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Development of a Project-Based Learning Model Integrating Canva Media and QR Codes in Islamic Education Teaching Methodology to Enhance Students' 4C Skills

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Abstract

Instruction in the Teaching Methodology of Islamic Education (PAI) course in Islamic higher education has predominantly relied on conventional lecturing, outdated textbooks, and static mini-paper assignments that fail to systematically cultivate prospective teachers' 4C skills (Critical Thinking, Creativity, Collaboration, and Communication). This study aimed to analyze pedagogical needs, develop and validate a Project-Based Learning (PjBL) instructional model integrated with Canva and QR Code media alongside its supporting learning package, and evaluate its preliminary effectiveness in enhancing students' 4C skills. Employing a Research and Development (R&D) approach, the study adapted Borg and Gall's procedural model into five operational phases: needs analysis, instructional design, prototype development, multidisciplinary expert validation with formative revision, and field testing. The needs assessment involved 10 lecturers and 115 fifth-semester PAI students at IAIN Curup, while field testing applied an eight-week quasi-experimental non-equivalent control group design comparing an experimental class (Class 5D, n = 22) and a control class (Class 5F, n = 17) measured via a 24-item 4C skills rating scale (pilot α = 0.892; field α = 0.932–0.947) supported by 1–5 analytical scoring rubrics for each competency. The findings revealed that: (1) 72.50% of lecturer responses rated existing materials as unsuitable for KKNI Level 6 competencies, whereas 98.87% of lecturer responses and 80.87% of student responses indicated that a Canva- and QR Code-integrated PjBL model was needed to strongly needed; (2) the developed prototype (an explicitly mapped 7-stage PjBL syntax and a 15-chapter textbook) achieved a Very Feasible rating from experts with an overall mean of 88.48% (content 100.00%, presentation 81.70%, graphic design 82.20%, language 90.00%) following minor formative revisions; and (3) pre-test analysis confirmed baseline parity ($|t| = 0.502 < t\text{-table} = 2.026$; $df = 37$; $p = 0.619 > 0.05$), while one-way ANCOVA controlling for pre-test scores demonstrated a statistically significant post-test difference favoring the experimental group ($F(1, 36) = 238.652$, $p < 0.001$, $\eta p^2 = 0.869$; adjusted means = 102.65 vs. 80.98; mean N-gain = 0.661 vs. 0.190; 77.27% of experimental students reaching the Very High category), with significant gains across Critical Thinking ($\eta p^2 = 0.720$), Creativity ($\eta p^2 = 0.755$), Collaboration ($\eta p^2 = 0.731$), and Communication ($\eta p^2 = 0.613$). These results suggest that the Canva- and QR Code-integrated PjBL model is pedagogically feasible and demonstrates promising effectiveness for fostering prospective PAI teachers' 4C skills, while acknowledging the methodological boundaries of intact-class quasi-experimental designs and self-report

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instrumentation.
***Keywords**: Canva;4c Skills; Higher Education; Islamic Education Teaching Methodology; Project Based Learning; Qr Code.*

