PjBL-based digital history model to improve historical concept skills and historical consciousness

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Article Info

ABSTRACT

Digital history-based project-based learning (PjBL) in history learning is a learning medium that can provide a special attraction for students who can improve historical concept skills and historical awareness. However, there are still many teachers who have not used it, so it is very important to study it. This research aims to analyze the influence of the digital history based PJBL model in improving historical concept skills and historical awareness. The method used is quasi-experimental with two classes, experimental and control. The population used class XI high school students in Lampung, Indonesia and the sample size was 213. Cluster random sampling was used to determine sampling, while data collection was in the form of test instruments. The test instrument questions were analyzed using the gain score and Kruskal-Walli's test to determine the increase in historical concept skills and historical awareness with the help of statistical package for the social sciences (SPSS) 26. The research results confirmed that digital history based PjBL was effective in increasing historical concept skills and historical awareness with a high score, making it the best choice to overcome obstacles in history learning.

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1. INTRODUCTION

Information and communication technology (ICT) in the digital era is growing day by day. This makes all countries vying to be able to adapt and survive amid tight competition in the digital era of today's sophisticated technology [1]. Education is one of the fields that has a major role in dealing with this progress, as stated by Saykili [2] that Indonesia should improve human resources capabilities and skills as soon as possible through education so that it can compete in the current digital era because education will form a generation that is creative, innovative, and competitive.

Learning in the 21st-century digital era now certainly requires technological sophistication in helping teachers to compete so that they are good at using technology [3], [4]. The skills demanded in 21st-century learning are not only the ability to memorize as is the case in most learning processes in Indonesia, but more critical thinking skills, creative thinking, and the ability to be able to solve problems that occur. in

the everyday life of students. In line with Olszewski and Crompton [5] that 21st-century learning is based on technological demands that are balanced with the demands of the times which aim to equip students with 21st-century life skills, namely critical thinking, communication, collaboration, and creativity (4C) skills [6]. The 4C skills are very important because these activities give students the ability to collaborate in groups by trying to solve certain problems, increase tolerance for differences of opinion between peers, and think critically and creatively to solve problems related to connecting things in life [7].

History teachers in today's digital era need to develop technological skills so they can be effective in integrating technology into history learning [8]. Learning history in a digital context teachers need to have good digital literacy to operate digital devices, master applications and software relevant to learning history, and understand how to use technology effectively in teaching. Digital history is present as an alternative form of learning history to be applied to attract interest in student learning [9]. Digital history refers to the use of digital technology and digital resources in the process of learning and understanding history [10]. This involves using digital tools such as software, websites, databases, digital archival sources, data visualization, simulations, and interactive media to enrich the history learning experience [11].

Digital technology allows wider access to various historical resources. Students via the Internet can access digital archives, museum collections, historical documents, maps, images, audio, and video that are relevant to the historical topic being studied [12]. This opens the door for students to explore extensive sources and gain a deeper understanding of the past [13]. Learning media through digital history can assist teachers in conveying material to students, besides that it can also be integrated with learning models such as problem-based learning (PBL), project-based learning (PjBL), cooperative learning, contextual learning, and others [14], [15]. One of these learning models can be combined with digital history and namely PjBL [16]–[18]. This digital history based PjBL learning model is an integration of methods or models that aim to develop student's abilities, especially in historical concept skills and historical consciousness.

PjBL based on digital history is a blend of historical learning models with the use of digital technology as a tool and source of information [19], [20]. This model integrates PjBL elements with the use of digital technology to enrich students' learning experiences in understanding history [21]. Historical concept skills and historical consciousness are historical learning outcomes that have been included in the independent curriculum based on Badan Standar, Kurikulum, dan Asesmen Pendidikan (BSKAP)/ educational standards, curriculum and assessment agency decree No. 008/H/KR/2022 regarding the achievements of learning history at the high school level, explains that the learning process is to generate historical understanding and awareness of events that occurred in Indonesia, both from the origins of our ancestors to the reform era [22]. This position is important as a transformation of knowledge of the past, which is contextualized into present life, as a basis for the future, and as an effort to strengthen human identity in local, national, and global dimensions which is carried out through history subjects.

