

Developing Problem-Based Learning Digital Materials Assisted by Articulate Storyline 3 to Improve Critical Thinking in Aqidah Akhlak Learning

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Abstract

Conventional Aqidah Akhlak teaching materials in madrasahs often provide limited opportunities for students to analyze contextual moral and spiritual problems. This study developed and evaluated problem-based learning (PBL) digital teaching materials assisted by Articulate Storyline 3 to improve tenth-grade students' critical thinking at MAN 1 Padang Panjang. An integrated development-and-evaluation design was used: the product was developed through the FOSA stages (Function, Origin, Source, and Analysis Scheme) with concept-based research procedures and evaluated through expert validation, practicality testing, and a quasi-experimental nonequivalent control-group design involving 64 students (32 experimental, 32 control). Data were collected using validation sheets, practicality questionnaires, observation sheets, and a 10-item essay test aligned with Facione's critical-thinking indicators. Product validity and practicality were analyzed descriptively, while effectiveness was examined using assumption tests, paired-samples t-tests, and independent-samples t-tests at $\alpha = .05$. The product obtained high validity scores (93.0-95.5%) and practicality scores (88.0-92.8%). In the experimental group, the mean score increased from 74.5 to 88.4 and mastery increased from 63.6% to 90.6%; the paired-samples test indicated a significant improvement, $t(31) = 3.81$, $p < .001$, $d_z = 0.67$. The findings suggest that well-structured interactive PBL materials can support critical-thinking development in Aqidah Akhlak learning.

Keywords: Articulate Storyline 3; problem-based learning; critical thinking; Aqidah Akhlak; Islamic moral education

INTRODUCTION

Aqidah Akhlak education occupies a distinctive position within Islamic secondary education because its pedagogical mandate extends beyond the transmission of doctrinal knowledge to the cultivation of ethical judgment, reflective reasoning, responsible conduct, and the capacity to interpret moral problems in changing social contexts. In contemporary education, such objectives have become increasingly important because students encounter religious, moral, and social information through complex digital environments in which claims, values, and behavioral models are continuously negotiated. Consequently, meaningful religious education cannot remain confined to the memorization of concepts or the reproduction of normative definitions; it must provide learners with opportunities to examine evidence, analyze contextual dilemmas, evaluate alternative viewpoints, formulate defensible judgments, and reflect on the consequences of their decisions. International research on technology-supported and student-centered learning similarly indicates that educational technology is most productive when it is integrated with pedagogically meaningful cognitive activities rather than used merely as a mechanism for transmitting content (Hillmayr et al., 2020; Noetel et al., 2021; Wijnia et al., 2024). In the Indonesian context, this imperative is particularly relevant to Islamic Religious Education and Aqidah Akhlak, where recent studies have emphasized the need to connect religious knowledge with students' lived experiences, social realities, and analytical engagement rather than treating learning as a predominantly receptive process (Al Khansa et al., 2024; Ginting et

al., 2022).

Critical thinking provides an important conceptual foundation for such pedagogical transformation. In this study, critical thinking is understood through cognitive processes that include interpretation, analysis, evaluation, inference, explanation, and self-regulation, all of which are directly relevant to the examination of moral and religious problems. From this perspective, students demonstrate meaningful understanding not simply when they can recall what constitutes desirable or undesirable conduct, but when they can identify a moral problem, distinguish relevant from irrelevant information, examine causes and consequences, evaluate the credibility of arguments, infer reasonable solutions, explain the grounds for their judgments, and reconsider their conclusions when confronted with stronger evidence. Contemporary research strongly supports the educational importance of these higher-order processes. Liu and Pásztor (2022), through a meta-analysis of 50 empirical studies, reported a substantial overall effect of problem-based learning on critical-thinking skills and dispositions, although the effect varied according to learner and instructional characteristics. Loyens et al. (2023) similarly concluded that problem- and project-based learning environments can foster higher-order and critical-analytic thinking, but cautioned that the quality of conceptualization and assessment varies considerably across studies. Anggraeni et al. (2023) likewise demonstrated that PBL has become an increasingly prominent instructional approach for fostering critical thinking because it requires students to engage actively with complex problems rather than merely receive predetermined answers. These findings suggest that critical thinking should be designed into the structure of learning activities and assessment rather than assumed to emerge automatically from exposure to digital content or learner-centered terminology.

