembar penilaian dan lembar observasi. Pengumpulan data dilakukan sebelum dan sesudah penerapan pembelajaran. Pengolahan dan analisis data menggunakan uji T. Hasil penelitian menunjukkan terdapat efektivitas yang signifikan penerapan pembelajaran berbasis proyek terhadap peningkatan kemampuan pemecahan masalah mahasiswa. Penerapan pembelajaran berbasis proyek berkontribusi dalam mengasah kemampuan pemecahan masalah sehingga direkomendasikan pada setiap matakuliah di perguruan tinggi menggunakan metode pembelajaran berbasis proyek.

**Kata kunci:** Efektivitas Pembelajaran; Kemampuan Pemecahan Masalah; Pembelajaran Berbasis Proyek.

### BACKGROUND

The teacher's role in the learning process as a facilitator also has a very important role in combining the knowledge gained by students during lectures with relevant skills for analyzing and resolving cases regarding health ethics and law in real situations. Apart from that, teachers also have the responsibility to create a conducive and enjoyable learning environment for students, so that they can hone their abilities in improving their thinking and creativity in solving problems. According to experts, creative abilities can be measured through problem-solving skills. (Anderson & Graham, 2021).

Based on several previous literature studies, project-based learning models and problem-based learning models are two forms of learning that can be applied in the study of Health Ethics and Law. These two learning models involve students solving real problems or specific situations in groups or individually. Previous studies show that both learning models are effective in increasing students' understanding, but project-based learning is more effective in improving problem solving skills (Ismail, 2018). Project-based learning and problem-based learning improve students' analytical skills and connection abilities in the mathematical field (Abidin, 2022). Project-based learning is known to have a significant effect on student learning outcomes in the lecture process (Amir & Solida, 2022). Project-based learning improves students' scientific thinking skills in the 21st century (Umam & Jiddiyah, 2021).

Many studies show that the learning model, namely project-based learning, is effective in improving students' understanding, problem solving skills and various skills. In the context of studying health ethics and law, the application of this learning model is thought to be effective in problem solving skills, collaboration skills, and students' understanding of health ethics and law issues.

The main difference in implementing project-based learning with other learning models lies in the greater emphasis on developing practical skills and real applications. In project-based learning, students are expected to be able to apply the principles of health ethics and law in real-life contexts. In addition, this approach places greater emphasis on teamwork, where collaboration and teamwork are required to apply the principles of health ethics and law in real-world situations.

In project-based learning, cooperation and collaboration can occur in applying the principles of health ethics and law in real-world situations, while problem-based learning can require students to work alone or in small groups to solve complex problems in the context of health ethics and law. In terms of flexibility, project-based learning is more flexible in its structure and end results, in contrast to problem-based learning which is more structured and focuses on specific end results.

Project-based learning gives students the freedom to determine the end result and develop a unique project according to their interests and needs. In contrast, problem-based learning is more oriented towards achieving clearly defined end results. In practice, the project-based learning model guides students in developing thinking skills and provides great opportunities for them to make decisions in selecting topics, observing, and completing certain projects.

This approach is useful for lecturers who want to create an active learning experience, with a focus on students so that they can experience more interesting learning and produce work based on the context of reality in everyday life. Several principles that need to be considered in project-based learning, according to Tomas (2000), include examining specific or central concepts, facilitating understanding, encouraging inquiry, providing creative freedom, and producing realistic projects. Students are expected to be responsible, both individually and in groups, in the independent projects they design, by presenting and making reports to demonstrate their communication skills both written and verbal.

In the eyes of Health Ethics and Law, the Public Health Science Study Program, Jambi University in 2021 and 2022 is still conventionally based and several topics apply a problem-based learning model. However, the problem is that the implementation of problem-based learning is not yet completely student-centered.

The learning innovation using a project-based model is planned to be applied in the eyes of Health Ethics and Law because there has been no previous application of project-based learning with the case method and there have been no special studies or previous research comparing the effectiveness of implementing the project-based learning model. Therefore, research was conducted by applying a learning model that allows students to be directly involved in providing an assessment of the perceived learning experience of case method-based project learning.

