RECONSTRUCTING HISTORICAL LITERACY: STUDENTS' PERSPECTIVES ON AI GENERATED CROSSWORD MEDIA BY CANVA AI FEATURE

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ABSTRACT

The integration of Artificial Intelligence (AI) in history education offers opportunities to enhance students' literacy skills, particularly in Islamic boarding school, *pesantren*, contexts where instruction is often lecture-centered and text-heavy. Despite growing research on digital game-based learning, limited studies have explored AI-generated crossword pedagogy in historical subjects from students' perspectives. This study addresses three questions: (1) How does AI-generated crossword learning through Canva AI features influence students' historical literacy? (2) What are students' perspectives toward its implementation? (3) What benefits and challenges are experienced? This research employed a qualitative case study design conducted in a Madrasah Aliyah in Pasuruan, East Java. Eighteen students from Grades X–XII were selected through random sampling. Data were collected through semi-structured interviews (30–60 minutes) and analyzed using thematic analysis. Findings reveal three major results. First, 15 of 18 students reported increased engagement and motivation compared to traditional lectures. Second, 14 students indicated improved vocabulary retention, recall accuracy, and understanding of historical terms through retrieval practice embedded in crossword activities. Third, although 16 students expressed positive attitudes toward the innovation, challenges included unstable internet access (7 students) and initial unfamiliarity with Canva AI features (6 students). Several participants noted that crossword activities effectively reinforced terminology but required teacher explanation for deeper historical analysis. In conclusion, AI-generated crossword puzzles positively support micro-level historical literacy and classroom engagement but function best as complementary tools within varied instructional strategies.

Keywords: AI Generated Crossword, Canva AI, History Subject, Literacy Skill, *Pesantren*

INTRODUCTION

Literacy skills are fundamental competencies that enable students to access, interpret, evaluate, and communicate information effectively. In the context of historical subjects, literacy goes beyond reading comprehension; it involves understanding chronological events, interpreting historical sources, analyzing cause–effect relationships, and constructing evidence-based arguments (Graff et al., 1975; Popa, 2022). In Islamic boarding schools (pesantren), where religious and general subjects are integrated, students are expected to engage deeply with historical content, including Islamic history and national history (Firmansyah & Amirudin, 2023; Hasan et al., 2022; Sabila et al., 2024). However, many students experience difficulties in mastering literacy skills in historical subjects due to dense texts, abstract concepts, unfamiliar vocabulary, and teacher-centered instructional methods.

Furthermore, one of the major challenges in teaching history is students' low engagement and motivation (Bruno-Jofré & Schiralli, 2008; Parellada & Carretero, 2022; Zanazanian, 2024). Historical materials are often delivered through conventional lectures and textbook-based learning, which may not sufficiently stimulate students' active participation. As

a result, students tend to memorize facts rather than develop critical literacy skills such as interpreting sources or evaluating historical narratives. In Islamic boarding schools, additional academic demands and structured daily routines may further limit opportunities for interactive and technology-enhanced learning (Sulastri & Ismail, 2025; Wijaksono & Albadri, 2025). Consequently, students' literacy performance in historical subjects remains below expectations.

Although various instructional strategies have been introduced, such as cooperative learning, discussion-based approaches, and multimedia presentations, the improvement of literacy skills is still limited. One reason is the lack of integration of innovative digital tools that can simultaneously enhance engagement and cognitive processing.

Moreover, teachers may have limited training or experience in utilizing educational technology effectively (Steel & Hudson, 2001; Vanegas et al., 2025). The rapid development of Artificial Intelligence (AI) offers new opportunities to design interactive learning media that can transform traditional classroom practices. However, the practical implementation of AI-based tools in Islamic boarding school contexts is still relatively underexplored.