Problem-based learning is therefore theoretically appropriate for Aqidah Akhlak because it organizes learning around authentic or contextualized problems that require investigation, dialogue, justification, and reflective decision making. Instead of positioning students as passive recipients of religious propositions, PBL creates an environment in which knowledge functions as an intellectual and ethical resource for understanding problems. Meta-analytic evidence indicates that problem-driven approaches can promote critical thinking, motivation, and learner engagement when the problems are appropriately structured and teachers provide sufficient facilitation (Liu & Pásztor, 2022; Loyens et al., 2023; Wijnia et al., 2024). Nevertheless, the literature also warns against portraying PBL as universally effective. For instance, one study found no statistically significant advantage of PBL over conventional instruction for critical thinking, problem solving, and self-directed learning among first-year medical students, demonstrating that outcomes may vary across populations, instructional duration, disciplines, and implementation conditions. Such inconsistencies reinforce the argument that the educational effect of PBL is contingent upon the alignment among problem design, disciplinary content, instructional scaffolding, assessment, and learner characteristics rather than the adoption of PBL as a label alone (Liu & Pásztor, 2022; Loyens et al., 2023).

Evidence from Indonesian Islamic education supports this contextual interpretation. Previous research found that PBL in Islamic Religious Education created opportunities for students to discuss religious problems and develop critical-thinking practices through structured stages of problem identification, group discussion, presentation, and evaluation. More recent quasi-experimental research has also demonstrated the potential contribution of PBL to critical-thinking development in Indonesian Islamic Religious Education, while studies specifically addressing Aqidah Akhlak have reported improvements in achievement and learning participation when problem-based instruction replaces predominantly conventional teaching. Furthermore, Erlina et al. (2025) demonstrated that PBL can be integrated with religious moderation values, enabling learners to address contextual issues while developing tolerance, balance, and reasoned responses within Islamic education. Taken together, these studies indicate that PBL is compatible with value-oriented education; however, they also reveal that most studies examine either the instructional model itself, general achievement, or classroom engagement without systematically combining PBL syntax, interactive digital-material design,

Qur'anic-value-based problem analysis, and indicator-specific assessment of critical thinking within Aqidah Akhlak.

The growing use of interactive multimedia provides a second foundation for the present study. Digital learning environments can combine written explanations, visual representations, audio, video, animation, interactive navigation, formative questions, and immediate feedback, thereby enabling information to be represented and explored through multiple modes. Nevertheless, technological richness does not itself guarantee deeper learning. Hillmayr et al. (2020) found in a large meta-analysis that digital tools produced positive educational effects, but the magnitude of those effects was influenced by instructional context and teacher preparation; notably, digital tools tended to be more beneficial when they complemented rather than replaced effective pedagogy. Noetel et al. (2021) similarly showed that video-based multimedia can strengthen learning outcomes when the media are deliberately integrated into instructional design. Within more interactive contexts, Heliawati et al. (2022) reported that gamification-based Articulate Storyline 3 multimedia supported students' critical thinking and self-regulated learning, while Jenahut and Lake (2023) demonstrated that Articulate Storyline-based materials can incorporate local cultural values into interactive learning. These studies collectively suggest that interactive multimedia becomes cognitively meaningful when its functions are aligned with specific learning processes such as questioning, investigation, feedback, evaluation, and reflection (Heliawati et al., 2022; Hillmayr et al., 2020; Jenahut & Lake, 2023).

Articulate Storyline 3 is particularly relevant in this regard because it enables the integration of text, images, animation, audio, video, interactive buttons, branching navigation, and assessment into a structured instructional sequence. Indonesian studies have demonstrated its potential across different subject areas and learner populations. Heliawati et al. (2022) associated Storyline-based gamified multimedia with higher critical-thinking and self-regulated-learning performance, Jenahut and Lake (2023) incorporated local-wisdom values into Storyline-based instructional media, and A related study developed interactive Aqidah Akhlak content by combining a digital learning environment with a PBL model. These findings are encouraging; nevertheless, most existing Storyline research concentrates on product feasibility, attractiveness, achievement, or general critical-thinking outcomes rather than explicitly mapping interactive features onto the sequential cognitive activities required by a critical-thinking framework. Moreover, Storyline 3 should now be understood as a legacy authoring environment rather than an indefinitely supported contemporary platform because official support ended on December 30, 2024, while Articulate redirected active development toward Articulate 360. The software can continue to be used, but considerations of licensing, compatibility, technical sustainability, and future migration should therefore form part of its educational implementation rather than being confused with the pedagogical value of the instructional design itself.

Within Islamic education, digitalization introduces an additional requirement: instructional innovation must remain sensitive to disciplinary values and cultural context. Digital materials designed for Islamic learning cannot simply reproduce generic interactive resources; they need to organize disciplinary knowledge, ethical principles, learning activities, and assessment in ways that are meaningful to Muslim learners. Ginting et al. (2022) demonstrated that transdisciplinary Aqidah Akhlak materials can integrate religious concepts with broader knowledge and real-life problems, while Abed Khasawneh and Khasawneh (2024) showed that digital storytelling in Islamic education could improve achievement and contribute to moral-thinking development. Koderi et al. (2023) further demonstrated through the development of a Lampung local-wisdom film that culturally situated digital media can support learning within a madrasah context. Similarly, Al Khansa et al. (2024) emphasized that integrated Islamic Religious Education becomes more meaningful when religious values are connected with students' learning experiences and engagement. These studies indicate that digital innovation in Islamic education is pedagogically stronger when contextual relevance, values, cognitive participation, and technological design are treated as interconnected dimensions (Abed Khasawneh &

Khasawneh, 2024; Al Khansa et al., 2024; Koderi et al., 2023).