Abstrak

Perkuliahan Metodologi Pengajaran Pendidikan Agama Islam (PAI) pada perguruan tinggi keagamaan Islam selama ini masih didominasi oleh ceramah konvensional, buku referensi yang kurang mutakhir, serta penugasan makalah ringkas yang belum secara sistematis mengembangkan keterampilan 4C (Critical Thinking, Creativity, Collaboration, dan Communication) mahasiswa calon guru. Penelitian ini bertujuan menganalisis kebutuhan, mengembangkan, memvalidasi kelayakan, dan menguji efektivitas awal model Project-Based Learning (PjBL) terintegrasi media Canva dan QR Code beserta perangkat bahan ajarnya pada mata kuliah Metodologi Pengajaran PAI. Penelitian menggunakan pendekatan Research and Development (R&D) dengan mengadaptasi model Borg dan Gall ke dalam lima tahapan: analisis kebutuhan, perancangan desain, pengembangan prototipe, validasi ahli dan revisi formatif, serta uji coba lapangan. Analisis kebutuhan melibatkan 10 dosen pengampu dan 115 mahasiswa semester V Program Studi PAI IAIN Curup, sedangkan uji lapangan menggunakan desain kuasi-eksperimen non-equivalent control group design pada kelas eksperimen (Kelas 5D, n = 22) dan kelas kontrol (Kelas 5F, n = 17) selama delapan pekan menggunakan instrumen skala keterampilan 4C sebanyak 24 butir (α = 0,892 pada uji coba; α = 0,932–0,947 pada sampel lapangan) yang dilengkapi rubrik analitik skala 1–5 untuk setiap dimensi 4C. Hasil penelitian menunjukkan bahwa: (1) 72,50% respons dosen menilai bahan ajar lama belum sesuai dengan tuntutan KKNI Level 6, sedangkan 98,87% respons dosen dan 80,87% respons mahasiswa menyatakan model PjBL terintegrasi Canva dan QR Code dibutuhkan hingga sangat dibutuhkan; (2) prototipe model (sintaks 7 tahap yang memetakan mekanisme pengembangan tiap kompetensi 4C) dan bahan ajar 15 bab dinyatakan sangat layak oleh tim pakar dengan rata-rata skor 88,48% (materi 100%, penyajian 81,70%, kegrafikan 82,20%, bahasa 90,00%) dengan revisi formatif minor; (3) uji pre-test mengonfirmasi kesetaraan awal kedua kelompok (|t| = 0,502 < t-tabel = 2,026; df = 37; p = 0,619 > 0,05), sementara analisis ANCOVA post-test dengan kovariat skor pre-test menunjukkan perbedaan skor keterampilan 4C yang signifikan secara statistik antara kelas eksperimen dan kelas kontrol ($F(1, 36) = 238{,}652$; $p < 0{,}001$; $\eta p^2 = 0{,}869$; rata-rata tersesuaikan = 102,65 vs 80,98; rata-rata N-gain = 0,661 vs 0,190; 77,27% mahasiswa kelas eksperimen mencapai kategori Sangat Tinggi), dengan peningkatan signifikan pada seluruh dimensi Critical Thinking ($\eta p^2 = 0{,}720$), Creativity ($\eta p^2 = 0{,}755$), Collaboration ($\eta p^2 = 0{,}731$), dan Communication ($\eta p^2 = 0{,}613$). Temuan ini mengindikasikan bahwa model PjBL terintegrasi Canva dan QR Code layak digunakan serta menunjukkan potensi efektivitas yang menjanjikan dalam meningkatkan keterampilan 4C mahasiswa calon guru PAI, dengan tetap memperhatikan keterbatasan desain kuasi-eksperimen dan skala laporan diri.
Kata kunci: Canva; Keterampilan 4C; Metodologi Pengajaran PAI; Project-Based Learning; QR Code.

I. Introduction

The mastery of 21st-century competencies—commonly operationalized as the 4C skills (Critical Thinking, Creativity, Collaboration, and Communication)—has become a central benchmark in higher education globally (Partnership for 21st Century Learning [P21], 2019; Trilling & Fadel, 2009). Recent international syntheses emphasize that 4C

competencies are tightly interdependent with digital literacy and must be cultivated through authentic, technology-scaffolded learning tasks rather than passive knowledge transmission (Thornhill-Miller et al., 2023; van Laar et al., 2017). In higher education, particularly within pre-service Islamic Education (Pendidikan Agama Islam/PAI) teacher training programs, prospective educators are expected not only to master normative Islamic pedagogical theories but also to design and execute interactive, digitally enriched classroom environments aligned with Level 6 of the Indonesian National Qualifications Framework (KKNI).

Despite these competency expectations, preliminary diagnostic observations, curriculum document audits (Semester Learning Plans/RPS), and interviews with faculty members teaching the Teaching Methodology of PAI course at IAIN Curup revealed persistent pedagogical gaps. Classroom instruction remained heavily anchored in conventional lecturing, static PowerPoint slides, handouts, and short individual literature-review papers. Existing reference textbooks used in the course were predominantly classical texts published decades ago, lacking integration with contemporary peer-reviewed journal findings, KKNI Level 6 learning outcomes, and structured digital project workflows. Consequently, prospective PAI teachers had limited structured opportunities to critically evaluate instructional strategies, creatively design visual teaching aids, collaborate in digital workspaces, or defend pedagogical products before peers. Preliminary survey data further corroborated this gap, with 72.50% of lecturer responses indicating that existing teaching materials were misaligned with current pedagogical and technological demands.