Several studies in recent years have examined the intersection of literacy development, historical learning, and technology-enhanced instruction. From previous research, researchers have increasingly explored how digital tools contribute to student engagement and literacy outcomes, providing a foundation for this study, for instance, Darnawati et al. (2025) investigated the effect of digital game-based learning on historical literacy among secondary school students in East Java. They found that interactive digital media significantly improved students' vocabulary retention and historical comprehension compared to conventional methods, especially when students engaged in collaborative problem-solving. However, the study noted limitations in students' access to and familiarity with technology, which affected inclusive implementation. The use of crossword puzzles in education has also drawn scholarly attention. Furthermore, Yudiati and Rizqi (2022) examined the role of digital crosswords in enhancing vocabulary mastery in social science learning among junior high school students. Their findings suggested that crosswords supported repeated retrieval practice and helped students construct meaning from context clues, leading to improved literacy outcomes. Although this study did not employ AI for puzzle generation, it highlighted the motivational and cognitive benefits of gamified word activities. Following this, Li and Liao (2025) explored the integration of AI-assisted instructional tools in senior high school history classes. Using an AI-based question generator, students engaged with adaptive assessments that provided immediate feedback. Results indicated increases in reading comprehension and historical reasoning skills, with students reporting higher engagement due to personalized content. However, the study also noted that teachers required training to use the AI tools effectively, and that students sometimes encountered technical difficulties. Then, Belda-Medina and Goddard (2024) specifically evaluated the use of Canva AI features to support vocabulary learning in language classrooms. Their quasi-experimental study found that AI-powered activities generated via Canva, such as automatic word matching and quiz creation, significantly improved students' engagement and perception of learning enjoyment. Students reported that AI media felt more relevant and interactive than traditional worksheets. While this research was situated in language learning rather than history, it demonstrated the potential of Canva AI for producing customized instructional materials that support literacy development. Most recently, Susanto et al. (2023) conducted research in Islamic boarding school settings, investigating students' attitudes toward educational technology in religious and general subjects. They reported that students generally responded positively to multimedia tools and AI learning platforms, especially when these tools allowed self-paced review and interactive content. However, the study also highlighted a dilemma: despite positive attitudes, teachers showed varied confidence in employing AI tools, and infrastructure limitations sometimes hindered smooth implementation.

Although previous studies between 2022 and 2026 have shown that digital game-based learning, crossword puzzles, and AI-assisted instructional tools can enhance students' engagement and literacy development, important gaps remain. Earlier research tended to examine digital crosswords without AI integration or AI tools without specifically applying them to crossword-based activities in historical subjects. Moreover, most studies were conducted in general secondary school or language learning contexts, leaving Islamic boarding schools (*pesantren*) underrepresented despite their unique educational environment and structured learning culture. Prior investigations also focused predominantly on quantitative learning outcomes, with limited attention to students' perspectives regarding the use of AI-

generated learning media. In addition, the application of Canva AI features has largely been explored in language classrooms rather than in supporting historical literacy, particularly in helping students understand historical terminology, events, and conceptual relationships. Therefore, this study offers novelty by integrating AI-generated crossword puzzles through Canva AI features to improve students' literacy skills in historical subjects within an Islamic boarding school context, while simultaneously exploring students' perspectives toward this innovation. Based on these gaps, this research is guided by the following questions:

1. How does the use of AI-generated crossword puzzles through Canva AI features influence students' literacy skills in historical subjects?
2. What are students' perspectives toward the implementation of AI crossword puzzles in learning history in an Islamic boarding school?
3. What challenges and benefits do students experience when using Canva AI-generated crossword puzzles in historical learning?

METHODS

This study employed a qualitative research approach, in which the design of the research was framed as a case study. The qualitative approach was selected because it allows for an in-depth exploration of participants' experiences, perceptions, and interpretations within their natural setting (Creswell & Poth, 2018). Rather than focusing on numerical measurement or statistical generalization, qualitative research emphasizes rich description, contextual understanding, and the construction of meaning.

The case study design was considered appropriate for this research because it enables the researcher to investigate a specific phenomenon (Hartley, 2004), namely, the implementation of AI-generated crossword learning in a historical subject, within a bounded system, such as a particular Islamic boarding school. Through this design, the researcher was able to examine the complexity of classroom interactions, instructional practices, and students' perspectives holistically. Data were collected in a real-life context to ensure authenticity and depth of analysis. By applying a case study framework, this research aimed to generate detailed insights into how AI-assisted learning tools influence students' literacy development and how learners interpret their experiences within the unique educational culture of the boarding school environment.

