

Project-Based Learning Digital Teaching Materials: Improving Student History Learning Outcomes

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Abstract: This study aims to determine the feasibility of PjBL-based digital teaching materials used in history learning, and to determine the effectiveness of PjBL-based digital teaching materials used in history learning. This research includes development research (R&D). The development procedure refers to the Borg and Gall development model namely: Potential Problems, Data Collection, Product Design, Design Validation, Design Revision, Product Trial, Product Revision, and Usage Trial. The test subjects were students of class XI. MAN 2 Medan Model. With a total of 31 students, data collection methods are interviews and instruments. The results of the development research show that: PjBL-based digital teaching materials developed in history subjects are appropriate to use, because they have gone through the expert/expert validation stage in the fields of material and media, and PjBL-based digital teaching materials developed in history subjects are effective in use because it has gone through several requirements tests and carried out a history learning achievement test by comparing it to the control class using different learning media. The results of the study show that: PjBL-based digital teaching materials used in history learning are appropriate for use in the learning process, and PjBL-based digital teaching materials that are used effectively can improve history learning outcomes.

Keywords: digital teaching materials; project-based learning; history

1. INTRODUCTION

Studying history allows us to develop a better understanding of the world we live in. Building knowledge and understanding of historical events and trends, especially over the past century, allows us to develop a much greater appreciation for current events today. And if we heed Santayana's warning, then remembering history – and taking important lessons from it – will help us avoid previous mistakes and prevent them from happening again.

Gischa [1] writing history is often seen as mere rote knowledge. There is a story behind a past event. Through the story of the event, we come to know the background or origin of an event that occurred. Able to see the changing times and culture from the past to the present. A historical story always contains values. Through history, we come to know the value of unity, tolerance amid differences, nationalism, and other noble values. One must learn history to emulate the values of heroic stories and historical stories in the form of tragedies. This is to create a better life in the future. These experiences provide new knowledge about what has happened. If bad things that have happened in the past happen again in the future, we can avoid them and overcome them. Learning history will also cultivate the habit of thinking contextually by the space and time in which events occur without leaving behind the nature of changes in socio-cultural processes. By studying history, we are easily trapped in opinions, because we are used to thinking critically, analytically, and rationally and are supported by facts.

The development and progress of learning theories and current curricula make the role of educational technology even more real. Negara et.al [2] state that modules are teaching materials written with the aim that students can study independently without or with teacher guidance. The application of the use of modules causes students to be more active in the learning process (student center). The Ministry of Education, Culture,

Research, and Technology said that teaching modules are a type of teaching device that contains a learning implementation plan, to help direct the learning process to achieve Learning Outcomes (CP).

Supriadi et. al [3] expressed in their research that learning history is learning that discusses the past and sometimes tends to be teacher center learning, besides that material that is less concrete will make students feel more abstract in learning history. so, that is the function of the history teacher to be able to overcome this problem, namely, learning must be designed according to the conditions of students and analysis of student needs.

The role of history education itself is as the main foundation for social studies education in internalizing values such as self-identity, empathy, and tolerance in fostering a sense of belonging and a sense of solidarity to form a national identity. Often learning History at school is not given enough attention. The learning media used in class is only based on student textbooks. Student worksheets stacked with knowledge questions were also found. Lack of creativity from teachers in developing student learning in history subjects such as conducting simple research or research around their homes or schools, visits to museums that are only for recreation rather than deepening the material, not doing book reviews related to all history learning content.

1.1 The Nature of Learning History

Suprijono [4] defines learning as a change in behavior as a result of experience. Suprijono [5] defines learning as a permanent change in behavior as a result of experience. Learning according to Gage and Berliner as cited by Dimiyati and Mudjiono [6] is a process that makes a person experience a change in behavior as a result of the experience he has gained.