Historical concept skills are abilities that must be mastered by students in studying historical events; identifying the progress of people or groups of people in creating and moving history; identifying historical events in Indonesia and linking or relating them to historical events in the world [23]–[25]. Meanwhile, historical consciousness is the ability to understand historical facts and see the interrelationships between the past, present, and future; relate historical events to social reality and evaluate historical events; interpret the values contained in historical events; develop an interest in deepening or continuing the study of historical science or historical education; developing awareness to visit and maintain historical heritage objects or sites; and actively participate in various historical activities [26]–[28]. These two historical learning achievement components can be developed through a digital history based PjBL model in history learning.

PjBL based on digital history has several aspects that are thought to be very effective for conveying historical material in enhancing historical concept skills and historical consciousness. These aspects are the use of digital resources, multimedia-based learning, and historical visualization. Students through digital history based PjBL utilize digital resources such as archives, databases, websites, videos, and other multimedia as sources of historical information [29], [30]. Students may use digital technology to create multimedia presentations, video documentaries, visual reconstructions, or other creative projects. Digital technology allows students to create dynamic and interactive historical visualizations [31]. Therefore, the digital history based PjBL model provides an opportunity for students to dig deeper into understanding history by utilizing available digital technology. This model presents historical content in an interesting form and allows students to be actively involved in the learning process.

Wilkins [32] explained that students' historical concept skills were said to be still low because they did not understand much in articulating historical events properly. Popa [33] explained that apart from historical concepts, students' historical consciousness is still minimally mastered because there are still many who cannot interpret historical values in the material. Furthermore, Mursid *et al*. [34] explained that PjBL is an effective learning approach to improve students' understanding and learning outcomes. In addition, digital history in history learning has been applied by teachers in utilizing learning technology so that it can help students be more active and interested in learning history. The position of PjBL based on digital history is a

form of teacher innovation to be applied in history learning to make it more interesting and increase student involvement. The purpose of this study was to analyze the impact of implementing the digital history based PjBL model to improve historical concept skills and historical consciousness which are important components in history learning outcomes. The influence of this learning model is of course for students to provide learning experiences that are more interactive, and interesting, and expand access to historical resources.

2.   RESEARCH METHOD

The quantitative method was used in this study, with a quasi-experimental design that has a control class but does not fully function to control external variables that affect the implementation of the experiment [35], [36]. The research pattern used was a nonequivalent control group design involving two class groups, namely the experimental class and the control class [37], [38]. More details about the quasi-experimental research design in the research can be explained in Table 1.

Table 1. Nonequivalent control group design research pattern

Class	Pretest	Treatment	Posttest
Experiment	S1	T1	S3
Control	S2	T2	S4

This study was initiated by giving pretest treatment to the experimental class (S1) and the control class (S2). The experimental class used the PjBL model based on digital history (T1), and the control class used the conventional learning model (T2). At the end of this study, the post-test treatment was given to the experimental class (S3) and the control class (S4).

This study used a population of class XI senior high school students in Metro, Lampung. The sample used was 133 students consisting of two schools namely State Senior High School 1 Metro, Lampung, and State Senior High School 6 Metro, Lampung. The sampling technique of this study used cluster random sampling which divided the sample into several separate groups (clusters). The data collection technique used is non-test and test (pre-test and post-test). This test is used to analyze the improvement of historical concept skills and historical consciousness. This research test instrument has the nature of open questions to involve students in critical, analytical, and reflective thinking processes (HOTS) toward historical material. Question items that have been made were analyzed using validity and reliability tests. The validity test was analyzed using quest and reliability using Cronbach Alpha. Valid and reliable instruments provide accurate and reliable results in measuring understanding, skills, or concepts to be assessed in history lessons [39][39], [40].

Data collection through procedures starting from observation and literature study. Observations were made to obtain needs analysis related to problem data in the learning process, while literature studies were to seek grounded theories from existing problems. This study was divided into two class groups, namely the experimental class and the control class. The experimental class uses the application of the PjBL learning model based on digital history and the control class uses the application of conventional learning models with a question-and-answer approach. Learning begins with a pretest in all classes and ends with a posttest after the entire learning process has been completed. Data analysis to find out the increase in historical concept skills and historical consciousness using the n-gain score equation with the Hake [41][41] formula listed (1). The acquisition category is if the n-gain score is greater than 0.7 ($g > 0.7$) then the indicators of historical concept skills and historical consciousness are in the high category, if the score is between 0.3 and 0.7 ($0.3 \leq g \leq 0.7$) then the category is medium, whereas if the score is less than 0.3 ($g < 0.3$) then it is in the low category. The criteria for obtaining the n-gain score can be seen in the Table 2.