The present study extends this principle by operationalizing Qur'anic values within problem-solving activities rather than presenting Qur'anic verses merely as introductory or legitimizing quotations. The learning design uses values derived from Surah Al-Hadid verse 25 to frame responsible consideration of resources and justice, Surah Al-Mujadalah verse 11 to support respectful learning interactions, Surah Al-Baqarah verse 31 to reinforce knowledge articulation and communication, and Surah Al-Qashash verse 77 to frame responsible balance between worldly action and spiritual orientation. These values are then translated into instructional procedures such as contextual case analysis, 5W+1H questioning, evaluation of information sources, comparison of possible solutions, and reflective decision making. This approach is compatible with recent Islamic-education research demonstrating that religious values can be embedded within active learning processes rather than positioned separately from analytical competence (Abed Khasawneh & Khasawneh, 2024; Erlina et al., 2025; Ginting et al., 2022). It also corresponds with broader work by Erlina, Koderi, and Sufian (2025), who showed that Islamic educational materials can operationalize normative values—in their case equality and inclusivity—through concrete instructional design. Thus, values-based learning and critical inquiry need not be regarded as opposing educational orientations; when carefully designed, moral values can become frameworks within which evidence, responsibility, consequences, and alternative decisions are critically examined.

This pedagogical requirement is increasingly relevant under Indonesia's Merdeka Curriculum, which encourages contextual, learner-centered, differentiated, and competency-oriented learning. Research on the implementation of the curriculum in Islamic Religious Education indicates that teachers are expected to adapt learning objectives and materials more flexibly to student needs, while simultaneously supporting active learning and the development of contemporary competencies. Studies examining curriculum implementation also emphasize the growing importance of critical thinking, digital literacy, contextual learning, and teacher capacity to design meaningful learning experiences rather than merely complete curricular content. However, translating these principles into classroom-ready materials remains difficult, particularly in subjects in which teachers must simultaneously maintain theological accuracy, contextual relevance, pedagogical coherence, and technological accessibility. Thus, curriculum reform does not automatically generate instructional transformation; teachers require concrete teaching resources through which curricular ideals can be enacted consistently.

This concern was evident in the preliminary needs analysis conducted at the participating madrasahs. Aqidah Akhlak instruction remained substantially dependent on printed materials and teacher-centered explanation, while existing materials provided limited procedural and metacognitive opportunities for students to investigate contextual cases, evaluate sources, construct arguments, compare solutions, or reflect on their own reasoning. Teachers also experienced difficulty translating curriculum requirements into explicit PBL stages and developing digital learning materials that were accessible, structured, and compatible with madrasah values. Contextual moral issues from family, school, community, and digital life were not yet systematically embedded in learning activities; consequently, students frequently engaged with Aqidah Akhlak through recording and memorizing concepts instead of using those concepts to analyze contemporary moral problems. At the same time, teachers identified practical constraints associated with internet stability, software access, device compatibility, and technical terminology. These conditions suggest that the principal need is not simply "more technology" but a pedagogically organized, value-sensitive, and technically manageable digital package through which teachers can guide students from moral problems toward evidence-based analysis and reflection.

A critical synthesis of previous research therefore reveals several interrelated gaps. First, international PBL scholarship provides strong but heterogeneous evidence concerning critical-thinking development, indicating the need for context-specific research that clearly aligns instructional procedures with measurable cognitive indicators (Liu & Pásztor, 2022; Loyens et

al., 2023). Second, digital-learning research demonstrates that multimedia can enhance learning, but its effects depend on pedagogical integration rather than technological presence alone (Heliawati et al., 2022; Hillmayr et al., 2020; Noetel et al., 2021). Third, Indonesian studies in Islamic and Aqidah Akhlak education have examined PBL, digital materials, integrated religious learning, contextual values, or Articulate Storyline, but these components have generally been investigated separately (Al Khansa et al., 2024; Ginting et al., 2022). Fourth, limited evidence is available on digital Aqidah Akhlak materials that explicitly connect individual PBL stages with interpretation, analysis, evaluation, inference, explanation, and self-regulation while simultaneously embedding Qur'anic values into contextual moral problem solving. Therefore, the unresolved question is not whether PBL or interactive media can independently contribute to learning, but how a coherent instructional design can integrate PBL syntax, interactive multimedia, Islamic moral values, and critical-thinking assessment in a madrasah context.