The data sources in this study consisted of senior high school students enrolled in a *pesantren* located in Pasuruan Regency, East Java, Indonesia. The participants were drawn from three grade levels, namely Grade 10, Grade 11, and Grade 12, to ensure representation across different stages of secondary education. Prior to the data collection process, all classes had been exposed to the AI crossword learning media during their previous History lessons, ensuring that participants had sufficient experience and familiarity with the instructional tool being examined. Participants were selected through a purposive sampling technique within each class, based on predetermined criteria relevant to the objectives of the study, in order to ensure that selected students could provide the needed information.The researcher selected six students from each grade level, resulting in a total of eighteen participants. The selected students represented diverse academic abilities, learning motivations, and socio-educational backgrounds, allowing for a more comprehensive understanding of students' perspectives. The participants' privacy was strictly protected throughout the study; therefore, the researcher used coded identifiers to ensure confidentiality and to facilitate systematic data analysis and reporting.

TABLE 1 | Participants' Demography

Code	Gender	Grade	Historical Interesting
S1	Male	X	Yes
S2	Female	X	No
S3	Male	XI	No
S4	Female	XI	Yes
S5	Male	XII	Yes
S6	Female	XII	No

The data collection process was conducted through semi-structured interviews, in which the researcher gathered data directly from the participants. This method was selected to allow

for in-depth exploration of participants' responses while maintaining a clear focus on the central research topics (Adams, 2015). Through semi-structured interviews, the researcher was able to ask predetermined guiding questions while also providing opportunities for follow-up inquiries to clarify and expand upon participants' answers. This flexible approach enabled the collection of rich, detailed, and contextualized information, ensuring that participants could freely express their experiences, perspectives, and insights without deviating from the objectives of the study. The researcher make five interviews guideline, as follow

TABLE 2 | Interview's Guidelines

No	Questions Guideline
1	Can you describe your experience when using AI-generated crossword puzzles (through Canva AI features) in learning historical subjects?
2	In your opinion, how did the AI crossword activities help (or not help) you understand historical terms, concepts, or events?
3	How did the use of AI crossword puzzles affect your interest and motivation in learning history compared to traditional classroom methods?
4	What challenges or difficulties did you experience when using Canva AI-generated crossword puzzles in history class?
5	What are your overall opinions about using AI-generated crossword puzzles in history learning, and what improvements would you suggest?

In the data collection process, the researcher first prepared and organized all participants in each class to ensure their readiness and understanding of the research procedures. The interviews were conducted after the completion of the instructional sessions to allow participants to reflect comprehensively on their learning experiences. Each participant was interviewed individually for approximately 30–60 minutes in order to obtain in-depth and detailed responses. Following the interviews, all collected data were carefully reviewed and analyzed to ensure clarity, consistency, and relevance to the research objectives. If any responses were found to be unclear, incomplete, or inconsistent with the focus of the study, follow-up interviews were conducted to clarify the information and strengthen the credibility of the findings. This additional step was undertaken to ensure the validity, trustworthiness, and data saturation of the study, thereby enhancing the overall rigor and reliability of the research process.