$$N - gain = \frac{\%posttest\ score - \%pretest\ score}{ideal\ score - \%pretest score} \tag{1}$$

Table 2. Distribution category of N-gain scores

N-gain Value	Category
$g > 0.7$	High
$0.3 \leq g \leq 0.7$	Medium
$g < 0.3$	Low

Further data analysis to determine differences in learning outcomes or scores obtained by students from the posttest and pretest used the Kruskal-Wallis's test with SPSS 26 [42]. This test is used because there is no need to test variables with normal distribution. The formulation of the hypothesis in this study is i) H_0: There are differences in digital history-based PjBL learning models to improve historical concept skills; and ii) H_1: There are differences in digital history-based PjBL learning models to increase historical consciousness. The category of acceptance and rejection of the hypothesis to analyze the significant level then H_0 and H_1 are accepted if the significance level is less than 0.05 (Asymp Sig < α).

3.   RESULTS
3.1. Descriptive of analysis

Digital history is a field of study that uses digital technology, tools, and methods to investigate, analyze and present historical information. This involves using digital technology and online resources to collect, organize, and analyze historical data, as well as digitally present historical findings and narratives [43]. Digital history involves using computer technology, software, digital databases, the internet, and other digital tools to gain new insights about history [44]. This approach allows historians and researchers to take advantage of the speed and computational capacity to analyze data more efficiently, identify patterns and trends, and correlate information from multiple sources [44].

Digital history in history learning exists as an alternative media that can help students to access various information related to finding study materials, references in writing assignments, and adding insight into the scientific fields of history and historical education[45]. The application of digital history can be combined with existing learning approaches such as PjBL (project-based learning) where students have the task of working on projects using digital technology and historical resources in the context of learning history [46]. Historical sources that can be used in the digital history based PjBL model can be accessed easily because they have been digitized. Table 3 explains information from several digital history links that can be used as material or sources for learning history using the PjBL model [47], [48].

Tabel 3. Links to digital history websites as sources for learning history

No.	Link digital history	Information
1.	[49]–[51]	The Digital History website, National Archives site: "*Ons national geheugen*", and Leiden University Libraries can be used by teachers to implement the digital history based PjBL model in increasing historical concepts and historical awareness. These three websites provide access to various digital-based historical learning resources that make it easier for students to search for digital archives, photo collections, documents, videos, research support, and others. Teachers and students can use this website as a source for learning PjBL history to better understand the world and national historical heritage.
2.	[52]–[54]	The *arsip nasional* website (*anri*), historia.id and *perpustakaan nasional e-resources* are very important in exploring digital-based historical sources in Indonesia. These three websites provide access to various digital-based historical learning resources that make it easier for students to search for digital archives, photo collections, documents, videos, research support, and others regarding Indonesian history, which makes it easier for teachers and students, allowing them to understand Indonesian history clearly. better and enrich understanding of historical concepts and historical awareness.

The digital history learning resources mentioned in Table 3 have great potential to become valuable additional tools for teachers in improving the quality of history learning, especially in the use of digital history to improve historical concept skills and historical awareness. Figures 1 and 2 are displays of digital history applied in history learning.

The form of historical sources contained in Figures 1 and 2 will certainly attract students to enjoy studying history more. The historical sources that have been listed are of course only a few examples because there are many others. These historical sources will later be used by teachers to utilize digital history. PjBL learning model based on digital history like this is a form of constructivist learning. Students are invited to construct or reconstruct their knowledge of history. The results of studying historical projects, students don't have to be in the form of papers or written reports but can also be in other forms that are appropriate for the digital generation, for example, vlogs, TikTok, Instagram feeds, and so on. This digital history based PjBL history learning model will indirectly encourage students to be creative and think critically.

Figure 1. Display of digital historical resources on the history of the american revolution [49]

Figure 2. Display of historia magazine on Islamic figures in Indonesia [53]

3.2. Instrument validity and reliability test results

Analysis of the validity and reliability of the instrument about historical concept skills and historical consciousness. Test the validity of the item items analyzed using the quest program and test the reliability of the item items using Cronbach Alpha with the help of SPSS 26. The results of the validity test items regarding historical concept skills and historical awareness can be presented in following Table 4.