To address these instructional deficits, Project-Based Learning (PjBL) offers a robust, constructivist pedagogical framework. Rooted in authentic inquiry, PjBL organizes learning around complex, driving pedagogical problems that culminate in tangible, publicly presented artifacts (Bell, 2010; Larmer et al., 2015; Thomas, 2000). Meta-analytic and systematic review evidence from international higher education literature confirms that PjBL yields medium-to-large positive effects on students' academic achievement, cognitive engagement, problem-solving, and collaborative competencies compared to traditional instruction (Almulla, 2020; Chen & Yang, 2019; Guo et al., 2020; Kokotsaki et al., 2016; Zhang & Ma, 2023). Specifically, Guo et al. (2020) demonstrated that in university settings, PjBL is most effective when supported by explicit scaffolding, clear project milestones, and structured artifact production that directly engages higher-order thinking and teamwork.

Integrating cloud-based visual design platforms such as Canva and mobile access conduits such as Quick Response (QR) Codes into PjBL provides a theoretically grounded mechanism for operationalizing each 4C competency. Grounded in the Cognitive Theory of Multimedia Learning (Mayer, 2014), Canva lowers technical graphic-design barriers (Gehred, 2020), enabling students to allocate cognitive resources toward critically synthesizing pedagogical concepts, translating abstract Islamic teaching strategies into

creative visual infographics and lesson plans, and co-editing project artifacts synchronously in shared digital workspaces (Collaboration and Communication). Concurrently, QR Codes operationalize seamless active and distributed mobile learning (Abdul Rabu et al., 2019; Drushlyak et al., 2023; Sung et al., 2016). Meta-analytic evidence by Sung et al. (2016) confirms that integrating mobile devices into inquiry- and project-oriented higher education enhances learning performance by bridging printed materials with instant multimedia resources. Furthermore, usability research by Hernando and Macías (2023) demonstrates that well-designed QR Code applications significantly improve user interaction, accessibility, and acceptance, allowing pre-service teachers to access curated Qur'anic exegesis (tafsir), academic journals, and micro-teaching demonstration videos directly from printed textbook pages.

A critical review of existing literature highlights a distinct research gap. Although several prior studies have examined Canva within PjBL or instructional content development—such as Zulhandayani (2023), who utilized Canva to enhance poster-design creativity in secondary-level language learning, and Fatihah and Ruhiat (2023), who developed Canva-based acid-base chemistry content—these studies focused primarily on isolated media production in general or secondary education rather than comprehensive pedagogical model development in Islamic higher education. Similarly, international higher education PjBL reviews (Chen & Yang, 2019; Guo et al., 2020; Zhang & Ma, 2023) predominantly document STEM, engineering, and business disciplines, leaving pre-service Islamic Education (PAI) teacher preparation underexplored. Crucially, this study does not claim to invent PjBL from scratch; rather, its novelty lies in adapting Gold Standard PjBL principles (Larmer et al., 2015; Thomas, 2000) into an explicitly operationalized 7-stage instructional syntax that systematically couples Canva collaborative design with QR Code mobile knowledge conduits, embedded within a KKNI Level 6-aligned, 15-chapter PAI Teaching Methodology package incorporating classical and contemporary Qur'anic exegesis.

Guided by this framework, the present study addresses four research questions: (1) What are the baseline perceptions and pedagogical needs of lecturers and students regarding a Canva- and QR Code-integrated PjBL model in the Teaching Methodology of PAI course? (2) How are the 7-stage PjBL syntax and its supporting instructional package designed and validated by multidisciplinary experts? (3) How practical is the developed model during formative trials? and (4) Does the Canva- and QR Code-integrated PjBL model produce a statistically significant difference in students' overall and per-dimension 4C skills compared to conventional instruction? For the quasi-experimental evaluation, the study tested the null hypothesis (H0: controlling for pre-test scores, there is no significant difference in post-test 4C skills between students taught with the Canva- and QR Code-integrated PjBL model and those taught with conventional methods)

against the alternative hypothesis (Ha: controlling for pre-test scores, students taught with the integrated PjBL model achieve significantly higher post-test 4C skills than those in the control group).

