

Application of Project Based Learning with Scientific Article Analysis Method to Improve Student Learning Outcomes in Education Profession Courses

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Abstract: The Education Profession course is a course that equips students so that one day they can carry out the main tasks of professional teachers, namely educating, teaching, guiding, directing, training, assessing, and evaluating students. The purpose of this research is to improve student learning outcomes in the Professional Education course through the application of Project Based Learning (PjBL) using the scientific article analysis method. This research was conducted in 6 meetings starting from March 2 2022 to April 6 2022. The subjects of this research included 22 students who attended the Education Profession course in Class II-C, in the Physics Education Study Program, University of Mataram. The research instrument for obtaining data on student learning outcomes uses essay tests given at the beginning of the meeting and at the end of the meeting. The increase in the score of learning outcomes after treatment in the form of implementing PjBL with the scientific article analysis method is calculated by the N-gain test. The results showed that the pre-test score was 51.2, while the post-test score was 80.3. Therefore, the N-gain value is 60.4 which is in the medium category. Thus, the implementation of PjBL using the scientific article analysis method has improved student learning outcomes in the Education Professions course.

Keywords: Project Based Learning; Article analysis; Student learning

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INTRODUCTION

Learning model innovations in terms of planning, implementing and evaluating learning need to be continuously carried out to improve student learning outcomes, especially HOTS. HOTS-based learning and assessment has an influence on improving the quality of education so that the quality of human resources can also increase (Suhendro et al., 2021). Innovative learning models such as Project Based Learning (PjBL) support learning objectives that expect students to master various soft skills competencies to face the challenges of the 21st century, namely 4C skills (Communication, Collaboration, Critical thinking and Problem Solving, and Creativity and Innovation). The learning process to produce a product in the PjBL model trains students to carry out broader inquiries so students can answer questions, solve problems, and complete complex challenges (Asman et al., 2022). The application of the 4C competency-based innovative learning model has a significant influence on improving student learning outcomes at universities. The intended learning outcomes include cognitive, affective, and psychomotor aspects (Supena et al., 2021).

Research on 4C competency development-based learning is becoming an interesting topic, especially in the Bali and Nusa Tenggara regions (Hidayatullah et al., 2021). The results of research on 4C-based innovative learning models such as the application of the Project Based Learning model in learning can improve student learning outcomes, including students' ability to think creatively (Susanto et al., 2022).

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The PjBL model can not only improve creative thinking skills, but also learning outcomes in the form of problem-solving skills. This PjBL learning model can continue to be developed in a synergistic and sustainable manner (Rochim et al., 2022). Therefore, research and training on 4C competency-based innovative learning models really need to be done. In addition, 4C competency-based activities need to be improved both in quantity and quality. An important factor that can make efforts to improve 4C competencies successful is the policy of the local government related to the education system (Ağaoğlu & Demir, 2020). In addition, things that influence the development of 4C competencies are cultural factors. The culture of the surrounding environment has an impact on the level of 4C competence possessed by students. In other words, lifestyle patterns owned by rural and urban communities greatly affect students' collaboration skills during the learning process. Some habits such as greeting, mutual cooperation, and getting to know each other are more entrenched in rural communities (Khoiri et al., 2021).

The PjBL model can not only be applied at the elementary level, but at all levels of education. However, the implementation of the PjBL model in the classroom must pay attention to various factors, including facilities and infrastructure, characteristics of learning materials, as well as characteristics of students (Keleman et al., 2021). In fact, the application of the PjBL model at the PAUD level has a positive effect on the development of artistic skills for teachers and students (Ibrahim et al., 2022). The application of the PjBL model at the high school level can improve learning outcomes such as developing student character values and science process skills (Sejati et al., 2021). The application of the PjBL model at the university level is an alternative that can be used to facilitate students in developing critical thinking skills as part of learning outcomes that are very much needed in the 21st century. Students are also more active in the lecture process with the PjBL model compared to the conventional model (Budiman et al., 2021). Student creativity in the experimental class is better than the control class. In this case, lecturers in the experimental class apply the PjBL model, while those in the control class use the conventional model (Ridlo et al., 2020).