Sturtevant [6] argues that the study of history is a window into the past that provides an understanding of the present, and how individuals, nations, and global communities might develop in the future. The study of history also instructs us about how societies emerged and examine cultural, political, social, and economic influences across space and time. It can also build a personal understanding of how we as individuals are the sum of various past experiences and actors ourselves in the process of historical change. In short, studying the past helps us to gain greater personal insight and understanding of each person's place in the great sweep of the human story.

Divine [8] explained that a learning process, it is an attempt to make students learn so that the situation is an event of learning, namely an effort to change the behavior of students. Changes in behavior can occur because of the interaction between students and their environment. According to Sardiman [9] that history is a branch of science that examines systematically the entire development process of change and the dynamics of people's lives with all aspects of life that occurred in the past. History is not only a reconstruction of the past that is retold but history is a science that can solve social problems. The understanding of history according to Syafi'i [10] history is the result of the recorded interaction and dialogue of the soul and mind of the historian with the reality of human life which takes place dynamically and creatively in a certain time and space.

Zahro et. al [11] explained that History Learning has a very important role in character education because history lessons have strategic meaning in the formation of dignified national character and civilization and in the formation of people who have a sense of nationality and love for the country. Strengthening history lessons as character education can be applied to start from the objectives of implementing learning, materials, sources, and media up to the assessment. Learning History plays an important role in the formation of character, attitude, and development of the nation which is meaningful in the formation of an Indonesian nation that has a sense of nationality, is intellectual, respects the struggle of the nation, and a sense of nationalism.

According to Sapriya [12] learning History has the following material coverage: (1) Contains the values of heroism, exemplary, pioneering, patriotism, nationalism, and an unyielding spirit that underlies the process of forming the character and personality of students; (2) Contains a repertoire of civilizations of nations including the civilization of the Indonesian nation; (3) Instill awareness of unity and brotherhood and solidarity to become a unifying nation in facing the threat of disintegration; (4) Contains moral teachings and wisdom that are useful in overcoming multidimensional crises faced in everyday life; (5) Instilling and developing a responsible attitude in maintaining environmental balance and sustainability.

The objectives of learning History according to the Regulation of the Minister of Education and Culture Number 20 of 2016, namely class X, and the IPS program (XI and XII) are divided into two historical contents in the first high school for specialization groups, namely: ways of thinking history, basic principles of history, early human civilization, the development of traditional countries in Indonesia, the great world revolution and the influence of Indonesian tourism and nationality. The world during the cold war and global political changes, the struggle to defend Indonesia's independence, Indonesia during the New Order and Reform era, and Indonesia and the world during the Information and Communication Technology

Revolution. Second, Indonesian history for compulsory groups in high school, namely analyzing the basic principles of history, ancient times, medieval times, the era of regional movements, modern times, historical figures, liberal democracy, guided democracy, New Order, Reformation, Indonesia in the context of world association.

1.2 The Nature of Digital Teaching Materials

Majid [13] wrote down the meaning of teaching materials are all forms of materials used to assist lecturers/teachers/instructors in carrying out teaching and learning activities. The teaching materials in question can be written or unwritten materials. Teaching materials enable students to learn competency coherently and systematically so that cumulatively they can master all competencies as a whole and in an integrated manner.

Jazuli [14] writes that teaching materials are a set of materials that are arranged systematically that can be used by students to create a condition that allows students to learn well. Teaching materials are all forms of written and unwritten materials that are used to assist educators (teachers, lecturers, or constructors) in carrying out the learning process in class. Explains that teaching materials have an orderly design and sequence, explain the instructions to be achieved, motivate students to learn, and generally tend to be individual students which students can work on independently because they are systematic and complete. Teachers must have teaching materials that are by the curriculum, target characteristics, and demands for solving learning problems. For teachers, the development of teaching materials is used as a learning requirement to be carried out.

According to Pannen (in Prastowo [15]), teaching materials are materials or subject matter that are arranged systematically and used by teachers and students in the learning process. In this study, the teaching materials developed were in the form of Indonesian history modules.