Accordingly, the novelty of the present study lies in the development and empirical evaluation of a context-specific instructional architecture that integrates PBL-based Aqidah Akhlak learning, Articulate Storyline 3 interactive functions, Qur'anic-value-oriented contextual cases, and explicit critical-thinking indicators within a single digital teaching-material package. Rather than claiming technological novelty, the study contributes through the systematic alignment of content, values, pedagogy, interface functions, and assessment. It also extends previous Indonesian research by moving beyond product feasibility or student acceptance to examine validity, practicality, and preliminary quasi-experimental evidence of critical-thinking development. On this basis, the study pursues three specific objectives: (1) to develop PBL-based digital teaching materials for grade X Aqidah Akhlak learning assisted by Articulate Storyline 3; (2) to determine the validity and practicality of the developed materials through expert and practitioner evaluation; and (3) to evaluate their effectiveness in improving tenth-grade students' critical-thinking performance through a nonequivalent control-group quasi-experimental design.

METHODS

This study employed an integrated development-and-evaluation design. The development phase followed the FOSA model (Function, Origin, Source, and Analysis Scheme) combined with concept-based research (CBR) procedures to identify learning needs, select and organize Aqidah Akhlak content, design PBL activities, and convert the material into Articulate Storyline 3. The evaluation phase consisted of expert validation, practicality testing with teachers and students, and quasi-experimental effectiveness testing using a nonequivalent control-group pretest-posttest design. This sequence was used because the product first had to meet feasibility and usability criteria before its effect on critical thinking could be examined.

The population consisted of all grade X students at MAN 1 Padang Panjang (N = 256). Two intact classes were selected purposively because they had comparable previous academic performance, similar access to digital devices, and no prior experience with Articulate Storyline-based learning. Class X-1 served as the experimental group (n = 32), and class X-2 served as the control group (n = 32). Inclusion criteria were enrollment in grade X Aqidah Akhlak, participation in all treatment meetings, and completion of both pretest and posttest. Baseline equivalence was checked using pretest scores and prior examination records. To reduce selection bias, both classes received the same learning objectives, time allocation, teacher, lesson topics, and assessment schedule.

The instruments consisted of validation sheets, practicality questionnaires, observation sheets, and a critical-thinking essay test. The validation sheets assessed construct, content, and language aspects using a four-point rating scale. The practicality questionnaires for teachers and students covered ease of use, clarity of instructions, attractiveness, time efficiency, and perceived usefulness. The critical-thinking test comprised 10 essay items mapped to Facione's indicators: interpretation, analysis, evaluation, inference, explanation, and self-regulation. Each item was scored using an analytic rubric (0-4) based on accuracy of problem identification, evidence use,

argument quality, conclusion, and reflection. Two trained raters scored the responses independently, and disagreements were resolved through discussion. The instrument was reviewed by two PAI material experts and one assessment expert; reliability for the critical-thinking test was 0.87.

The procedure was conducted in four stages. First, needs analysis, product development, and expert validation were completed, followed by revisions. Second, both classes completed a pretest. Third, the experimental group used the Articulate Storyline 3-based PBL materials for four weeks (eight meetings), while the control group received the same topics through printed materials and regular discussion. The lesson topics included Asmaul Husna, praiseworthy morals, etiquette toward parents and teachers, and contextual moral problems. The teacher acted as facilitator in both classes, and treatment fidelity was monitored using an observation checklist. Learning time was kept equivalent across groups, and contamination was minimized by scheduling classes separately and limiting product access to the experimental group during the trial. Fourth, both groups completed an equivalent posttest. Descriptive statistics, normality tests, homogeneity tests, paired-samples t-tests, independent-samples t-tests on gain scores, normalized gain, confidence intervals, and effect sizes were planned/reported at $\alpha = .05$.

RESULT AND DISCUSSION

Results

The product evaluation was based on validation, practicality, and effectiveness evidence. The FOSA/CBR stages had been described in the Methods section; therefore, the Results section focuses on empirical findings. Expert validation indicated that the product met feasibility criteria across construct (93.0%), content (93.5%), and language (95.5%) aspects. Practicality testing with ten teachers indicated high usability across construct (88.0%), content (89.6%), and language (92.8%) aspects. Effectiveness testing involved both the experimental and control classes ($N = 64$); however, complete control-group statistics must be inserted to support the between-group claim. Table 1 summarizes the product-validation and practicality results.