Each stage in the PjBL model can facilitate the development of critical thinking skills and communication and collaboration skills. Therefore, the implementation of PjBL can improve cognitive learning outcomes, critical thinking skills, and students' social attitudes (Launuru et al., 2021). The application of the PjBL model can also improve student learning outcomes, namely time management skills (Santoso et al., 2021). The application of the PjBL model in learning not only improves student learning outcomes but also improves various teacher skills (Paristiowati et al., 2022). Student response to the application of the PjBL model in lectures was very good. The PjBL model can be recommended for lecturers to increase student motivation and interest in lectures (Handayani et al., 2021).

Teachers must prepare various learning tools if they want to apply the PjBL model. The intended learning devices are: syllabus, learning implementation plans, teaching materials, student worksheets, learning media, and assessment instruments (Triana et al., 2020). The application of the PjBL model can be more optimal in improving student learning outcomes if in the learning process the teacher integrates various things that are close to everyday life. Contextual phenomena will provide meaningful learning experiences for students. The PjBL model with an ethno-science context is an innovation that can be recommended to improve student learning outcomes in all aspects, namely cognitive, affective and psychomotor (Sumarni & Kadarwati, 2020). The application of the PjBL model with the method of analyzing scientific articles, including articles that discuss ethnoscience and other forms of local wisdom is worthy of development. This study aims to improve student learning outcomes in the Professional Education course through the application of Project Based Learning (PjBL) using the scientific article analysis method.

METHOD

The research aimed at improving student learning outcomes was conducted in 6 meetings. Treatment in the form of Project Based Learning (PjBL) with scientific article analysis methods is carried out online through the Mataram University Online Learning System which can be accessed via the link: <https://daring.unram.ac.id/>

Details of research activities through the SPADA University of Mataram mentioned above starting on March 2 2022 to April 6 2022 are shown in Table 1.

Table 1. Details of research activities

Meeting	Date	Topic	Activity
First	March 2, 2022	Teacher Competency	Analysis of scientific articles that discuss the topic of: "Teacher Competence".
Second	March, 9 2022		Deepening the material by submitting questions according to the topic, namely: "Teacher Competence".
Third	March, 16 2022	General Policy in Teacher Training and Development	Analysis of scientific articles that discuss the topic of: "General Policy in Teacher Development and Development".
Fourth	March, 23 2022		Deepening the material through submitting questions according to the topic namely: "General Policy in Teacher Development and Development".
Fifth	March, 30 2022	Teacher Competency Improvement	Analysis of scientific articles that discuss the topic of: "Increasing Teacher Competence".
Sixth	April 6, 2022		Deepening the material through submitting questions according to the topic, namely: "Increasing Teacher Competence".

The product produced in the implementation of this PjBL is in the form of the results of the analysis of scientific articles in accordance with the topics discussed. The steps taken in implementing PjBL using the scientific article analysis method in this study include: 1) determine fundamental questions; 2) designing project planning; 3) to arrange the schedule; 4) monitoring students and their project progress; 5) test the results; 6) evaluate the experience (Winangun, 2021). Lecture coordination includes the mentoring process so as to produce products in this study using the WA Group application assistance.

The subjects of this study consisted of 22 students who attended the Education Profession course in Class II-C, in the Physics Education Study Program, University of Mataram. This research was conducted in the even semester, 2021/2022 academic year. The research instrument used to obtain data on student learning outcomes is an essay test. The test is given to students at the beginning of the meeting and at the end of the meeting. The increase in student learning outcomes scores after treatment in the form of implementing PjBL with the scientific article analysis method is calculated using the N-gain test. The increase in student learning outcomes from the pretest to the final test is calculated using the N-gain with the following equation (Hake, 1999).

$$N - gain = \frac{S_{post} - S_{pre}}{S_{max} - S_{pre}} \times 100\% \tag{1}$$

The N-gain acquisition category is shown in Table 2.

Table 2. Category of N-gain acquisition	
Interval (%)	Category
$g > 70$	High
$30 \leq g \leq 70$	Medium
$g < 30$	Low

RESULT AND DISCUSSION

The online lecture system for the Education Profession course in this study is based on the Learning Management System (LMS) through the SPADA University of Mataram. The Online Learning System in question can be seen in Figure 1. Lecturers provide files of learning materials which become initial knowledge or information for students. After the allotted time allocated for studying the material files has been exhausted, the lecturer gives instructions for conducting discussions through the "Discussion Forum" feature. Lecture coordination is carried out through the subject WA Group. Students discuss with discussion partners that have been formed by the lecturer. Material for discussion comes from the results of the analysis of scientific articles related to certain topics according to the learning material at the meeting at that time.