According to Wena [16] a module is a form of print media that contains a learning unit equipped with various components so that students who use it can achieve their goals independently.

So, it can be concluded that teaching materials are all forms of materials or a set of learning materials/substances (teaching material) which are compiled as a whole and systematically, in the form of print and digital, which can also be used by educators and students for learning activities and have learning planning objectives that outline large part contains the knowledge, skills, and attitudes that must be mastered by students to achieve specific learning objectives and competencies that have been determined during learning activities.

Learning modules can also be called digital scripts. Digital manuscripts are scripts that can be read, heard, and displayed on digital devices, both desktops and smartphones. Manuscripts can be in the form of books, modules, teaching materials in the form of text, or a combination of writing, audio, or video which are displayed as a single whole as a script. Often we hear the terms e-module, e-book, and e-learning, all of which are presented as digital text using various applications.

The presentation of digital/electronic teaching materials is different from printed teaching materials. Presentation of

teaching materials in digital/electronic form can provide a lot of convenience and interest, including: Displayed using a gadget or computer screen; More practical to carry everywhere and not burdensome to carry; Using a flash drive, hard disk, or memory card to store data; Production costs are cheaper, do not require additional costs to reproduce, and delivery of teaching materials can be done using WhatsApp, telegram, email and so on; Durable and timeless; Using a screen or monitor for too long will cause your eyes to feel sore; The script can be arranged linearly or non-linearly; Can be equipped with audio and video in the presentation; In each learning activity a password can be given which is useful for locking and providing security; and Using electricity and computers to operate it.

1.3 The Nature of Project-Based Learning (PjBL)

Sani [17] explained that project-based learning or PjBL is carried out to deepen the knowledge and skills obtained by creating works or projects related to teaching materials and competencies that students are expected to possess. Wena [18] argued that project-based learning is an innovative learning model, and places more emphasis on contextual learning through complex activities.

Cervantes [19] suggested that an effective PjBL environment consists of five components: (a) authentic and engaging driving questions, (b) student-generated artifacts, (c) student collaboration research, (d) community audience, and (e) use of technology-based cognitive, and communication tools. In PjBL principles, students pursue solutions to problems by asking and correcting questions, debating ideas, making predictions, devising plans, collecting and analyzing data, drawing conclusions, communicating ideas, asking new questions, and creating artifacts.

Ergül [20] also explained that the project-based learning method is one of the student-centered teaching methods that have been used. This is one way to provide opportunities for students to take part in a learning environment, make them take responsibility for their learning, develop students, and have them understand and structure information. In a project-based learning approach, students build and direct their learning, develop their creativity, prefer solving problems they face in collaboration, and bring the classroom to life. In short, project-based learning is an approach based on students working alone or in small groups to produce concrete products.