II. Research Methods

This study employed a Research and Development (R&D) approach adapting the ten-stage procedural model of Borg and Gall (1989) and Gall et al. (2003). To align with semester-based higher education course development and resource constraints, the original ten stages were systematically consolidated into five operational phases: (1) research and information collection (curriculum/RPS document audit, lecturer interviews, and perception/needs surveys); (2) instructional planning (formulating the 7-stage PjBL syntax, KKNI Level 6 RPS, and 4C mapping); (3) preliminary product prototype development (15-chapter textbook, lecturer manual, and student project guide); (4) multidisciplinary expert validation, formative revision, and preliminary one-to-one/small-group practicality checks; and (5) main field testing using a quasi-experimental pre-test/post-test non-equivalent control group design (Creswell & Creswell, 2018). Borg and Gall's final stages (operational multi-site field testing, final product revision, and mass dissemination) were intentionally excluded from the current study scope and reserved for subsequent multi-institutional research.

Four distinct participant groups were involved across the R&D phases at the Islamic Education (PAI) Study Program, Faculty of Tarbiyah, IAIN Curup: (1) Needs and Perception Survey Cohort: All 10 lecturers teaching the Teaching Methodology of PAI course and 115 fifth-semester students drawn from a population of 195 students across six intact classes (Classes 5A–5F) using simple random sampling determined via Harry King's Nomogram at a 10% margin of error and 95% confidence level (Fraenkel et al., 2012; Sugiyono, 2014). (2) Instrument Pilot Cohort: 25 fifth-semester students from a separate parallel class (Class 5G), intentionally excluded from both the survey population (5A–5F) and the field-test cohorts to prevent testing contamination. (3) Multidisciplinary Expert Panel: Four senior academics conducting structured, rubric-based feasibility validation (constituting structured expert review rather than an iterative, anonymous Delphi round), mapped specifically to their respective domains—Dr. FN, M.Pd.I. (PAI Teaching Methodology; content/material feasibility), Prof. Dr. IW, M.Pd.I. (Educational Psychology; presentation feasibility), Dr. Ksn, S.Ag., M.Pd. (Instructional Technology; graphic/media design feasibility), and Prof. Dr. IFi, M.Pd. (Applied Indonesian Language; linguistic feasibility). (4) Quasi-Experimental Field-Test Cohort: Two intact classes selected through purposive cluster sampling—Class 5D (n = 22) as the experimental group and Class 5F (n = 17) as the control group (total N = 39 active, consenting students who completed both pre-test and post-test assessments across the eight-week intervention). Both classes were taught by the same lecturer to minimize instructor-related confounding variables. The experimental class received instruction via the 7-

stage Canva- and QR Code-integrated PjBL model, whereas the control class received conventional instruction consisting of lectures, standard PowerPoint presentations, textbook readings, and individual written summaries.

Ethical Considerations: Institutional research permission was obtained from the Faculty of Tarbiyah, IAIN Curup prior to data collection. All participating lecturers and students were briefed on the study objectives, assured of voluntary participation without academic penalty, and provided informed consent. To protect participant confidentiality in accordance with ethical research standards (Creswell & Creswell, 2018), interviewed faculty members are pseudonymized as Lecturer A and Lecturer B in the qualitative findings. Data were collected through five instruments: (1) a 36-item perception questionnaire assessing suitability of existing teaching materials (5-point Likert scale: Strongly Disagree [STS] to Strongly Agree [SS]); (2) a 176-item comprehensive chapter-level needs checklist covering content, KKNI Level 6 alignment, PjBL syntax, and Canva/QR integration across all 15 course chapters (1 = Strongly Not Needed to 5 = Strongly Needed); (3) structured expert validation rubrics covering content, presentation, graphic design, and language; (4) semi-structured interview and non-participant classroom observation protocols aligned with the 7-stage syntax; and (5) a 24-item 4C skills assessment instrument comprising four equal subscales of 6 items each (Critical Thinking [P1–P6], Creativity [P7–P12], Collaboration [P13–P18], and Communication [P19–P24]), scored on a 5-point scale (1 = Very Poor to 5 = Very Good; subscale score range: 6–30; theoretical total score range: 24–120, converted to a 0–100 percentage scale). To ensure rigorous construct alignment, every indicator was operationalized directly from the Partnership for 21st Century Learning (P21, 2019) framework and contemporary 4C assessment guidelines (Thornhill-Miller et al., 2023) rather than discipline-specific physics worksheets. Table 1 details the operational indicators, item allocation, and behavioral assessment criteria for each 4C competency, while Table 2 presents the analytical 1–5 scoring rubric used to evaluate student performance and self-assessment items.

