Development of Project-Based Learning Model-Based Videos to Optimize Basic Teaching Skills

Yeni Megalina[1], Rugaya[2], Khairul Amdani[3]

{yeni@unimed.ac.id[1], rugaya@unimed.ac.id[2], amdani.khairul@gmail.com[3]}

Physics Department, Faculty of Mathematics and Natural Sciences, Universitas Negeri Medan, Medan, Indonesia[1,2,3]

Abstract. Microteaching is a sixth-semester course focusing on teaching fundamentals and various educator skills. Students often face challenges with classroom management during their teaching practice (PPL) due to insufficient mastery of basic skills. To address this, instructional media such as Project-Based Learning (PjBL) model-based teaching videos are needed. These videos are designed to help students observe and understand essential teaching skills. This study aims to develop a feasible and practical video for students, conducted in the Physics Department at University of Medan using the ADDIE R&D model. Data collection involved observations, tests, questionnaires, and documentation. Both qualitative and quantitative analyses were applied. Results show the video achieved: a) 83.13% from Learning Expert 1 (very good) and 78.75% from Learning Expert 2 (good); b) a practicality score of 86.52%, classified as very practical.

Keywords: Microteaching, Video, Project-Based Learning Model.

1 Introduction

Rapid technological advancements characterize the current era, driven by Industry 4.0 and Society 5.0. These changes impact the education sector significantly. Despite technological progress, the role of teachers as educators remains irreplaceable. According to [1], teachers play a crucial role in the teaching and learning process. Their responsibilities extend beyond teaching to include guiding and directing students to stay on the right track during learning activities. Guidance here refers to supporting students' development by providing direction and an environment aligned with national education goals.[2] In the context of Industry 4.0, teachers are required to have high competencies and adapt their teaching methods to align with the current curriculum, which is the Merdeka Curriculum. With curriculum changes, both educators and students must adapt, especially educators who must be flexible.[3]

A current issue is the challenge of becoming a professional teacher, particularly for students preparing to become teachers. Prospective teachers, who are prepared through microteaching as a prerequisite for real teaching practice,[4] often struggle with confidence and classroom

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management during their teaching practice. This lack of confidence and classroom control is due to inadequate mastery of basic teaching skills and pedagogical competencies. According to [5], effective teaching skills positively impact students' motivation to learn. Good teaching skills can foster students' enthusiasm for learning and motivation. To manage a classroom effectively, students need learning media to understand basic teaching skills. Feedback from several lecturers indicates that students need media such as simulation teaching videos to optimize their basic teaching skills.

Although many microteaching videos are available on YouTube, this video will be developed based on a learning model that supports the Merdeka Curriculum. The video will utilize technology and innovative teaching models aligned with Industry 4.0. It aims to address the issues faced by students. According to Gagne in [6], learning media include tools used to deliver educational content, such as books, tape recorders, cassettes, videos, film, slides, photos, graphics, television, and computers. Videos fall under the category of learning media. Educational videos are systematically created tools in audio or visual formats that contain learning materials, such as theory explanations, practical procedures, or other content that can enhance students' interest in self-learning, increase their knowledge, and improve learning outcomes.[7] Educational videos facilitate active learning and help students prepare before practical courses, allowing instructors to avoid repetitive explanations and ensure a smooth, engaging, and efficient online learning process.[8]

In teaching, students should be involved in experiences facilitated by the teacher, integrating cognitive and emotional engagement in enjoyable and challenging activities that encourage student initiative.[9] One teaching model that involves students in experiences and can motivate them is Project-Based Learning (PjBL). The PjBL model is a teaching approach that incorporates projects into the learning process. [10] This video was recorded using a smartphone and edited with Canva, an online application providing attractive design templates, features, and categories.[11] [12] found that the video product supports the Case Method and Team-Based Project learning processes, receiving very good ratings for content validity, media validity, and trial results

2 Research Methods

This study employs a Research and Development (R&D) approach using the ADDIE model. The phases involved in the research include: (1) analysis, (2) design of media and instructional plans, (3) development and validation of media and instructional designs, (4) implementation, and (5) both internal and external evaluation. The research subjects are students from the 2021 cohort enrolled in the Microteaching course. The data analysis methods include both quantitative and qualitative techniques. Data collection techniques used in this research include observation, interviews, and questionnaires with several steps: 1) Observation is conducted in the Department of Physics at Universitas Negeri Medan to gather information about the infrastructure supporting learning, as well as the students' conditions and needs, which cover aspects of knowledge, attitudes, and skills. 2) Interviews are carried out with lecturers responsible for the Microteaching course, 3) Questionnaires are directed at: a) Students, to obtain feedback on the practicality of the video, and b) Expert validators in

instructional design, consisting of two individuals, to assess the feasibility of the video developed.

