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Implementation of Project-Based Learning (PjBL) through AI-assisted comic creation

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Abstract
The History of Islamic Civilization is complex subject matter that requires an in-depth strategy to understand. This study aims to describe the implementation of project-based learning (PjBL) in teaching the History of Islamic Civilization through Artificial Intelligence (AI)-assisted comic creation. PjBL is a learning model that involves a comprehensive learning experience, in which students are asked to determine a topic, develop a project according to a timeline, and present and evaluate their work. This research employs a qualitative case study approach. The research subjects were Social Studies Education students enrolled in a single class of the History of Islamic Civilization course. Data were collected through observation of PjBL implementation, documentation of learning outcomes to determine the success of the learning process, and interviews to capture students' responses to the project process. The findings show that PjBL implementation was carried out through six stages. The first stage was helping to determine the discussion topic. The second was designing the comic project. The third was determining the implementation timeline. The fourth was monitoring project development with the lecturer. The fifth was assessing the project outcome through presentation. The sixth was evaluation and reflection. AI was used by students to search for topic references, search for the key points to be discussed in the comic, and create the comic's visuals. The findings indicate that mastery of prompting is required to produce comic visuals that match the desired outcomes and the needs of the project. Anachronism and historical distortion need to be evaluated to determine the accuracy of AI-generated visual output. The limitation of this study lies in the limited scope of AI use for history learning, confined to a single course and a single institution. Further research is expected to expand the impact of AI on PjBL in terms of creativity of use as well as more structured measurement of students' digital literacy.

Keywords:
Artificial Intelligence (AI); History of Islamic Civilization; Project-Based Learning; Comic

A. INTRODUCTION

The History of Islamic Civilization (HIC) course at the higher education level plays a strategic role in building historical awareness, cultural identity, and students' critical analysis of the dynamics of world civilization. However, teaching HIC frequently faces pedagogical challenges, including the dominance of teacher-centered expository

approaches, content that is dense with chronology, and abstract historical narratives that are difficult for students to visualize (Sultoni, 2021). This conventional learning pattern has the potential to reduce students' active engagement and to limit historical understanding to mere factual rote memorization rather than deep historical meaning-making.

This problem was directly observed in the classroom: when students took the midterm evaluation, their average learning outcomes were below 70, with a total of 26 students. This finding became the basis for evaluating subsequent instruction in order to implement a learning approach capable of fostering both engagement and understanding, thus the learning outcome increase. One such approach is Project-Based Learning (PjBL).

Project-Based Learning (PjBL) has emerged as a well-established learning model that positions students as the center of learning (student-centered) through work on real-problem-based projects (Sholeh et al., 2024). Theoretically, PjBL is rooted in the constructivist and social-constructivist paradigms, which view knowledge as actively constructed by learners through experience, collaboration, and reflection, rather than merely transmitted from instructor to learner. A large-scale study by Almulla (2020) on the application of PjBL in higher education confirms that PjBL's effectiveness is determined by four key components collaborative learning, disciplinary subject learning, iterative learning, and authentic learning which jointly enhance student engagement. PjBL not only improves critical thinking and collaboration skills, but also gives students space to express their conceptual understanding as a concrete, creative product (Fitri et al., 2024). In the context of history, visual projects such as comic creation have proven effective in transforming complex historical texts into more contextual and communicative pictorial narratives (Kusmarni et al., 2024), consistent with the findings of Moreno-Vera et al. (2021) that the use of comics in history education increases pre-service teachers' motivation and historical thinking, as well as with the digital-comic development study by Nugroho et al. (2024) (Amalina & Azharotunnafi, 2025), which showed increased student interest in historical events.