Table 1. Operationalization of 4C Competencies, Indicator Blueprint, and Measurement Structure

4C Competency	Items (Range)	Operational Definition (P21, 2019; Thornhill-Miller et al., 2023)	Specific Assessment Indicators (3 Core Sub-Indicators per Competency)
Critical Thinking	P1–P6 (6–30)	Ability to analyze complex PAI classroom problems, evaluate pedagogical evidence, and justify instructional decisions logically.	(1) Identifying and decomposing authentic PAI teaching dilemmas; (2) Evaluating instructional strategies against KKNI Level 6 & Qur'anic exegesis (tafsir); (3) Formulating evidence-based pedagogical arguments.
Creativity	P7–P12 (6–30)	Ability to generate original, pedagogically relevant instructional ideas and translate abstract Islamic concepts into visual learning artifacts.	(1) Generating novel PAI lesson designs and visual metaphors; (2) Synthesizing theory into structured Canva infographics, mind maps, and interactive slides; (3) Refining prototypes iteratively based on peer/lecturer critique.
Collaboration	P13–P18 (6–30)	Ability to work effectively, respectfully, and equitably within diverse teams to co-construct shared pedagogical products.	(1) Negotiating team roles and production milestones responsibly; (2) Co-editing digital artifacts actively within shared Canva workspaces; (3) Integrating diverse peer perspectives and resolving group bottlenecks constructively.
Communication	P19–P24 (6–30)	Ability to articulate pedagogical rationales clearly across written, visual, oral, and multimodal digital channels.	(1) Structuring clear visual-textual messages in Canva pitch decks and portfolios; (2) Delivering fluent micro-teaching demonstrations shared via student-generated QR Codes; (3) Defending project decisions and delivering constructive peer feedback.

Table 2. Analytical 1–5 Scoring Rubric for Evaluating Each 4C Competency

4C Competency	Score 1 (Very Poor)	Score 2 (Poor)	Score 3 (Moderat)	Score 4 (Good)	Score 5 (Very Good)
Critical Thinking	Fails to identify pedagogical issues; repeats textbook definitions without analysis.	Identifies surface problems but lacks alignment with PAI theory or tafsir sources.	Analyzes classroom dilemmas adequately with partial reference to KKNI/tafsir.	Evaluates strategies critically using coherent evidence from journals and tafsir.	Demonstrates rigorous, independent synthesis linking dilemmas, KKNI Level 6, journals, and tafsir.

4C Competency	Score 1 (Very Poor)	Score 2 (Poor)	Score 3 (Moderat)	Score 4 (Good)	Score 5 (Very Good)
Creativity	Copies standard templates with no original adaptation to PAI content.	Makes minimal visual edits; design lacks pedagogical clarity or structure.	Produces functional Canva visuals with moderate originality and layout balance.	Designs engaging, original Canva infographics/lesson aids tailored to PAI topics.	Produces highly innovative, cohesive visual-pedagogical artifacts maximizing learner comprehension.
Collaboration	Works in isolation; does not contribute to shared Canva folder or milestones.	Contributes sporadically; relies heavily on teammates to complete project tasks.	Fulfills assigned basic tasks in group workspace with occasional coordination.	Co-edits actively, meets team milestones, and responds constructively to peers.	Demonstrates exemplary shared leadership, equitable co-creation, and proactive conflict resolution.
Communication	Presentation/portfolio is disorganized; QR video missing or incomprehensible.	Conveys fragmented ideas; weak alignment between Canva visuals and oral delivery.	Presents project adequately with functional QR links but limited defense depth.	Articulates rationales clearly across Canva slides, QR micro-teaching video, and Q&A.	Delivers persuasive, multimodal defense integrating crisp Canva visuals, seamless QR demos, and scholarly critique.

Instrument Validation Procedures and Reliability Evidence: A three-stage validation protocol was executed prior to field testing (Creswell & Creswell, 2018; Fraenkel et al., 2012). First, content and face validity were established through expert judgment by the four multidisciplinary validators (PAI methodology, educational psychology, instructional technology, and Indonesian language), who reviewed all 24 items against the P21 blueprint for indicator relevance, non-ambiguity, and linguistic precision. Second, empirical item-level construct validity was evaluated via a pilot test with 25 fifth-semester students from an independent parallel class (Class 5G) using Pearson product-moment item-total correlations (criterion: $r_{count} > r_{table} = 0.396$ for $n = 25$, $df = 23$, $\alpha = 0.05$, two-tailed), retaining all 24 valid items. Third, internal consistency reliability was verified using Cronbach's alpha, yielding a strong pilot composite reliability coefficient of $\alpha = 0.892$ (well above the 0.70 threshold for educational research; Fraenkel et al., 2012).