## METHODS

This research is a quasi-experimental research using a non-equivalent Pretest-Posttest Control Group Design, meaning that the research was carried out twice before the experiment was carried out (pre-test) and after the experiment was carried out (post-test). The research variable tested is problem solving ability. The research involved 200 students who were selected using a simple random sampling technique (random sampling technique).

## RESULTS AND DISCUSSION

**Table 1. Frequency Distribution of Problem Solving Ability Values**

Assesment Score	Experimental Class		Control Class	
	F	(%)	F	%
60	0	0.0	6	6.0
65	6	6.0	21	21.0
70	5	5.0	16	16.0
75	8	8.0	24	24.0
80	30	30.0	30	30.0

85	1	1.0	2	2.0
90	21	21.0	1	1.0
95	29	29.0	0	0.0

The results of the assessment of problem solving abilities showed that in the experimental class the highest score was 30% at 80 and 29% at 95. Meanwhile, in the control class, the highest score was 80, which was 30%. There was no score of 95 in the control class. This means that in the assessment of problem-solving abilities, the highest score can be achieved with the application of project-based learning methods compared to the application of problem-based learning.

**Table 2. Recapitulation of Problem Solving Ability Score Calculation Results**

Statistic	Problem solving skill	
	Experimental Class	Control Class
Mean	84,70	73,05
Mode	80	80
Std. Deviation	9,261	6,850
Minimum	65	60
Maximum	95	90

Calculating the problem solving ability score in the experimental class obtained an average student score of 84.70 with a minimum score of 65 and a maximum score of 95. In the control class the average score obtained by students was 73.05 with a minimum score of 60 and a maximum score of 90. The results of these calculations also show that the scores obtained are higher when applying project-based learning methods compared to applying conventional learning methods.

**Table 3. Difference in Mean Problem Solving Ability Between the Implementation of Project Based Learning and Conventional Problem Based Learning**

Problem Solving Ability	n	Mean	SD	P-value
Experimental Class	100	84,70	9,261	0,000
Control Class	100	73,05	6,850	

From the results shown in Table 6, it can also be concluded that there is a significant difference in the average problem solving ability between the application of project-based learning methods (M=84.70; SD=9.261) and the application of conventional-based learning methods (M=73.05; SD = 6.850), the significance value obtained is  $p= 0.000$ . The resulting mean difference between the application of project-based learning and conventional learning shows that there is a difference in the effectiveness of the application of the two learning methods.

Learning effectiveness refers to the extent to which a learning method or strategy succeeds in achieving the stated learning objectives. In the educational context, learning effectiveness measures the extent to which students acquire the knowledge, skills, understanding and competencies expected in accordance with the curriculum or learning

objectives that have been determined. The findings in this research are in line with several previous studies which show that there are differences in the effectiveness of implementing project-based learning and problem-based learning (Abidin, 2022). The results of this research also support previous findings which state that there is a correlation between the use of project-based learning methods and the development of problem-solving abilities (Sari, 2021). Apart from that, previous research also proves that project-based learning influences students' skills to be more critical, which is an indicator of fighting power (Rachmawati et al., 2018).

Problem solving ability is the ability to identify, analyze and solve problems. For students, the assessment of problem-solving abilities is measured from the aspects of skills in identifying problems, analyzing problems, formulating solutions and determining alternative solutions (F. Dewi, 2015).

In an educational context, students need to use these abilities to complete assignments, overcome learning difficulties, and achieve academic goals. In this research, the application of project-based learning can result in students achieving higher scores on the assessment of problem-solving abilities compared to the application of problem-based learning. Similar findings in previous research show that project-based learning is superior (Santoso & Wulandari, 2020). However, this can be different in different class conditions or courses because problem-based learning is also an effective learning method choice in improving problem-solving abilities. (Redhana, 2013) (P. S. Dewi & Septa, 2019).

## CONCLUSIONS AND RECOMMENDATIONS

There is a difference in average problem solving abilities between the application of project-based learning and conventional learning. The application of project-based learning contributes to honing students' fighting power and problem-solving abilities, so it is recommended that every course in higher education use a project-based learning method that makes students actively involved in the learning process.

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