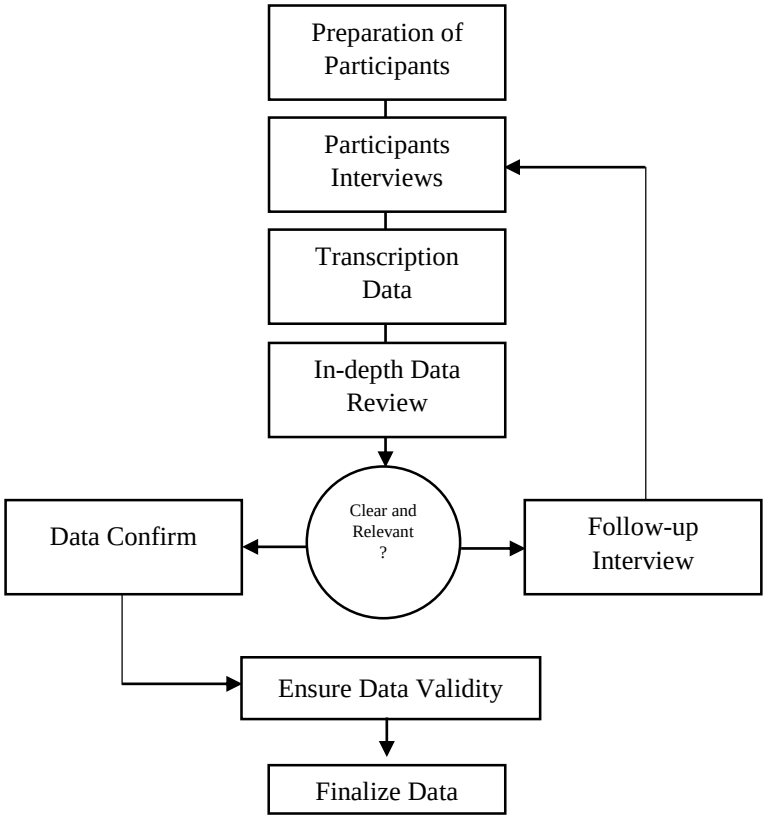

FIGURE 1 | Data Collection Process

Subsequently, the data were analyzed using a thematic analysis method, in which the researcher systematically examined and interpreted the data by identifying, categorizing, and organizing recurring patterns or themes that emerged throughout the dataset. This analytical approach involved several stages, including data familiarization, initial coding, theme development, theme review, and refinement to ensure coherence and relevance. Through this process, the researcher was able to construct meaningful interpretations that reflect participants' perspectives and experiences in a structured and rigorous manner.

RESULTS AND DISCUSSION

The findings of this study are categorized into three major themes: students' experiences while learning through AI-generated crossword puzzles, students' comprehension in historical literacy learning, and the challenges as well as advantages encountered in the use of AI crossword activities.

Students' experiences while learning through AI-generated crossword puzzles

The first theme highlights students' lived experiences when engaging with AI-generated crossword puzzles through Canva AI features in history learning. Overall, participants described a noticeable transformation in classroom atmosphere, learning participation, and emotional engagement compared to conventional lecture-based instruction.

Most students explained that traditional history lessons in the pesantren context were generally dominated by teacher explanations, note-taking, and textbook reading. While this approach provided information, it often positioned students as passive recipients. The introduction of AI-generated crosswords created a more dynamic environment in which students were required to think actively, interpret clues, and recall previously learned material.

S1 described this shift clearly:

> *Usually history class is just listening and taking notes, but when we used the AI crossword, I felt more active because I had to think about the answers by myself, analyze the clues carefully, recall previous lessons, and connect different historical concepts before deciding on the correct response.* (S1)

This sense of active involvement was echoed by S4, who emphasized the element of challenge and curiosity:

> *It was different from normal lessons. The crossword made me curious about the terms, and I wanted to complete it like a challenge, because each clue encouraged me to think more deeply about the meaning of historical events and pushed me to stay focused until I solved every part of the puzzle.* (S4)

For students who initially reported low interest in history, the AI crossword activities served as a motivational bridge. S2, who previously indicated little enthusiasm for the subject, admitted:

> *I am not really interested in history, but the crossword game made it less boring. It felt like playing while learning, and it helped me understand the material in a more relaxed and enjoyable way without feeling pressured. (S2)*

Similarly, S6 noted:

> *I usually feel sleepy in history class, but when we used the crossword, I was more focused because I didn't want to leave any blank answers.* (S6)

These responses suggest that the gamified format reduced psychological barriers often associated with dense historical texts. The puzzle format encouraged persistence, problem-solving, and peer interaction, creating a more collaborative learning atmosphere. S5 highlighted the competitive yet positive dynamic:

> *It motivated me because I wanted to finish the puzzle faster than my friends, but we also discussed the answers together, shared our ideas, compared different interpretations of the clues, and helped each other understand the historical terms more clearly before deciding on the final answers. (S5)*

However, adaptation challenges were also present. S3 explained:

> *At first I was confused because I was not used to learning history with technology like this, especially since our usual lessons mostly involve*

> *listening to the teacher and reading textbooks rather than interacting with digital tools and AI-based activities…* (S3)

This indicates that while AI-based media can stimulate engagement, students still require orientation and guidance during early implementation.

The findings of this study reveal that the integration of AI-generated crossword puzzles through Canva AI features significantly transformed students' classroom experiences in historical learning. Participants consistently described a shift from passive, teacher-centered instruction toward a more active, participatory learning environment. In the *pesantren* context, history lessons were typically characterized by lectures, note-taking, and textbook reading. While such approaches transmitted information, they often positioned students as passive recipients. The introduction of AI-generated crossword activities disrupted this pattern by requiring students to actively interpret clues, retrieve prior knowledge, and construct answers independently (Yumei & Zixi, 2025).

Furthermore, AI-generated crossword pedagogy enhanced emotional engagement, classroom participation, and learning motivation. Students reported feeling more focused, curious, and challenged during lessons. The gamified structure of crossword puzzles appeared to reduce the monotony commonly associated with dense historical texts (Anita & Moetia, 2025). Rather than perceiving history as a subject requiring rote memorization, students experienced it as an interactive problem-solving activity.