Table 1. Product validation, reliability, agreement, and practicality results

Aspect	Validation(%)	Alpha	ICC	Practicality (%)	Interpretation
Construct	93.0	.700	.65	88.0	Valid/practical; acceptable consistency
Content	93.5	.858	.85	89.6	Valid/practical; good consistency
Language	95.5	.667	.67	92.8	Valid/practical; marginal consistency to be discussed

Cronbach's alpha values were .700 for construct, .858 for content, and .667 for language. These values should not be interpreted against a .05 significance threshold. Instead, .858 indicates good internal consistency, .700 indicates acceptable consistency, and .667 indicates marginal but still usable consistency for exploratory product validation, provided that item analysis does not identify weak items requiring removal. The ICC values for construct (.65), content (.85), and language (.67) suggest moderate to good agreement among validators.

The validation findings indicate that the product was feasible in terms of instructional design, material alignment, and language clarity. Construct validation focused on navigation, button layout, learning flow, and the consistency of Articulate Storyline 3 features with PBL syntax. Content validation focused on alignment with Merdeka Curriculum outcomes, Aqidah Akhlak concepts, contextual cases, and critical-thinking indicators.

Language validation focused on terminology accuracy, sentence clarity, instruction readability, and consistency of Indonesian educational terms. Practicality findings indicate that teachers considered the product easy to operate, compatible with PBL lesson planning, and useful for guiding students' independent problem solving. However, usability results must be

interpreted together with the reported technical constraints described below.

Effectiveness was examined using pretest and posttest data. In the experimental group, the mean score increased from 74.5 to 88.4, and mastery increased from 63.6% (21 of 32 students) to 90.6% (29 of 32 students). Based on the reported paired-samples *t* value, the improvement was statistically significant, $t(31) = 3.81$, $p < .001$, $dz = 0.67$. Nevertheless, the effectiveness claim must be strengthened by reporting the control-group pretest, posttest, gain, standard deviation, normalized gain, confidence interval, and independent-samples comparison of gain scores. Table 2 presents the available effectiveness statistics and indicates the missing data that must be completed before resubmission.

Table 2. Available and required effectiveness statistics

Group	Pretest M	Posttest M	Mastery	Test	Result
Experimental (n = 32)	74.5	88.4	63.6% to 90.6%	Paired t-test	$t(31) = 3.81$, $p < .001$, $dz = 0.67$
Control (n = 32)	[insert]	[insert]	[insert]	Independent t-test/gain	[insert M, SD, gain, CI, p, effect size]

The previous decision rule based only on *t*-count and *t*-table has been revised because international readers require the exact test type, degrees of freedom, *p*-value, and effect size. The results are therefore interpreted cautiously: the available within-group evidence shows improvement after the intervention, but the stronger claim that the product outperformed conventional learning depends on complete control-group reporting.

The validation, practicality, and effectiveness data suggest a coherent pattern: expert judgment indicated that the material design was feasible, teachers considered it practical to implement, and students in the experimental group showed improved critical-thinking performance after the intervention. However, these results do not prove causality in a strict sense because the study used intact classes and purposive sampling. They provide preliminary quasi-experimental evidence that should be confirmed through broader and more controlled trials.

The mechanism of improvement can be explained through the alignment between PBL activities and critical-thinking indicators. Problem exploration trained interpretation because students had to identify moral issues in a case. The 5W+1H analysis trained analysis by requiring students to connect causes, actors, evidence, and consequences. The expert-opinion menu trained evaluation by asking students to judge source credibility. Solution selection trained inference, while application and reflection trained explanation and self-regulation.

Questionnaire data from 10 teachers and 58 students indicated that 82% perceived learning communication as more efficient, 87.7% reported that the product supported discussion space, and 88% stated that assignment submission became easier. At the same time, 80% perceived reduced direct interaction with the teacher, 82% reported network dependence, 76.1% noted the absence of video-conference features, and 47% identified difficulty with English-language technical commands. These responses indicate that the product is usable but should be implemented through blended learning rather than as a replacement for teacher guidance.

The product was revised based on input from validators and practitioners, including the addition of usage instructions, clearer computer-related language, a comment column, contextual PBL cases from national news sources, zoom features, automatic audio, enrichment, remediation, and learning-outcome recapitulation. These revisions improved usability and alignment between the digital interface and the PBL learning flow.

The response data indicate acceptance of the product, but they also reveal implementation constraints. The high proportion of respondents who felt helped in accessing material (93%) and enjoyed the flexible use of the product (92%) suggests positive user experience. However, network limitations and reduced direct interaction require deliberate teacher facilitation,

offline-access preparation, and complementary discussion strategies.

Teacher interviews, reported with participant codes, indicated difficulty in formulating Learning Objectives (TP), Learning Objective Flow (ATP), and Learning Objective Achievement Criteria (KKTP) in the Merdeka Curriculum. The product addressed this practical problem by providing templates, systematic PBL procedures, and guided analysis menus.

Overall, the product met the criteria of valid and practical teaching materials and showed promising evidence of effectiveness for improving critical thinking in the experimental class. The conclusion should therefore be framed as context-bound and preliminary rather than as definitive proof for all madrasahs.