In the creation of visual projects, Artificial Intelligence (AI) now opens new opportunities for optimizing PjBL implementation, particularly in the production of visual media (Islami & Musyarri, 2026). Although research on the application of PjBL in history education (Kusmarni et al., 2024) and on the use of AI in Islamic education (Hakim & Anggraini, 2023) has begun to grow, empirical research that specifically explores the integration of AI-assisted comic-based PjBL in the History of Islamic Civilization course remains very limited. This study aims to fill that gap by providing an in-depth description of the implementation of the six stages of AI-assisted PjBL in creating HIC comics, evaluating the role of students' prompting skills, and analyzing students' responses to and the limitations of using AI in history education at the higher education level. Specifically, this study is directed at answering the research question of how the stages of AI-assisted PjBL implementation in creating History of Islamic Civilization comics are carried out. The novelty of this study lies in its position as one of the first empirical studies to capture the integration of generative AI into comic-based PjBL within the domain of the History of Islamic Civilization an intersection that has not been widely addressed by the AI-based PjBL literature, which has so far focused mainly on science or language subjects (Susanto et al., 2024).

B. METHODS

This study used a descriptive qualitative approach with a case study design, chosen because the aim of the research is to gain an in-depth, contextual understanding of how the use of AI through PjBL implementation unfolds within a particular time frame and setting (Creswell & Poth, 2018). This research is intended to explain how PjBL was

implemented in the History of Islamic Civilization course. The research was conducted at UIN Malang, in the Social Studies Education study program. The research subjects were Social Studies Education students enrolled in the History of Islamic Civilization course during the semester in which the study was conducted. Subjects were selected through purposive sampling, based on the consideration that all students in the class were carrying out the AI-assisted HIC comic project relevant to the research focus.

The researcher collected data using three techniques: observation, documentation of the project outcomes, and interviews. Observation was conducted by monitoring the progress of the project carried out by students according to the planned timeline, covering planning, execution, and presentation of the project outcome. Planning included determining the idea, designing the comic project, and setting the implementation timeline. Project execution included creating the comic once the idea had been determined, and consultation with the supervising lecturer. Presentation of the project outcome involved presenting the project in class and receiving feedback from the supervising lecturer. Assessment was carried out in two ways: performance assessment by the lecturer, and peer assessment of the progress-making process. Peer assessment served to determine the extent of each group member's contribution.

Documentation studies were carried out to determine how students used AI in creating the comic. This activity was reported through progress reports 1, 2, and 3. Documentation was also used to examine the peer assessments that students recorded via a Google Form, in which they entered each member's name, contribution, and a rating on a scale of 1–10. If a group had 5 members, each student was required to rate the other 4 members.

Interviews were conducted by asking questions about the process of creating the comic project, the involvement of AI, and the obstacles encountered along with the solutions applied. Interviews were conducted in person, group by group, after each group's presentation, using a semi-structured interview guide so that students' responses could develop further without straying from the research focus.

Data analysis followed the interactive model of Miles, Huberman, and Saldaña (2014), consisting of three stages that occur simultaneously: (1) data condensation the process of selecting, simplifying, and focusing the raw data from observation transcripts, progress documents, and interviews; (2) data display organizing the data into a matrix of PjBL stages, as presented in Table 2, to facilitate identification of patterns of AI involvement at each stage; and (3) conclusion drawing and verification the process of interpreting the patterns that emerge and cross-checking them against the source data to ensure the consistency of the findings.

Data trustworthiness was established through source triangulation comparing data obtained from observation, documentation, and interviews for the same PjBL stage as well as through member checking, i.e., confirming the researcher's interpretations with a number of student subjects to ensure that the findings matched their actual experience. Research ethics were addressed by obtaining consent from students before their observation, documentation, and interview data were used for publication purposes, as well as by anonymizing student identities in the reporting of results

Table 1. Data Collection Guidelines

No.	Data Collection Technique	Aspect	Key challenge
1.	Observation	The process of creating the project, from planning to presentation	-
2.	Documentation study	Peer assessment; AI involvement in creating the history comic	Several students did not answer comprehensively
3.	Interview	Project creation process;	Need more time to

	AI involvement; obstacles and solutions in the project	create the best result

C. RESULT & DISCUSSION

As an introduction, the lecturer had already provided guidelines regarding the History of Islamic Civilization comic project. These guidelines covered the standards for the resulting work and how AI should be used to assist visualization. The implementation of Project-Based Learning (PjBL) in the History of Islamic Civilization (HIC) course in the Social Studies Education study program at UIN Malang was carried out through six structured stages that integrated project-based learning with the use of Generative Artificial Intelligence (GenAI) technology. The initial guidelines set by the lecturer covered the standard form of the work, narrative accuracy, creativity, comic visualization, and the ethical limits of AI use. The stages of PjBL comprised determining the topic, determining the points to be discussed, determining the activity timeline, monitoring project development with the lecturer, assessing the project outcome through presentation, and evaluation and reflection.