The output results in Table 4 explain that as many as 22 items of questions on the variable are declared fit. Determination of fit test (case/person) with the model in the Quest program Adam and Kho [55] is also based on the magnitude of the average value of the infit mean of square (INFIT MNSQ) and its standard deviation which ranges from 0.77 to 1.33. The results of the item reliability test were analyzed using Cronbach's Alpha with an alpha value of 0.79 indicating that the item was declared reliable in the good category. Reliability decision-making refers to Mohaffyza *et al.* [56] which consists of 0.00 (invalid), 0.00 - 0.20 (poor), 0.20 - 0.0 40 (poor), 0.40 - 0.60 (moderate), 0.60 - 0.80 (good), and 0.80 - 1.00 (very good). All item items in this study were declared valid and reliable to assess historical concept skills and historical consciousness so that researchers obtained accurate and appropriate data.

3.3. The results of the analysis of historical concept skills and historical consciousness through the n-gain score

In this research, the results of the analysis using the n-gain score calculate the increase in skills in historical concepts and historical consciousness. The results of the analysis show differences in the acquisition of historical concept and historical consciousness skill scores between the control class (conventional) and the experimental class (digital history based PjBL) before and after learning, which is documented in Table 5.

Table 4. The results of the validity test on the items about historical concept skills and historical consciousness

Variable	Item number	INFIT MNSQ	Description
	Item 1	0.97	Fit
	Item 2	0.93	Fit
	Item 3	0.96	Fit
	Item 4	0.95	Fit
	Item 5	1.38	Fit
Historical concept skills	Item 6	0.84	Fit
	Item 7	0.99	Fit
	Item 8	0.83	Fit
	Item 9	0.91	Fit
	Item 10	0.96	Fit
	Item 11	0.99	Fit
	Item 12	1.24	Fit
	Item 13	1.13	Fit
	Item 14	1.56	Fit
	Item 15	0.93	Fit
	Item 16	0.84	Fit
Historical consciousness	Item 17	0.81	Fit
	Item 18	0.97	Fit
	Item 19	0.91	Fit
	Item 20	0.87	Fit
	Item 21	0.91	Fit
	Item 22	0.98	Fit

Table 5. The results of the n-gain scores for each indicator of historical concept skills and historical consciousness

Variable	Class	Pretest	Explain Posttest	N-gain	Pretest	Evaluate Posttest	N-gain	Pretest	Conclude Posttest	N-gain
Historical concept skills	Experiment	67	87	0.79	63	81	0.62	71	98	0.81
	Control	52	69	0.26	50	72	0.24	51	76	0.30
Historical consciousness	Experiment	58	76	0.64	52	79	0.69	73	89	0.71
	Control	48	62	0.21	44	57	0.26	55	75	0.24

The results of the analysis in Table 5 show that in general there has been an increase in historical concept skills and historical consciousness. This is based on the higher n-gain score in the experimental class compared to the control class. The n-gain indicator values obtained in the experimental class were 0.79 and 0.64, including in the high and medium categories, for the evaluation indicator the n-gain values obtained were 0.62 and 0.69 in the medium category, and the conclusion of the overall posttest indicator was the n value -gain of 0.81 and 0.71 which is classified as high. Meanwhile, the control class obtained an n-gain indicator score of 0.26 and 0.21 in the low category, for the evaluation indicator the n-gain score was 0.24 and 0.26 in the low category, and the conclusion of the overall posttest indicator n-gain score was 0. 30 and 0.24 which are classified as low category. The results of the recapitulation of the difference in scores between the experimental class and the control class are presented in Table 6.

Table 6. Results of students' historical concept skills and historical consciousness test through Kruskal-Wallis

Indicator Variable	Chi-Square	df	Asymp. Sig.
Historical concept skills	178.921	1	0.000
Historical consciousness	178.921	1	0.000

The results of the analysis using Kruskal-Wallis which are explained in Table 6 aim to determine the differences in increasing skills in historical concepts and historical consciousness between the experimental and control classes with the help of SPSS 26. Based on the results of the analysis in this study, there are significant differences. This is based on obtaining the value Asymp Sig. of is 0.000, which means it is smaller than 0.05 or $(0.000 < 0.05)$, so it can be stated that there is a significant difference in the value of historical concept skills and historical consciousness between students who carry out digital history based PjBL learning and conventional learning.