Figure 1. Instructions for analyzing scientific articles

The process of student discussion with discussion partners according to the groups formed by the lecturer can be seen in Figure 2. Each student conducts an analysis of scientific articles, while the discussion partners will provide comments in the form of responses or questions related to the results of scientific article analysis. Interactive discussions took place between discussion pairs, as well as the course supervisor lecturers. Lecturers also provide responses that are deemed necessary to increase student understanding of the topic of discussion.

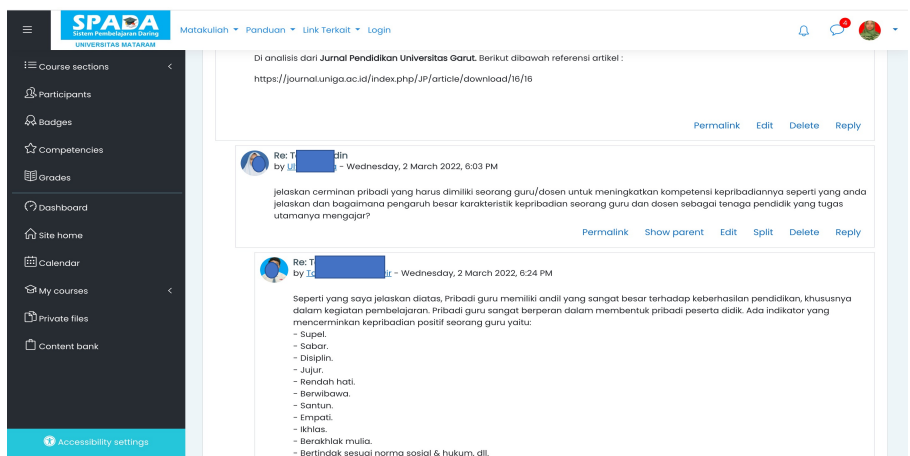


Figure 2. The process of discussing the results of the analysis of scientific articles

Treatment in the form of applying the Project Based Learning model with the scientific article analysis method has succeeded in increasing student learning outcomes in the Education Profession course. The results showed that the average score of students during the pre-test was 51.2. After treatment, student learning outcomes increased, this can be seen from the average score at the time of the post-test which increased to 80.3. Student learning outcomes during the pre-test and post-test can be seen in Figure 3.

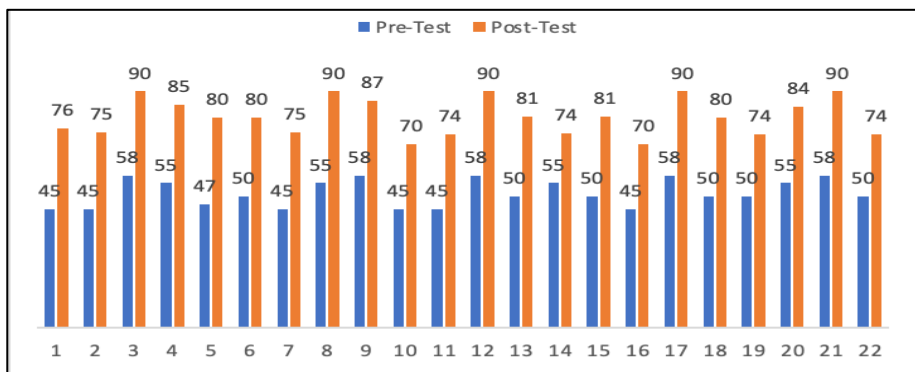


Figure 3. Student Learning Outcomes

Based on the pre-test and post-test values, the N-gain value can be determined. From the calculation, the N-gain value is 60.4 which is in the medium category. This means that the implementation of PjBL using the scientific article analysis method has improved student learning outcomes in the Education Profession course. This Education Profession course is a course that equips students so that one day they can carry out the main tasks of professional teachers, namely educating, teaching, guiding, directing, training, assessing, and evaluating students. The N-gain value for each student can be seen in Figure 4.