In summary, the involvement of AI and the empirical findings at each stage of PjBL are presented in Table 2 below:

Table 2. Research Findings on AI Use in Comic Creation

No	PjBL Stage	AI Used	Findings
1	Idea determination	Searching for source references from articles and AI tools such as ChatGPT, Gemini, Claude, Dola	AI results need to be verified against articles/books, as AI output is sometimes inconsistent with the sources.
2	Planning	AI was involved in determining the key points to be discussed	AI helps summarize the points to be discussed.
3	Setting the implementation timeline	No AI involvement	The work proceeded through 3 stages: first, progress in determining the idea; second, developing the storyboard (narrative/dialogue/characters) and visualization plan; third, producing the comic visualization.
4	Monitoring project development with the lecturer	ChatGPT, Gemini, Dola, Claude used to craft visualization prompts	AI helped select characters' dialogue. AI does not always produce the expected visualization if the prompt is incomplete; creativity in prompt-writing or additional manual tools are needed to produce the desired visuals.
5	Assessing the project outcome through presentation	No AI involvement	Learning outcomes improved after the oral test/presentation. Students gained a better understanding of the material discussed.

6	Evaluation and reflection	No AI involvement	Students evaluated and verified the information/visualization produced by AI.

Discussion

Implementation of AI-Assisted PjBL

1. Determining the Topic

The discussion topic was determined at the start of instruction. Students were divided into small groups to study the major topics in the history of Islamic civilization, such as the Rightly Guided Caliphs (Khulafaur Rasyidin), the Umayyad Dynasty, the Abbasid Dynasty, the Fatimid Dynasty, the Crusades, the Safavid Dynasty, and the Ottoman Dynasty. Students were asked to search for references on the topic to be discussed. Verification of the source material was essential as the basis for subsequent discussion. The findings at the idea-determination and planning stages show that generative AI tools ChatGPT, Gemini, Claude, and Dola were the tools most widely used by students as instruments for searching and summarizing references, rather than as a sole source of historical truth. This pattern is consistent with Rozaanah's (2024) warning that generative AI output has the potential to introduce anachronisms or historical distortion if not cross-verified against credible primary/secondary sources, and it reinforces the importance of the ethical framework for AI use in education raised by Holmes et al. (2022). Students' need to verify AI results against articles or books, as reflected in Table 2, can be read as an emerging form of critical AI literacy among students, although this study did not measure it in a structured way.

2. Project Planning

Project planning was carried out by posing a series of guiding questions about which points should be discussed in the comic. At this stage, the lecturer set several planning criteria, one of which required students to formulate a more specific, narrowly scoped topic. Narrowing the topic in this way was important to reduce material overload, since the broader the scope of the chosen topic, the greater the number of information elements students would have to process and visualize simultaneously. This is consistent with Cognitive Load Theory as proposed by Sweller (1988), which explains that human working memory capacity is limited, so material that is too complex or insufficiently scoped risks producing cognitive overload that hinders, rather than supports, the learning process.

At this stage, generative AI began to be involved, primarily to help summarize and organize the key points that students had formulated using the 5W+1H framework (see Table 2). This role of AI as a narrative-planning assistant is consistent with the findings of Shan et al. (2026), who showed that involving Generative AI at the narrative-design stage of educational comics effectively accelerates the process of mapping insights/discussion points into a coherent story structure, even though the final decisions regarding the substance and sequencing of the narrative must still rest with the (human) creator in order to preserve accuracy and depth of meaning.

3. Determining the Activity Timeline

This comic creation project was designed through three sequential development stages. The first stage was determining the theme and the points to be discussed, as explained in the planning stage above. The second stage was creating the storyboard, which covered page and panel layout, character determination, narrative and dialogue composition, and the writing of supporting captions. The third stage was comic visualization the process of turning the storyboard into a complete, final comic work.