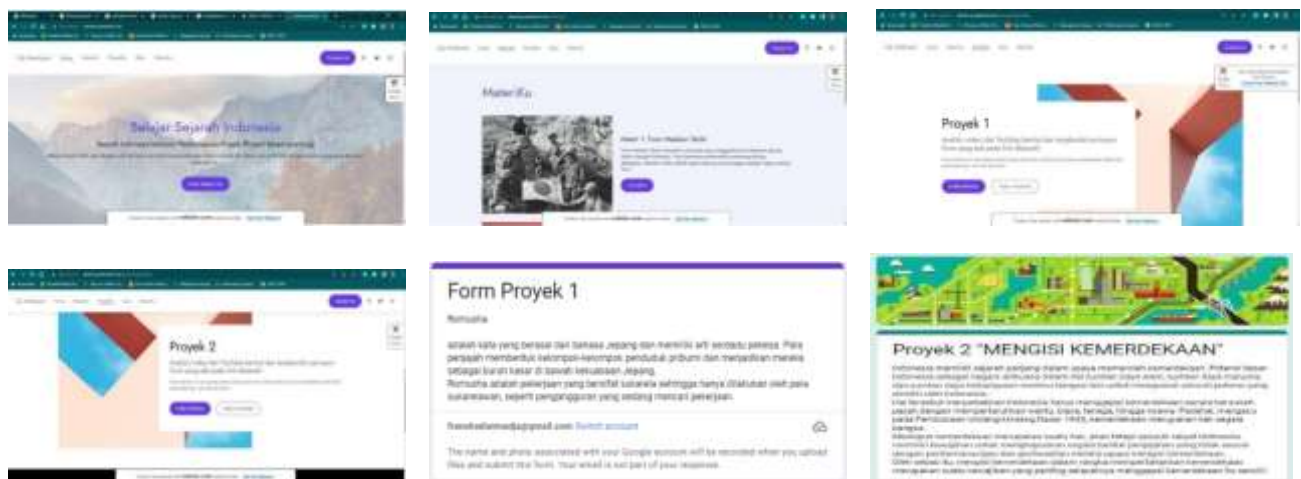


Figure 1. Display of PjBL-Based Digital Teaching Materials

The research problems are formulated as follows: (1) are PjBL-based digital teaching materials used in history learning appropriate for use in the learning process, and (2) are PjBL-based digital teaching materials used effectively to improve history learning outcomes?

2. METHOD

This type of research is a type of development research commonly called development (R&D). Development research is research that aims to produce a product through the development process [21]. According to Sugiyono [22] research and development is research that produces products and also other activities, namely testing the effectiveness of the products to be produced. To be able to produce a particular product, namely research that needs analysis in nature and to test the effectiveness of the product so that it can function to a large audience, research must be carried out to test the effectiveness of the product that has been produced. According to Borg and Gall [23], development research is a process used to develop and validate products.

Sukmadinata [24] explains research and development is a research approach that produces a new product or refinement of an existing product. R&D is a method for producing certain products or improving existing products and testing the effectiveness of these products. Researchers conducted research and development of digital teaching materials, the feasibility level of digital teaching materials in History subjects was known through validation by material experts, validation by media experts, validation by teachers, and trials of use by students. Research and development oriented to research, design, produce, validate, and test the resulting product.

The implementation of this research was carried out at MAN 2 Model Medan. The implementation time for the development of digital teaching modules and research will be carried out in March 2023 in the Even Semester of the 2022/2023 Academic Year. Research subjects are individuals who participate in research. The subjects of this study were students of MAN 2 MODEL MEDAN class XI IPS. The object of this study was

students of class XI IPS MAN 2 Medan Model in the subject of Indonesian History using PjBL to increase student interest and learning outcomes.

Procedure and Development This research uses the R&D model. Borg & Gall [25] stated that research and development (R&D) is an industry-based development model in which research findings are used to design new products and procedures which are then systematically conducted field trials are evaluated and refined until the research findings meet the effectiveness criteria. , a certain quality or a certain standard.

Borg & Gall states that R&D is an industry-based development model in which research findings are used to design new products and procedures which are then systematically conducted field trials are evaluated and refined until the research findings meet certain criteria of effectiveness, quality or certain standards: (1) Potential Problems Teaching materials function as materials that can help and complement educators in carrying out the learning process in class and helping potential students to become independent learners; (2) Data Collection Before determining the choice of product planning to be developed, it is better to collect data on needs that can be used to overcome the problems faced by the school where the research is carried out; (3) Product Design Based on the results of the needs analysis, the next step is for the researcher to design the developed product; (4) Design Validation The next step is to validate the design. Design validation is an activation process to evaluate product design rationally; (5) Design Improvements are carried out after obtaining an assessment from experts. All input, criticism, suggestions, and recommendations from experienced experts and teachers are recorded and used as a basis for improving the product designs developed [26]; (6) Product Trial After revision and improvement by the validator, the next step is product trial. This trial aims to see the feasibility and effectiveness of the product being developed. Product development can be directly tested, after being validated and revised by the validator (Sugiyono, 2014: 302); (7) Product Revision is carried out based on the results of the initial trial. The results of the field trials obtained qualitative information about the program or product being developed; (8) Use Trial After testing the product is successful and there may still be a few weaknesses that need to be corrected, then the product in the form of a teaching material supplement is applied within a wider scope of educational institutions or in a wider group [28].