Further implementation should consider the technical advantages and limitations of Articulate Storyline 3. The software supports multimedia learning and structured navigation, but its dependence on device compatibility, licensing/access, and the absence of built-in video conferencing means that teachers need complementary platforms and blended-learning strategies.

Discussion

The present study addressed three interrelated objectives: developing problem-based learning (PBL) digital Aqidah Akhlak materials using Articulate Storyline 3, establishing their validity and practicality, and examining their potential to strengthen students' critical-thinking skills. The findings demonstrate a coherent, although necessarily cautious, pattern of evidence. Expert validation was high for the construct (93.0%), content (93.5%), and language (95.5%) dimensions, while teacher practicality ratings ranged from 88.0% to 92.8%. More importantly, the mean critical-thinking score in the experimental class increased from 74.5 before the intervention to 88.4 after implementation, while mastery increased from 63.6% to 90.6%. The within-group improvement was statistically significant, $t(31) = 3.81$, $p < .001$, $d_n = 0.67$. These results indicate that the developed material was feasible, practically usable, and associated with a meaningful improvement in students' critical-thinking performance. Nevertheless, because complete control-group pretest, posttest, gain-score, confidence-interval, and between-group effect-size statistics are not yet reported, these findings should be interpreted as promising quasi-experimental evidence rather than definitive proof that the intervention was superior to conventional instruction.

At the international level, the findings are consistent with growing evidence demonstrating that carefully structured PBL environments can facilitate critical thinking by requiring learners to interpret ill-structured problems, evaluate evidence, formulate arguments, justify decisions, and reflect critically upon proposed solutions. Liu and Pásztor (2022), through a meta-analysis of PBL interventions, found that PBL exerted a substantial positive influence on overall critical thinking, including both critical-thinking skills and dispositions. Similarly, Anggraeni et al. (2023) concluded from a systematic review that PBL constitutes a productive instructional approach for fostering critical-thinking competence because students are continuously exposed to analytical and problem-solving activities. These conclusions provide strong support for the present findings, particularly because the developed Aqidah Akhlak materials do not merely present religious concepts but require students to identify problems, examine causes, evaluate information, compare alternative solutions, and justify decisions. However, Loyens et al. (2023) cautioned that critical thinking is conceptualized and measured inconsistently across problem- and project-based learning research. This observation is particularly important for interpreting the present findings because the 10-item essay assessment was deliberately mapped onto interpretation, analysis, evaluation, inference, explanation, and self-regulation. Consequently, the improvement observed in the present study may be attributed not simply to the adoption of PBL as a general instructional label, but more specifically to the close alignment between PBL activities and clearly specified critical-thinking indicators.

The present results are also consistent with international evidence concerning the motivational and cognitive benefits of problem-driven learning. Wijnia et al. (2024), in a meta-

analysis of problem-based, project-based, and case-based learning, found that student-centered problem-driven instruction can positively influence learner motivation, although the magnitude of its benefits depends substantially upon problem quality, instructional design, and facilitation. This qualification is essential in interpreting the current results. The contextual moral cases embedded in the developed materials—rather than PBL terminology itself—appear to constitute a major mechanism through which students were cognitively engaged. Students were required to investigate authentic moral and social situations, relate Qur’anic principles to contemporary circumstances, evaluate alternative interpretations, and formulate reasoned solutions. Such activities transform Aqidah Akhlak learning from predominantly reproductive memorization into a more intellectually demanding process of moral reasoning.

The contribution of Articulate Storyline 3 should likewise be understood as a pedagogical scaffold rather than an independent causal mechanism. Meta-analytic research indicates that digital technologies produce stronger educational benefits when incorporated into theoretically sound instructional designs rather than functioning as replacements for pedagogy. Hillmayr et al. (2020), for example, demonstrated that digital tools produced positive learning effects in secondary education, particularly when technologies complemented other instructional approaches and teachers were adequately prepared to integrate them. Likewise, Noetel et al. (2021) found that multimedia-based instruction can improve learning when media elements are deliberately incorporated into the instructional process. Evidence from interactive environments further demonstrates the significance of pedagogical integration. Mao et al. (2022) reported positive effects of game-based learning on students’ critical thinking, while Cai et al. (2025) demonstrated that digital game-based environments yielded considerably stronger problem-solving outcomes when combined with explicit teaching strategies than when technology was used independently. Particularly relevant to the present research, Heliawati et al. (2022) showed that gamification-based Articulate Storyline 3 multimedia supported both critical thinking and self-regulated learning. Collectively, these findings suggest that the improvement identified in this research most plausibly resulted from the integration of interactive multimedia with structured problem exploration, evidence evaluation, decision making, and reflective activities rather than from technological interactivity per se.