The percentage calculations can be used to draw conclusions or categorize the criteria for multimedia feasibility based on the aspects being investigated. Additionally, media feasibility classification follows the 5-category Likert scale.[13] The criteria based on percentage values are shown in the following table.

Table 1. Feasibility Criteria

Interval (%)	Criteria
81% ≤ x ≤ 100%	Very Feasible
61% ≤ x ≤ 80%	Feasible
41% ≤ x ≤ 60%	Pretty Feasible
21% ≤ x ≤ 40%	Not Feasible
0% ≤ x ≤ 20%	Very Not Feasible

Table 2. Practicality Criteria

Interval (%)	Criteria
81% ≤ x ≤ 100%	Very Practical
61% ≤ x ≤ 80%	Practical
41% ≤ x ≤ 60%	Pretty Practical
21% ≤ x ≤ 40%	Not Practical
0% ≤ x ≤ 20%	Very Not Practical

[13]

3 Results and Discussions

The results of this research are a project-based learning (PjBL) video, which was deemed highly feasible by the instructional design expert with a score of 83.13% and feasible by the subject matter expert with a score of 78.75%. Additionally, the video was considered highly practical by the students. The research utilized the ADDIE development model, with the following steps

3.1 Analysis Stage

The researcher identified issues during the PLP 2 course through observations and interviews with teachers and lecturers. Students were struggling to manage the classroom effectively, primarily because many of them had not yet mastered basic teaching skills. Although there are numerous books that discuss basic teaching skills, students need media that directly simulates these skills. The media to be developed is a video based on the Project-Based Learning (PjBL) model.

The development of a Project-Based Learning (PjBL) model-based video aims to optimize fundamental teaching skills using the Research and Development (R&D) ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. The process begins with the Analysis stage, which includes needs assessment, curriculum analysis, and student analysis. The researcher identified issues through observations and interviews with several lecturers teaching microteaching courses. The problem identified was that many students struggled with classroom management and mastery of Physics content during their teaching practice (PLP 2). This difficulty was partly due to inadequate basic teaching skills, leading to the decision to develop a PjBL-based teaching video as a solution. The video includes simulations of teachers using fundamental teaching skills.

3.2 Design Stage

The researcher chose to create a video based on the Project-Based Learning (PjBL) model to help students master basic teaching skills. Currently, learning is student-centered, and one of the models that emphasizes student participation is Project-Based Learning (PjBL). The syntax of the PjBL model includes the following steps: 1) Essential questions, 2) Designing a product plan, 3) Creating a project schedule, 4) Monitoring project progress, 5) Testing the results, and 6) Evaluating the learning experience. The video will demonstrate a teacher using basic teaching skills. The researcher gathered relevant material sources aligned with the course's learning outcomes (CPMK), then designed a storyboard that outlines the media framework, including the introduction, content, and conclusion. The video was edited using the Canva application to make it more engaging.

Table 3. The Results of Design Stage

No	PjBL Model Syntax	Screenshot of the Learning Video
1	PjBL-Based Video Cover	
2	Syntax Model Project-Based Learning a. Posing essential questions	

No	PjBL Model Syntax	Screenshot of the Learning Video
	b. Designing the product plan	
	c. Creating a project schedule	
	d. Monitoring project progress	
	e. Testing the results	
	f. Evaluating the learning experiences	

No	PjBL Model Syntax	Screenshot of the Learning Video
3.	Closing of the learning video	

In the design phase, a storyboard was created, and the media in the form of a video was produced using Canva. Canva is a comprehensive application because it allows for the creation of various media and is easy to use on both mobile phones and laptops. This aligns with the findings of research [14], which shows that Canva is effectively utilized as a video creation tool. Additionally, Canva is more efficient because it offers a wide range of design templates for free and is available in several versions, including web, Android, and iPhone. Therefore, instructional videos can be created using just a smartphone. The video is based on a Project-Based Learning (PjBL) model that optimizes eight basic teaching skills: opening and closing lessons, questioning, explaining, classroom management, guiding small group discussions, reinforcement, varying teaching methods, and teaching small groups and individuals. This teaching model was chosen because it can motivate students and foster creativity, which is supported by research [15] indicating that project-based learning models can enhance creativity and learning outcomes. In this video, the following syntax stages are implemented: (1) In the first stage, students observe and ask fundamental questions about the material and some examples of its application in daily life, which the teacher presents using a projector. (2) In the second stage, students, together with the teacher, determine the project to be conducted, such as Archimedes' Law using a virtual laboratory. Students prepare their laptops and develop the project plan. (3) In the third stage, students arrange the project schedule, including the time and location for submission, set at 11:00 a.m. in the classroom. (4) In the fourth stage, the teacher monitors the students' activities in groups as they conduct experiments in the virtual laboratory. (5) In the fifth stage, the results are tested, with students presenting their projects in front of the class in groups, followed by questions from other groups based on the completed projects. (6) In the sixth stage, students verify their answers after discussion and receiving feedback from the teacher.