Based on the formulation of the next problem, namely whether the PjBL-based digital teaching materials developed are effective in improving history learning outcomes. Learning is said to be effective if there are significant differences in learning outcomes between classes that are given treatment in classes that are not given treatment. The hypothesis uses the mean difference test or t-test. The t-test is the average difference to find out whether there is a significant difference at the 0.05 significance level with Microsoft Excel 19.

The hypothesis formulated is:

Ho: $\mu_1 = \mu_2$ (there is no mean difference between the treated and untreated classes).

Ha: $\mu_1 \neq \mu_2$ (there is an average difference between the treated and untreated classes).

Decision-making Ho is accepted if the significance is greater than 0.05. The following is the calculation using the 2nd difference test for the population average according to Sudjana [27]:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{s \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Where:

\bar{X}_1 = total average score of the experimental class sample.

\bar{X}_2 = total average score of the control class sample.

s = standard deviation

3. RESULTS AND DISCUSSION

3.1 RESULTS

The results of the assessment by media experts and material experts, for all aspects of the assessment are determined by the average score. The results of the assessment were then analyzed and determined whether or not it was appropriate to develop PjBL-based digital teaching materials in history learning. The average percentage of the results of the assessment of media experts and material experts is in Table 1 below:

Table 1. Average Percentage of Assessment Results for PjBL-based digital teaching materials

No	Categorization	Percentage of average%	Criteria
1.	Material Expert Validation	88	very feasible
2.	Media Expert Validation	82,3	feasible
The average		85,15	very decent

PjBL-based digital teaching materials in history learning show that: Material Expert Validation is 88.00% very feasible category; Media Expert validation is 82.3% in the appropriate category so that the average is 85.15% in the very feasible category. which means that the use of PjBL-based digital teaching materials in history learning meets the needs of students

The analysis requirements test performed is the normality and homogeneity tests. Testing was carried out using the Liliefors test. A summary of the normality of the two samples can be seen in Table 2 below:

Table 2. Summary of Data Normality Test with Liliefors

No.	Data	Class	L count	L table	Conclusion
1	Posttest	Experiment	0,214	0,161	Normal
2	Posttest	Control	0,211	0,161	Normal

Based on Table 2, it can be seen that the results of the posttest data normality test in the experimental class obtained $L_{count} < L_{table}$ ($0.214 < 0.161$) and in the control class also obtained $L_{count} < L_{table}$ ($0.211 < 0.161$). Thus, it can be concluded that the post-test data and the experimental and control classes are normally distributed at the significance level $\alpha = 0,05$

Homogeneity test analysis using the F test is to prove the largest variance and the smallest variance with the formula:

$$F = \frac{\text{Varian terbesar}}{\text{Varian terkecil}} = \frac{S_1^2}{S_2^2}$$

A summary of the homogeneity of the two samples is seen in Table 3 below:

Table 3. Summary of Data Homogeneity Test with Fisher's Test

No.	Data	Class	F _{count}	F _{table}	Conclusion
1	Post-test	Experiment	1,42	1,84	Homogeneous
2	Post-test	Control			

Based on Table 3, it can be seen that the results of the posttest data homogeneity test calculations in the experimental class and control class at a significant level $\alpha = 0.05$ obtained $F_{count} < F_{table}$ ($1.42 < 1.84$), it can be concluded that the Posttest data in the two classes have the same or homogeneous variance.