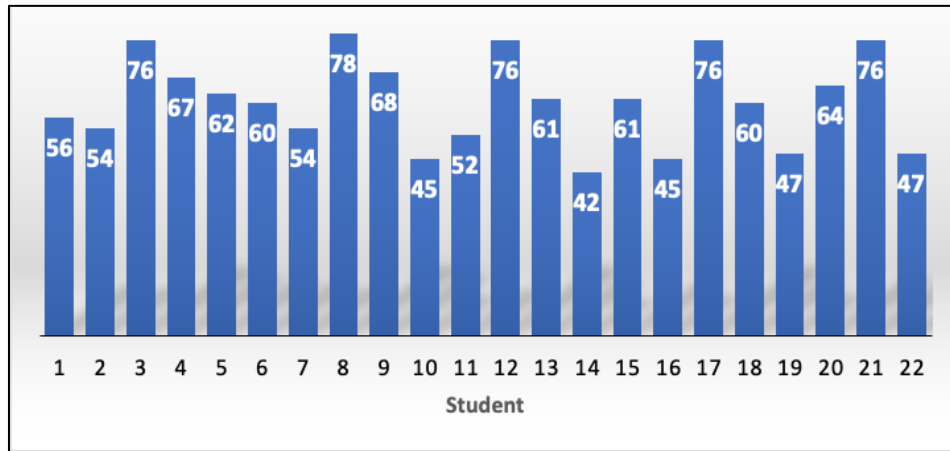


Figure 4. N-gain

During the COVID-19 pandemic, learning system innovation was needed in implementing the PjBL model to support government policies regarding restrictions on social interaction or direct interaction between teachers and students in class. Learning systems that utilize technology can be the best choice in the form of online learning, or it can be a combination of online and face-to-face learning (Hujjatusnaini et al., 2022). The application of the PjBL model both offline and online has a positive effect on improving student learning outcomes, if there is good two-way communication between teachers and students (Kim, 2021).

Online learning during the COVID-19 pandemic has various advantages compared to conventional learning. In conventional learning, teaching materials that have been delivered by the teacher cannot be repeated, while notes that can be made by students are still limited. The teacher's explanation in conventional learning also has limitations in transferring knowledge to students. Conventional learning also has limited space and learning time because it cannot be accessed anytime and anywhere, even though currently students have a tendency and dependency on digital or ICT-based content. This situation is a positive value for online learning where teaching materials can be accessed, stored, or shared via the internet network (Rabiman et al., 2020).

The use of online learning through the LMS (Learning Management System) can support the ability to write and perform analysis (Duin & Tham, 2020). Lectures that use scientific-based LMS in SPADA (Network Learning System) have proven effective in improving student learning outcomes (Saputro & Susilowati, 2019). Kendala yang dapat terjadi ketika perkuliahan dilaksanakan secara daring adalah keterbatasan jaringan internet, technological limitations, and limitations in the use of applications (El Khuluqo et al., 2021).

For science learning that requires practical or experimental activities, teachers can use virtual laboratories to help students understand concepts through various scientific activities (Aldiab et al., 2019). Therefore, prospective teacher students need to familiarize themselves with online learning as a preparation for teaching in real class later. This online learning can be modified with various innovative learning models, including the Project Based Learning model. Curriculum design using the PjBL model requires good evaluation instruments so that it can have an impact on improving the quality and quality of education (Subando et al., 2021).

The personality possessed by a teacher can become a hidden curriculum. This personality influences the way teachers teach and educate students. The teacher's personality is related to the effectiveness of strengthening student character education at school. The personality in question includes: 1) the teacher is able to be a role model; 2) the teacher is able to act as a friend; 3) the teacher gives an example of discipline; 4) the teacher masters the subject matter; 5) teachers are fair; 6) teachers can respect students; 7) the teacher is patient; 8) teachers want to learn for life; 9) the teacher is relaxed; 10) teachers are

considered fun by students; 11) the teacher is not fierce; 12) teachers master skills in educating student character (Lukman et al., 2021).

CONCLUSION

Treatment in the form of applying the Project Based Learning (PjBL) model using the scientific article analysis method has improved student learning outcomes in the Education Profession course. The knowledge gained by students is a provision to become a professional teacher. Materials that have been mastered by students through the application of the PjBL model using the scientific article analysis method are: first, Teacher Competence; second, General Policy in Teacher Training and Development; third, Teacher Competency Improvement. The ability to analyze scientific articles based on discussion topics in the implementation of the PjBL model in Education Profession lectures is an effort to improve the 4C competencies that students must have in the 21st century. The PjBL model with the scientific article analysis method can also be used in other subjects, depending on the characteristics of the material and the characteristics student. Further research needs to be conducted to see and analyze the effect of the PjBL model using the scientific article analysis method on strengthening character education at universities, as well as its influence on various soft skills needed by students in solving problems and in the world of work in the future.

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