Placing the storyboard as a distinct stage prior to final visualization is not without reason. In the production of narrative-visual works such as comics and animation, the storyboard functions as a pre-visualization tool that allows the storyteller to arrange plot, characterization, and panel composition before investing

time in detailed rendering (Mou et al., 2013). In other words, the storyboard becomes a low-cost space for experimentation to test whether the chosen sequence of historical events is logical, whether characters' dialogue fits the historical context of the period, and whether the transitions between panels are sufficiently clear to the reader — before such errors become "locked in" to a final visual form that is far harder to revise. Mou et al.'s (2013) findings in the context of animation content development show that storyboard-driven methods help designers, novice designers in particular, to visualize and revise their creative ideas more freely than moving straight into final production.

The significance of the storyboard stage is even more relevant in the context of data-based or fact-based comics such as history comics, because the storyboard bridges the two central dimensions of comic creation: content relation (how pieces of information/insight relate to one another narratively) and layout (how those pieces are spatially arranged into panels) (Bach et al., 2017). In the context of this study, both dimensions are crucial given that the material being visualized consists of historical events that are chronological and causally sequential in nature; an error in panel or dialogue arrangement at the storyboard stage risks introducing chronological confusion or even historical distortion if it is only noticed after the final visualization has been completed. The three development stages of this project theme determination, storyboarding, and visualization can therefore be understood as an application of the iterative and staged production principle common in narrative-visual production, and simultaneously as a layered quality-control mechanism that ensures the accuracy of the historical narrative is preserved before the final comic is produced, including when part of the visualization process is assisted by generative AI.

4. Monitoring Project Development

At the project-monitoring stage, students were asked to develop the comic visualization with AI assistance. Some groups acknowledged that their first visualization attempt did not match what they wanted. They therefore revised their prompts into more complete instructions. One of the most crucial findings of this study is the importance of students mastering prompt engineering. To produce a comic visual that is precise and consistent with the historical narrative, students could not simply issue a simple instruction. As revealed in the interview with the Rightly Guided Caliphs (Khulafaur Rasyidin) group, students used a layered, multi-turn prompting strategy that combined technical and narrative elements:

> *"Create an A5-sized comic cover, with this title, this character, this setting, this theme — for example, the main character experiences a learning teleportation. Once the visual fits, the next prompt is added: create a 4-panel comic with a cover design like this for the following page..."*

The "learning teleportation" element shows students' use of narrative metaphor to bridge the modern world with the historical context of the Rightly Guided Caliphs era. Nevertheless, complications arose when the AI produced anachronistic visuals — for example, presenting modern cultural visual elements in a 7th-century CE setting. Effective prompt-engineering skill therefore requires a deep understanding of the historical material itself (Hanifaa & As'ad, 2025). The following is a visualization result produced from a detailed prompt:

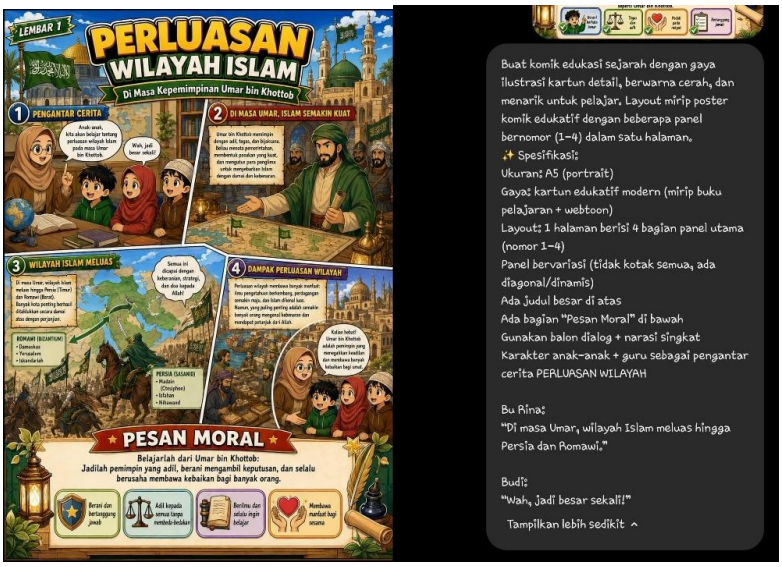


Figure 1. Visualization result from a detailed prompt

Evaluation of visual results is adjusted from the stage of compiling the story narrative and dialogue in the second timeline, after determining the title and points to be discussed. The main challenge that emerged was a mismatch between the AI-generated visualization and students' expectations whenever the prompts given were incomplete, requiring students to make repeated revisions and to add manual tools. This finding reinforces Walter's (2024) argument that prompt engineering is a core competency in the use of generative AI for education; a lack of proficiency in composing precise prompts directly affects the quality and accuracy of the visual output that constitutes the final product of the PjBL project. This finding is also consistent with Almulla (2020), who asserts that PjBL's success is strongly determined by iterative learning — that is, cycles of trial, feedback, and revision. In the context of this study, that cycle occurred through the repeated interaction between students and generative AI in producing an appropriate comic visualization.

5. Assessing the Project Outcome through Presentation

At the project assessment and presentation stage, no AI involvement was found. Learning outcomes improved after the test/oral presentation. The average learning outcome increased compared to the average midterm exam (UTS) score, which was a written test only. The score increased from an initial 67.27 to 80.07. This finding is consistent with a number of studies on the development of comics as a learning medium for history and science, which consistently report increased motivation, engagement, and conceptual understanding among students when material is presented in a narrative-visual format compared to conventional text formats (Moreno-Vera et al., 2021; Nugroho et al., 2024; Susanto et al., 2024). Thus, the improvement in learning outcomes in this study can be understood as the synergistic result of two factors: the PjBL structure, which encourages active (student-centered) engagement, and comics as a medium that bridges the abstraction of historical narrative into a more concrete and communicative visual representation (Kusmarni et al., 2024).

6. Evaluation and Reflection

The evaluation-and-reflection stage shows that students independently began to question the reliability of the information and visualizations generated by AI. This reflective pattern indicates that the AI-assisted PjBL experience shaped not only technical competence (prompting), but also a critical epistemic stance toward generative technology a competency that Walter (2024) identifies as part of a broader AI literacy that goes beyond mere technical prompt-writing skill. Overall, these findings extend the AI-based PjBL literature, which has previously focused mainly on Islamic education in general (Hakim & Anggraini, 2023; Hanifaa & As'ad, 2025; Islami &

Musyarri, 2026), by presenting empirical evidence from the domain of the History of Islamic Civilization, which is narrative-chronological in nature and sensitive to historical accuracy.

This study has a number of limitations that should be taken into account when interpreting its findings. First, the research was conducted in a single course at a single institution, so the transferability of the findings to other contexts should be approached with caution. Second, the study did not quantitatively measure students' digital literacy or prompting ability using a standardized instrument, so the conclusions regarding the relationship between prompting skill and comic visual quality remain qualitative-descriptive in nature. Third, the study did not systematically document the historical accuracy of AI-generated content relative to primary sources, so the recommendation to verify AI content that emerges from the findings is observational rather than measured.

D. CONCLUSION

This study concludes that the implementation of AI-assisted Project-Based Learning (PjBL) in comic creation for the History of Islamic Civilization course took place through six structured stages: determining the topic, planning the project design, setting a timeframe, monitoring project progress with the lecturer, assessing outcomes through presentation, and evaluation and reflection. Generative AI played an important role in the reference-search stage, planning discussion points, and producing the comic's visuals, but had no contribution at the assessment and evaluation stage, which demands more independent reasoning and reflection from the evaluator. The main finding of this study confirms that mastery of prompting skills is a determining factor in aligning AI-generated visual output with the project's narrative-historical needs, while also underscoring the need for layered verification of generative AI output to maintain historical accuracy. In practical terms, the findings of this research recommend that lecturers provide prompt training and historical fact-verification guidance to minimize the risk of anachronism or historical distortion in students' final products. The limitation of this study is that it was limited to classes for social studies students. In the future, more emphasis could be placed on students who already have good digital literacy.

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