The following is the formulation of this statistical hypothesis, namely:

Ho : $\mu A1 \leq \mu A2$
 Ha : $\mu A1 > \mu A2$

Information:

$\mu A1$: average student learning outcomes taught using PjBL-based digital teaching materials
 $\mu A2$: average student learning outcomes taught without using PjBL-based digital teaching materials

The t-test is used as a hypothesis-testing tool because the research data is normally distributed and homogeneous. The hypothesis in the research is:

Ho: PjBL-based digital teaching materials are not effective in improving history learning outcomes
 Ha: PjBL-based digital teaching materials are effective in improving history learning outcomes

Hypothesis testing in this study was carried out using the t-test formula. The t-test was conducted to find out whether there is a significant difference between learning outcomes in classes taught using PjBL-based digital teaching materials (experimental class) and learning outcomes taught using printed books (control class) with the provision that if $t_{count} > t_{table}$ then H_0 is rejected and H_a accepted.

The calculation results obtained $t_{count} = 5.85$ and $t_{table} = 1.66$ so that $t_{count} > t_{table}$ at a significant level $\alpha = 0.05$. Based on these results, that H_0 is rejected and H_a is accepted or in other words, there is a significant difference between student learning outcomes in the experimental and control classes at a significance level of 5%. Thus, the learning outcomes of students who are taught using PjBL-based digital teaching materials differ from those of students who are taught with printed books, namely a higher average score of 8.5 and the control class an average score of 7.3 and has been tested for its effectiveness.

3.2 DISCUSSION

The learning that was carried out by students of class XI IPS 1 MAN 2 Model Medan while using digital history teaching materials with the material The Tyranny of the Rising Sun and Independent Indonesia was very memorable for them. So far, the use of digital learning in schools has been developed, but not comprehensively to all subjects, especially History. Class XI IPS students feel interested in learning both at school and at

home with their devices or via laptops and wherever they can access the History learning material.

Sari [29] that digital teaching materials based on Project Based Learning get very good qualifications. It can be concluded that digital teaching materials based on Project Based Learning are appropriate for use in the learning process. Project Based Learning-based digital teaching materials can help students understand social studies learning.

Farhana, F., Suryadi, A., and Wicaksono, D. 2021. In the same research writing digital-based teaching materials in English lessons can experience an increase in mastering competency achievement targets in English subject class XII at SMK Atlantis, especially the Multimedia major and Nursing. The results of the post-test field trials, based on the KKM score in English lessons, showed that the learning outcomes of students who achieved mastery in learning totaled 37 people or 94.59%. The average rating of the post-test questions at the field trial stage was 87.56. This means that digital-based teaching materials in English lessons have been used effectively. This is shown that the learning outcomes of students reach the KKM target of 90%.

Digital teaching materials get very good qualifications because there are several interesting things to read in digital teaching materials on cultural diversity materials, namely material presented with pictures, interesting videos, and interactive quizzes that motivate students to learn using digital teaching materials that are developed and make learning not boring. Digital teaching materials can be designed in an attractive way containing videos and interactive quizzes.

4. CONCLUSION

Based on the formulation of the problem, objectives, results, and discussion of the research on the development of e-module learning media previously described, the following conclusions can be drawn:

1. PjBL-based digital teaching material products developed in history subjects meet the requirements and are suitable for use as learning media. PjBL-based digital teaching materials in history learning show that: Material Expert Validation is 88.00% very feasible category; Media Expert validation is 82.3% in the appropriate category so the average is 85.15% in the very feasible category. which means that the use of PjBL-based digital teaching materials in history learning meets the needs of students.
2. The effectiveness of PjBL-based digital teaching materials in history subjects that have been developed is considered more effective than printed modules. the learning outcomes of students who are taught using PjBL-based digital teaching materials differ from those of students who are taught with printed books, namely that the average score is 8.5 and the control class has an average score of 7.3 and has been tested for its effectiveness.

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