This finding aligns with earlier research. Ashfaq (2025) demonstrated that digital game-based learning increased engagement in historical subjects, while Rahini et al. (2024) found that crossword-based learning enhanced students' enthusiasm in social science classrooms. Similarly, Huang (2025) reported improved student engagement through AI-assisted instructional tools. However, what distinguishes the present study is its focus on AI-generated crosswords within a *pesantren* setting, an educational environment that has been underrepresented in technology-enhanced learning research. Moreover, prior studies largely emphasized quantitative achievement gains, whereas this research foregrounds students' lived experiences and perceptions.

The mechanism underlying this transformation appears to involve gamified cognitive activation. Crossword puzzles require active retrieval and analytical thinking, processes that engage students more deeply than passive listening. The sense of challenge and competition also stimulated intrinsic motivation. In this way, the AI-generated crossword functioned as both a cognitive and affective intervention.

Nevertheless, adaptation challenges emerged during initial implementation. Some students reported confusion in using Canva AI features, indicating that digital literacy and technological familiarity influence effectiveness. This reflects findings from Umirova et al. (2024), who noted that positive student attitudes toward educational technology must be supported by adequate training and infrastructure. From a methodological perspective, the qualitative case study design enabled rich contextual understanding of student experiences. However, the small sample size and single-site setting limit generalizability. Additionally, as the findings rely on self-reported perceptions, there is potential for social desirability bias.

Influence on Students' Historical Literacy Comprehension

The second theme focuses on how AI-generated crossword puzzles through Canva AI features influenced students' historical literacy skills. The findings indicate that the crossword activities did not merely function as entertainment but significantly contributed to students' understanding of historical terminology, conceptual relationships, and contextual interpretation. Participants described noticeable improvements in vocabulary mastery, recall ability, and deeper engagement with historical content.

Several students explained that the crossword format required them to actively retrieve information from memory rather than passively reread notes. This retrieval process strengthened their retention of key concepts. S5 stated:

> *When I read the clue, I had to remember the event and its meaning. It helped me understand the concept, not just memorize the year, because I needed to connect the historical background, key figures, and the significance of the event within a broader timeline in order to answer correctly.* (S5)

The response suggests that the activity shifted focus from rote memorization toward conceptual comprehension. Instead of recalling isolated dates, students were encouraged to connect terms with broader narratives and historical significance.

Similarly, S1 emphasized the role of repetition and association:

> *The crossword helped me remember important terms because I saw them repeatedly and connected them with the definitions, which made it easier for me to understand their meanings clearly and recall them during class discussions and assessments* (S1)

This repeated exposure to terminology supported vocabulary consolidation, particularly for complex historical terms that students often find abstract or unfamiliar. The structured clues in the crossword required students to interpret definitions carefully, thereby strengthening their reading comprehension skills.

Students who initially reported low interest in history also acknowledged cognitive benefits. S6 shared:

> *I usually forget historical terms quickly, but with the crossword I remembered them longer because I had to fill them in correctly, and I needed to understand the meaning before writing the answer in each box.* (S6)

The statement indicates that the act of completing the puzzle created a sense of responsibility and accuracy, which reinforced learning retention. The need to match each answer precisely with intersecting words required careful analysis, minimizing superficial guessing.

Furthermore, S4 highlighted how the crossword supported contextual understanding:

> *Some historical words are difficult, but when they appeared in the crossword, I tried to find their meaning from the lesson before. It made me understand better.* (S4)

This reflection demonstrates that students engaged in contextual reconstruction—connecting prior explanations, textbook content, and classroom discussion with the puzzle clues. Such processes reflect higher-order literacy skills, including inference-making and meaning negotiation.

However, students also recognized the limitations of the activity. S2 noted:

> *The crossword is good for remembering terms, but sometimes we still need explanation from the teacher to understand the bigger story.* (S2)

This perspective suggests that while AI-generated crossword puzzles effectively support micro-level literacy skills, such as vocabulary recognition and definition matching, they should be integrated with macro-level instructional strategies, including narrative explanation and analytical discussion.