3.3 Development Stage

This stage is carried out by two experts in physics education to assess the feasibility of the media, which is a PjBL-based learning video.

3.3.1 Analysis of Feasibility Results:

Feasibility testing aims to determine the criteria for suitability and obtain recommendations for improvements before implementation.

a) Results of Validation by Expert I:

The subject matter experts involved in the development of the video consist of two individuals. The results of the feasibility test conducted by Expert 1 can be seen in Table 4 and Figure 1.

Table 4. Expert I Evaluation of the Innovative Model-Based Learning Video

No	Aspects	Frequency				Score	Item	Weight	Percentage (%)
		1	2	3	4				
1.	Subject	0	0	6	4	34	10	40	85,00
2.	Video Display	0	0	6	2	26	8	32	81,25
Average									**83,13**

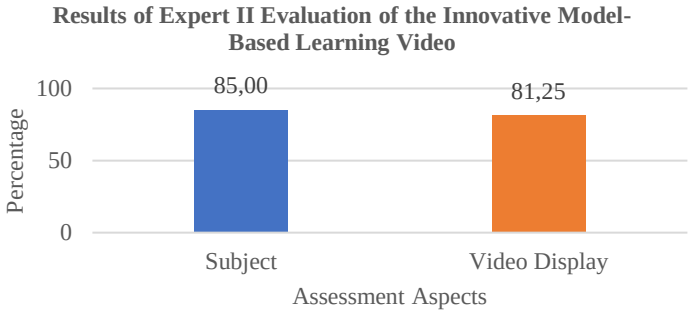

Fig. 1. Diagram of Expert I Evaluation Results for the Project-Based Learning Model Video

b) Results of Validation by Expert II:

The subject matter experts involved in the development of the video consist of two individuals. The results of the feasibility test conducted by Expert II can be seen in Table 5.

Table 5. Expert II Evaluation of the Innovative Model-Based Learning Video

No	Aspects	Frequency				Score	Item	Weight	Percentage (%)
		1	2	3	4				
1.	Subject	0	1	5	4	33	10	40	82,50
2.	Video Display	0	0	8	0	24	8	32	75,00
Average									**78,75**

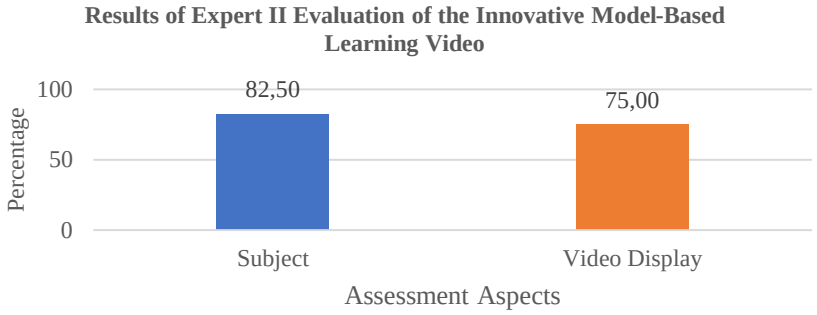

Fig. 2. Diagram of Expert II Evaluation Results for the Project-Based Learning Model Video

In the development phase, the video was reviewed by two physics education experts to assess its feasibility and provide suggestions for improvement to ensure the final product meets its intended goals. Based on the feasibility test results from the first expert, the video scored 85% in the material aspect and 81.25% in the video presentation aspect, with an overall average score of 83.13%. These results indicate that the video is highly suitable for optimizing basic teaching skills. The first expert suggested arranging the students' seating to ensure balance and avoid empty spaces before filming and improving the teacher's position during discussions to avoid being too far away and leaving many empty spaces in the classroom when teaching. According to the second expert's feasibility test results, the video scored 82.50% in the material aspect and 75.00% in the video presentation aspect, with an overall average score of 78.75%. These results suggest that the video is suitable for use. The second expert recommended that the Project-Based Learning (PjBL) model should address ill-structured problems encompassing multiple concepts, rather than focusing on a single concept. The research findings align with those of [8], which showed that an instructional video product in MP4 format, detailing the steps of online microteaching with a 15-minute duration and presented in a PowerPoint slideshow with a 16:9 or vertical screen ratio, received a score of 90.5% from content experts, categorized as "very feasible," and 78.3% from media experts, categorized as "feasible."