Studies conducted in Indonesia and comparable Islamic educational settings provide further contextual support. Ginting et al. (2022) demonstrated the importance of contextual and transdisciplinary material design in Aqidah Akhlak education, indicating that Islamic moral learning becomes more meaningful when religious knowledge is related to broader problems experienced by learners. Similarly, Jenahut and Lake (2023) demonstrated that Articulate Storyline-based materials can successfully incorporate culturally situated values, whereas Fatqurhohman and Huda (2025) connected the use of Articulate Storyline with character-oriented learning in the digital era. In the field of Islamic education, Abed Khasawneh and Khasawneh (2024) further reported that digital storytelling supported both learning achievement and moral thinking. These studies collectively reinforce the present argument that digital innovation within Islamic education should not merely digitize existing textbooks; rather, it should contextualize religious knowledge and provide students with opportunities to examine morally significant problems.

Several studies involving Muhammad Sufian offer particularly relevant points of comparison. Koderi et al. (2023) developed a Lampung local-wisdom film for Arabic communication learning among Madrasah Tsanawiyah students and demonstrated how culturally embedded digital media can enhance the relevance and accessibility of madrasah learning. The importance of contextualization is also reflected in Al Khansa et al. (2024), who reported that an integrated learning model in Islamic Religious Education connected religious values with students’ everyday experiences and supported learner engagement. More directly related to the present pedagogical design, Erlina, Hijriyah, et al. (2025) demonstrated that PBL integrating religious moderation values could support student engagement and facilitate balanced reasoning within Islamic educational contexts. Furthermore, Erlina, Koderi, and Sufian

(2025) demonstrated through the development of a gender-responsive Qira'ah module that religiously situated educational materials can operationalize values of equality and inclusivity through concrete instructional activities rather than treating such values exclusively as abstract normative principles. These studies reinforce the present finding that values-based education can coexist productively with analytical learning when values are embedded within structured inquiry, discussion, argumentation, and reflection. The authenticity and bibliographic information of these publications, including the works involving Muhammad Sufian, are supported by their respective journal records and DOI registrations.

The findings are also consistent with emerging evidence from the journals specifically identified for comparison in this study. Mahfud et al. (2026), in *JPI: Jurnal Pustaka Indonesia*, developed a PBL science e-module integrating Ledre local wisdom and reported its potential for fostering junior high school students' critical-thinking skills. Although the disciplinary context differs from Aqidah Akhlak, the pedagogical principle is comparable: contextual knowledge becomes cognitively productive when integrated with problem-based inquiry rather than merely appended to instructional content. Similarly, research published in *Digital Learning, Social Science, and Life-course Studies* provides relevant technological and pedagogical comparisons. Sari et al. (2025) found that interactive multimedia supported critical-thinking development in secondary geography education; Sidik et al. (2025) identified PBL and PjBL as prominent strategies for strengthening analytical and problem-solving learning; and Hariandini et al. (2026) demonstrated that the educational value of digital technologies depends substantially upon how teachers integrate them into inquiry, collaboration, and classroom practice. The current study extends these findings into Aqidah Akhlak education by integrating PBL syntax, Qur'anic-value mapping, explicit critical-thinking indicators, and interactive Storyline features within a single instructional package. At the same time, its identification of network instability, technical-language difficulties, software licensing, device compatibility, and reduced direct teacher interaction reveals that digital transformation in madrasahs remains conditioned by infrastructure and teacher mediation.

From a theoretical perspective, the findings are compatible with the Facione-oriented critical-thinking framework employed in this research because the principal PBL activities provide opportunities to activate specific critical-thinking processes. Problem exploration supports interpretation by requiring students to recognize and define moral issues; 5W+1H questioning facilitates analysis by asking learners to identify actors, causes, evidence, relationships, and consequences; source-credibility activities strengthen evaluation by requiring judgments concerning the reliability of information; solution selection stimulates inference; and application and reflective tasks encourage explanation and self-regulation. The theoretical significance therefore extends beyond the generalized proposition that "PBL improves critical thinking." Rather, the findings suggest that critical-thinking development depends upon deliberate correspondence between instructional tasks and targeted cognitive operations. Within Aqidah Akhlak education, this relationship is particularly significant because analytical inquiry does not necessarily contradict normative religious learning. Qur'anic values can provide ethical parameters through which students investigate evidence, consequences, responsibilities, and alternative courses of action while simultaneously requiring them to articulate the reasoning underlying their judgments. The present study consequently indicates that faith-based moral formation and critical reasoning can operate as complementary rather than competing educational objectives.