The second theme highlights the influence of AI-generated crossword puzzles on students' historical literacy. Participants consistently reported that the crossword activities strengthened their understanding of historical terminology, concepts, and contextual relationships. The bottom-line finding is that AI-generated crosswords significantly supported micro-level literacy development, particularly vocabulary retention, conceptual association, and recall accuracy.

Students described how the crossword format required them to retrieve information actively rather than simply reread notes. This process reinforced memory consolidation and deepened comprehension. Instead of memorizing isolated dates, learners were encouraged to connect terms with broader narratives and meanings. The intersecting structure of crossword puzzles required precise answers, minimizing superficial guessing and encouraging careful analysis (Yang, 2025).

These findings resonate with Mansur and Fatima (2023), who observed that crossword puzzles enhance vocabulary mastery through repeated retrieval practice. Similarly, Ikrawansyah and Romadhon (2024) found that AI-assisted tools improve reading comprehension by providing adaptive engagement. However, the novelty of this study lies in its application to historical literacy within a *pesantren* context and the integration of Canva AI for automatic puzzle generation. Previous research often focused on language learning or general digital tools; this study situates AI crossword pedagogy specifically within historical content learning.

Importantly, students also acknowledged limitations. While crosswords helped them remember terms and definitions, they recognized that understanding complex historical narratives, causal relationships, and broader interpretations still required teacher explanation (Bordeos et al., 2023). This distinction suggests that AI-generated crosswords primarily support micro-level literacy, terminology and recall, rather than macro-level historical reasoning. The cognitive mechanism underlying these improvements can be explained through

retrieval practice theory (Carpenter et al., 2022). Actively recalling information strengthens long-term memory more effectively than passive review. Additionally, contextual clues in crossword puzzles encourage inferential thinking, reinforcing comprehension.

Despite these positive outcomes, the absence of quantitative literacy measurement limits the strength of claims regarding learning improvement. Because the study relies on student perception rather than objective testing, improvements are interpretive rather than statistically verified. Furthermore, without a comparison group, causal conclusions should be drawn cautiously. Nevertheless, the current interpretation suggests that AI-generated crosswords function effectively as reinforcement tools that strengthen vocabulary and conceptual clarity. They should be understood as complementary scaffolds within broader historical instruction rather than replacements for analytical discussion.

Benefits and Challenges of Canva AI-Generated Crossword Pedagogy

The third theme explores in greater depth the perceived benefits and challenges of implementing AI-generated crossword puzzles through Canva AI features in historical learning within the *pesantren* context. The data indicate that while students generally responded positively to the innovation, they also identified important pedagogical and technical considerations that influence its effectiveness.

A dominant benefit highlighted by participants was increased motivation. The gamified nature of crossword activities created a sense of challenge and competition that encouraged active participation. S5 stated:

> *It motivated me because I wanted to finish the puzzle faster than my friends. It felt like a competition but still related to the lesson, and it made me more focused, enthusiastic, and determined to understand the historical material correctly so I could answer each clue with confidence.* (S5)

This sense of challenge fostered intrinsic motivation, particularly among students who previously felt disengaged from history lessons. S2, who initially reported low interest in the subject, reflected:

> *Usually, I feel sleepy in history class, but when we used the crossword, I paid more attention because I didn't want to miss the answers, and I felt more responsible for completing each clue correctly and understanding the meaning behind every historical term included in the activity.* (S2)

Beyond motivation, students emphasized improved vocabulary retention and conceptual reinforcement. The crossword format required them to recall specific terms accurately, reinforcing spelling, meaning, and contextual usage. S1 explained:

> *When I filled in the boxes, I had to be sure about the spelling and the meaning. It made me more careful and helped me remember the terms.* (S1)

Additionally, students noted that the activity promoted collaborative learning. Although the crossword was sometimes completed individually, informal peer discussion naturally occurred. S4 shared:

> *Sometimes we discussed the answers with friends. It helped because we could remind each other about the events, clarify confusing historical terms, share different interpretations, and strengthen our understanding through collaborative explanation and peer support.* (S4)

This collaborative interaction supported social construction of knowledge, strengthening historical understanding through dialogue.

Despite these benefits, participants also described several challenges. One major issue was technological limitation, particularly unstable internet connectivity. S3 reported:

> *Sometimes the internet connection was slow, so we couldn't load the crossword quickly. It interrupted our focus*. (S3)

Technical barriers occasionally reduced the smoothness of implementation, highlighting the importance of infrastructure readiness in *pesantren* environments.