4. DISCUSSION

Digital-based PjBL in history is a learning approach that involves students in projects related to historical topics by utilizing digital technology [57]. This approach integrates technology and history, students are allowed to study, analyze, and present historical information interestingly and interactively [58],

[59]. This model is by the curriculum implemented in Indonesia today, namely the independent curriculum. The learning model in the independent curriculum provides opportunities for students to be independent in learning so that teachers can use PjBL in history lessons so that students have more valuable and critical experiences in learning activities [60]. In this learning model, the teacher acts as a facilitator and evaluates the results of students' products or discoveries that are displayed through projects that have been done [61].

The achievements of learning history in the independent curriculum have several aspects which include developing historical concept skills and historical consciousness [62]. The implementation of digital history based PjBL can have a significant impact on student learning outcomes, especially on the achievement of historical concept skills and historical consciousness[63], [64]. This is because students are invited to not only learn historical facts, but also to develop skills such as research skills, critical analysis, teamwork, communication, digital literacy, and problem-solving. They learn to relate the historical experience to their world, understand its impact, and develop a deeper understanding of the past and its relevance in the present context.

Issa and Khataibeh [65], and Susilowibowo and Hardini [66] explained that the implementation of the PjBL model was able to improve student's skills and learning outcomes. The achievement of learning history is the result or goal to be achieved by students after going through the process of learning history. This achievement reflects the understanding, knowledge, skills, and attitudes that students are expected to acquire after studying history. The digital history based PjBL learning model has great potential to address challenges that arise in the digital era [67]. Historical concept skills and historical consciousness can be achieved due to students' digital literacy skills so they can learn to use digital tools, such as presentation software, video editing, or website creation, to present their research results interestingly and interactively [68]. In addition, students have wider access to various historical resources via the Internet. PjBL based on digital history allows students to use these resources, such as digital databases, archives, historical websites, and e-books, to conduct more in-depth research and obtain relevant information.

This research creates a breakthrough that differentiates it from previous research by exploring the positive impact of the digital history based PjBL learning model in the learning context [69]. These remarkable research findings reveal that this innovative approach has a significant impact on student's development, especially in significantly improving their historical concept skills and historical awareness [70]. Through this approach, students not only gain knowledge about history but also feel active involvement in the history learning process, creating a deeper and more meaningful experience that will leave an impression on their academic and personal development [71].

Historical concept skills and historical consciousness have increased significantly through the application of the PjBL model based on digital history because this model provides a strong stimulus to be interested in learning history. This happens because of interactive involvement, the use of digital technology, such as multimedia, videos, simulations, or games, can make learning history more interesting and entertaining. This helps maintain students' interest and increases their involvement in the learning process [72]. In addition to building teamwork and collaboration, digital history based PjBL facilitates teamwork and collaboration between students. Through digital learning platforms, online collaboration tools, or online communication, students can work together on historical projects, share ideas, solve problems, and provide feedback to one another. It helps develop teamwork, communication, and negotiation skills essential in a modern work environment.

5. CONCLUSION

This study concludes that the results of the analysis that has been carried out show that the digital history-based PjBL model has succeeded in increasing historical concept skills and historical consciousness where all indicator values through n-gain fall into the medium and high categories, which means that there is a significant difference between the experimental class and the control class. The digital history based PjBL model is a form of innovation from challenges in the current digital era to prepare students with skills relevant to the future. PjBL is digitally based in history enabling the development of 21st-century skills, such as digital skills, media literacy, online collaboration, effective communication, problem-solving, and critical thinking. This helps students deal with challenges and demands in the workplace and everyday life in the digital age. However, it should be remembered that implementing PjBL based on digital history also requires access to technology and adequate internet connectivity. Students and teachers must have sufficient resources to support effective learning through this model. This research is still limited to two schools, it does not reflect different schools because different schools will of course give different results. It is hoped that further research can apply it in various schools in a wider context so that the results obtained can be presented. Application of this model can also help prepare students to become more skilled and knowledgeable citizens

in an increasingly complex society. Apart from that, the successful implementation of the digital history based PjBL model can also motivate teachers to be more innovative in teaching methods and utilize technology in the learning process. This can bring about positive changes in history education, with more enthusiastic teachers and students more engaged in learning.

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