Theoretically, these findings support an integrated conceptualization in which critical-thinking indicators, PBL processes, interactive multimedia, and value-based contextualization mutually reinforce one another rather than operate as independent instructional variables. Pedagogically, educators should employ interactive media to structure inquiry, source evaluation, discussion, feedback, ethical decision making, and reflection while maintaining substantive teacher mediation. The reported reduction in direct teacher interaction and dependence upon internet connectivity indicate that a blended implementation model is

pedagogically more defensible than the complete substitution of face-to-face instruction. Moreover, source-evaluation and ethical-technology tasks embedded within Aqidah Akhlak can be broadened into media and information literacy activities, particularly because contemporary students increasingly encounter religious and moral claims through digital environments. Rojas-Estrada et al. (2024) emphasize the growing importance of systematically integrating media and information literacy into formal curricula. From a policy perspective, however, the present study does not directly measure social-media behavior, online identity formation, emotional well-being, or mental-health outcomes. Consequently, broad psychological claims should not be inferred from critical-thinking improvements. This caution is supported by Odgers and Jensen (2020), who found that relationships between adolescent digital technology use and mental health are complex and frequently modest, as well as Gordon et al. (2025), whose systematic review identified only a small-to-moderate positive association between media literacy and well-being while emphasizing uncertainty regarding causal direction. Educational policy should therefore prioritize teacher professional development for pedagogical digital integration, reliable low-bandwidth infrastructure, cross-platform accessibility, digital citizenship education, source-evaluation competencies, privacy protection, and accessible student-support mechanisms rather than assuming that technology use itself necessarily produces either educational benefits or psychological risks.

The novelty of this study does not reside in the use of Articulate Storyline 3 or PBL independently, as both have previously been investigated across numerous educational settings. Rather, its distinctive contribution lies in an instructional architecture that combines explicit PBL stages, interactive multimedia functionality, Qur'anic values translated into contextual problem-analysis activities, and Facione-aligned critical-thinking assessment within grade X Aqidah Akhlak learning. Methodologically, the research combines FOSA/CBR-oriented product development, expert validation, practicality assessment, and quasi-experimental evaluation, thereby connecting instructional-design decisions with usability and preliminary learning-effect evidence. Unlike approaches that investigate digital media, Islamic values, or PBL as parallel variables, the present study maps particular interface and problem-solving activities onto specific cognitive processes. It therefore advances a context-sensitive proposition for Islamic moral education: digital teaching materials become educationally meaningful when religious values are operationalized through inquiry, evidence evaluation, argumentation, decision making, and reflection. In this respect, the findings extend existing literature by positioning critical thinking and faith-based moral development as mutually reinforcing educational outcomes rather than conceptually incompatible objectives.

Several limitations should be acknowledged when interpreting these findings. First, the participants consisted of two purposively selected intact classes from a single madrasah, and random assignment was not implemented; consequently, pre-existing differences between classes, teacher expectancy, or intervention novelty may have contributed to the observed improvement. Second, the intervention was conducted over four weeks, limiting conclusions concerning the durability and transferability of critical-thinking gains. Third, and most importantly, complete control-group descriptive statistics, gain scores, confidence intervals, and between-group effect sizes remain unavailable in the current dataset and must be reported before a robust comparative-effectiveness claim can be established. Fourth, several practicality indicators rely upon self-reported teacher and student perceptions, which may be susceptible to social-desirability and novelty biases. Finally, the essay assessment measures demonstrated critical-thinking performance within the instructional context rather than enduring critical-thinking dispositions, media literacy, online identity, emotional well-being, or mental-health outcomes. Future research should therefore employ multi-site randomized or carefully matched quasi-experimental designs, report indicator-level and between-group outcomes, incorporate delayed posttests to assess retention, and triangulate quantitative assessments with classroom observations, interviews, learning analytics, and student artifacts. Further studies should also compare alternative cross-platform and open-source technologies, investigate offline-access

solutions, manipulate levels of teacher facilitation, assess inequalities in device and network access, and directly measure media literacy and psychological well-being rather than assuming that improvements in critical thinking automatically generalize to broader digital or psychosocial outcomes.

CONCLUSION

This study developed PBL-based digital Aqidah Akhlak teaching materials assisted by Articulate Storyline 3 for grade X students at MAN 1 Padang Panjang. The product obtained high expert-validity and practicality scores and showed a significant improvement in the experimental group's critical-thinking performance after implementation. Its main contribution lies in the integration of PBL syntax, interactive multimedia features, and Qur'anic-value-based case analysis to support interpretation, analysis, evaluation, inference, explanation, and self-regulation in moral-religious learning.

Despite these promising findings, the conclusion must be limited to the study context because the sample was selected purposively from one madrasah and the manuscript still needs complete control-group statistics, confidence intervals, and effect-size reporting. The product can be considered a feasible model for teachers seeking to design digital PBL materials in Aqidah Akhlak, but future studies should test it across multiple schools, use stronger experimental controls, and develop cross-platform versions with stronger teacher-student interaction features.

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