Another challenge involved digital literacy and adaptation. Some students were unfamiliar with Canva's AI features at the beginning. S6 stated:

> *At first, I was confused about how to use it. I needed help to understand the instructions, especially because I was not familiar with the Canva AI features and the steps were not clearly explained at the beginning of the activity.* (S6)

This suggests that initial orientation and teacher guidance are essential to ensure equitable participation. Pedagogically, students also noted that crossword activities alone were insufficient for deep historical analysis. S2 commented:

> *The crossword helps with terms, but for understanding the whole story or the reasons behind events, we still need explanation from the teacher.* (S2)

Similarly, S5 suggested the importance of instructional variation:

> *If we only use crossword every time, it might become less interesting and students may eventually feel bored or less challenged. It should be combined with discussion, video, interactive presentations, or other creative learning activities to maintain motivation, deepen understanding, and support different learning styles in the classroom.* (S5)

These reflections indicate that while AI-generated crossword pedagogy enhances engagement and retention, it functions best as a complementary strategy within a broader instructional design.

The third theme examines the broader benefits and challenges of implementing Canva AI-generated crossword puzzles in historical learning. Furthermore, the students perceived significant motivational and retention benefits, but also identified technological and pedagogical limitations that influence sustainability and effectiveness.

One major benefit identified by participants was increased intrinsic motivation. The puzzle format created a sense of challenge and mild competition, encouraging students to engage more seriously with the material. The activity fostered both individual responsibility and peer collaboration, as students occasionally discussed answers and clarified misunderstandings together (Omodan & Skosana, 2023). This collaborative dimension aligns with social constructivist perspectives on learning, where knowledge is co-constructed through interaction.

Additionally, students emphasized improved vocabulary retention and spelling accuracy. The requirement to fill intersecting words correctly demanded precision, reinforcing careful cognitive processing. This indicates that the crossword structure promotes disciplined attention to detail. However, technological barriers presented notable challenges. Unstable internet connectivity occasionally disrupted learning flow, reducing focus and efficiency. This confirms findings by Yusuf (2024), who highlighted infrastructure constraints in *pesantren* environments. Furthermore, initial unfamiliarity with Canva AI features required teacher guidance and adaptation time.

Pedagogically, students warned against overreliance on crossword activities. They noted that if used excessively, the activity might lose its novelty and effectiveness. They also emphasized the need to combine crosswords with discussions, narrative explanations, and multimedia resources. This insight suggests that AI-generated crosswords are most effective when integrated into varied instructional designs (Durgungoz & Durgungoz, 2025; Evmenova et al., 2025).

From a methodological standpoint, the study's strength lies in capturing both positive and critical perspectives, ensuring balanced interpretation. However, the short-term nature of implementation limits conclusions about long-term sustainability (Kuruppu et al., 2024). The novelty effect may also have influenced students' enthusiasm.

In addressing classroom monotony and vocabulary retention challenges, AI-generated crossword pedagogy offers a practical solution. Yet, it does not eliminate the need for teacher facilitation, infrastructure readiness, and pedagogical variation.

CONCLUSION

This study concludes that the use of AI-generated crossword puzzles through Canva AI features positively influences students' historical literacy and classroom engagement in the *pesantren* context by strengthening vocabulary mastery, recall ability, conceptual association, and reading comprehension of historical terms through active retrieval rather than passive memorization, although it does not fully replace the teacher's role in developing deeper historical reasoning such as analyzing causality and interpreting broader narratives. Students generally expressed positive perspectives toward the implementation of AI crossword activities, describing them as engaging, motivating, and less monotonous than traditional lecture-based instruction, with the gamified format fostering curiosity, focus, participation, and even increased interest among those previously less engaged in history. The findings also reveal important benefits and challenges, as students reported improved retention,

collaborative interaction, and learning enthusiasm, while also experiencing limitations related to unstable internet connectivity, initial unfamiliarity with Canva AI features, and the restricted capacity of crossword tasks to support macro-level analytical understanding. Therefore, it is suggested that AI-generated crossword pedagogy be implemented as a complementary reinforcement strategy integrated with discussion, explanation, and source analysis rather than as a standalone method, supported by adequate technological infrastructure, teacher digital training, and varied instructional design, while future research should consider mixed-method or experimental approaches and broader educational settings to examine long-term and measurable impacts on historical literacy development.

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