3.4 Implementation Stage

The implementation was carried out with students from the 2021 Physics cohort, classes A, B, and D, to test the practicality of the video. The implementation took place in the classroom. The process involved distributing the Project-Based Learning model video to the class groups via WhatsApp and Telegram, allowing students to access the developed media anytime and anywhere. This implementation helps test and ensure that the developed video is practical for use by learners. The Implementation stage involved testing the video's practicality with students from the 2021 cohort, classes A, B, and D. The practicality test of the video, conducted by students, aims to determine the ease of use of the educational media. The video was distributed through WhatsApp and Telegram groups, and students could download and view it offline. The video, with a duration of 24 minutes and 45 seconds, was assessed for practicality.

3.5 Evaluation Stage

Evaluation is conducted to assess the feasibility of the learning video. The evaluation includes data analysis from instructional design experts and student responses, as well as results from pre-tests and post-tests. The validation results from two physics education lecturers as experts indicate that the Project-Based Learning model video, which aims to optimize basic teaching skills, falls into the categories of very feasible and feasible.

The results of the practicality test for the students are as follows:

Tabel 6. Results of the Practicality Test Instrument for the Learning Video for Students

No	Aspects	Frequency					Score	Item	Weight	Percentage (%)
		1	2	3	4	5				
1.	Ease of use	0	1	41	214	242	2191	498	2490	87,99
2.	Attractiveness of Presentation	0	0	47	154	131	1412	332	1660	85,06
3.	Benefits	0	3	40	189	180	1782	412	2050	86,50
	Average									**86,52**

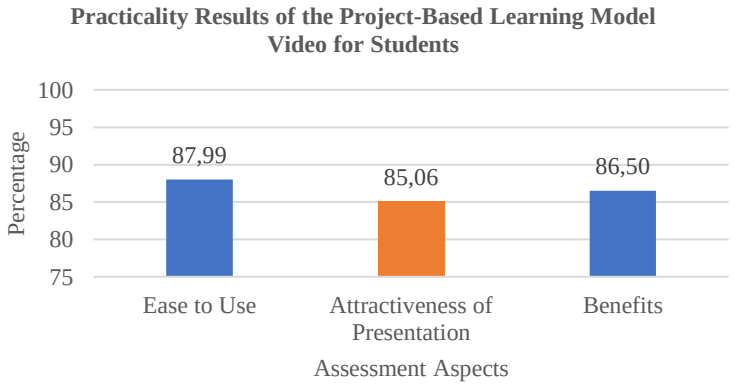

Fig. 3. Diagram of the Practicality of the Learning Video for Students

Evaluation of the video's practicality showed 87.99% for ease of use, 85.06% for attractiveness, and 86.50% for usefulness, with an overall average of 86.52%, categorizing it as very practical. Therefore, the PjBL-based teaching video is deemed very feasible, suitable, and highly practical.[16]

The advantages of the PjBL-based video include: 1) offline usability, 2) manageable file size suitable for download and storage on student devices, and 3) suitability for both online and offline learning environments. According to [17], such videos are appropriate for various learning contexts and can be expanded to include additional basic competencies. 4) Students can watch the video repeatedly,[18] enhancing their understanding of the material. However, the video has limitations, including excessive empty space during filming and uneven student seating arrangements due to using a different, larger classroom.

4 Conclusions

The conclusion of this research is that the development of a Project-Based Learning (PjBL) model video utilized the Research and Development (R&D) approach with the ADDIE development model. The resulting media product is a video with a duration of 24.45 minutes, including an introduction, core content, and conclusion. The core content uses the Project-Based Learning model to optimize basic teaching skills. This video can be used by both students and lecturers on smartphones or laptops. The research findings indicate that the video meets the criteria for being very feasible, with a rating of 83.13% according to Expert 1, and feasible with a rating of 78.75% according to Expert 2. The practicality test results from students show a score of 86.89%, categorized as very practical.

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