To further verify subscale stability on the field sample (N = 39), empirical reliability analyses confirmed strong composite consistency (pre-test α = 0.932; post-test α = 0.947) as well as acceptable-to-strong subscale internal consistency across all four dimensions: Critical Thinking (pre α = 0.698, r_xy = 0.189–0.638; post α = 0.870, r_xy = 0.570–0.740), Creativity (pre α = 0.790, r_xy = 0.374–0.632; post α = 0.808, r_xy = 0.439–0.674), Collaboration (pre α = 0.793, r_xy = 0.511–0.645; post α = 0.850, r_xy = 0.515–0.730), and Communication (pre α = 0.768, r_xy = 0.288–0.652; post α = 0.707, r_xy = 0.255–0.611). Because the 24-item rating scale captures students' self-reported 4C competencies, quantitative scores were triangulated with non-participant classroom observations and rubric-guided reviews of student Canva/QR artifacts, while self-report limitations are explicitly acknowledged in the Discussion.

Qualitative data from interviews, observations, and RPS documentation were analyzed interactively following Miles, Huberman, and Saldaña (2014) through data condensation, data display, and conclusion drawing/verification, reinforced by source and method triangulation. Quantitative expert feasibility percentages were interpreted using standard five-tier R&D criteria (Fraenkel et al., 2012): 81%–100% (Very Feasible/Excellent), 61%–80% (Feasible/Good), 41%–60% (Moderately Feasible), 21%–40% (Less Feasible), and 0%–20% (Not Feasible), while student 4C percentage achievement was classified into five tiers: Very High (81%–100%), High (61%–80%), Moderate (41%–60%), Low (21%–40%), and Very Low (≤ 20%). Quasi-experimental field-test data were analyzed using Kolmogorov-Smirnov (with Lilliefors significance correction) and Shapiro-Wilk normality tests, Levene's homogeneity of variance tests, an independent samples t-test for pre-test baseline parity (df = 37, α = 0.05, two-tailed critical t = 2.026), paired samples t-tests for within-group pre-to-post gains, Hake's normalized gain formula [N-Gain = (Post-Test − Pre-Test) / (Maximum Score − Pre-Test); categorized as High > 0.70, Medium 0.30–0.70, Low < 0.30], and one-way Analysis of Covariance (ANCOVA) on post-test overall and per-dimension 4C scores using pre-test scores as the covariate after verifying homogeneity of regression slopes, with effect sizes reported via partial eta squared (ηp^2; Cohen, 1988: 0.01 = small, 0.06 = medium, 0.14 = large).

III. Result and Discussion

A. Research Findings

1. Lecturers' and Student' Perceptions of Existing Instructional Materials

Perception questionnaires comprising 36 items were administered to 10 lecturers (total 360 item-responses) and 115 fifth-semester students (4,137 valid item-responses out of 4,140 expected; 3 missing entries) to evaluate the alignment of current Teaching Methodology of PAI materials with 21st-century 4C demands and KKNI Level 6 competencies. The recapitulated findings are presented in Tables 3 and 4.

Table 3. Recapitulation of Lecturers' Perception Questionnaire Results (N = 10; 36 Items)

Assessed Dimension	STS (1)	TS (2)	KS (3)	S (4)	SS (5)	Total
Suitability of current PAI methodology materials (content, KKNI, media, 4C)	84	177	59	25	15	360
Percentage (%)	**23.33%**	**49.17%**	**16.39%**	**6.94%**	**4.17%**	**100.00%**

As shown in Table 3, 72.50% of lecturer responses (23.33% STS + 49.17% TS) indicated that existing instructional materials were unsuitable for contemporary pedagogical demands, while an additional 16.39% rated them only moderately suitable (KS). Only 11.11% of lecturer responses (S + SS) expressed satisfaction.

Table 4. Recapitulation of Students' Perception Questionnaire Results (N = 115; 36 Items)

Assessed Dimension	STS (1)	TS (2)	KS (3)	S (4)	SS (5)	Total
Suitability of current PAI methodology materials (content, KKNI, media, 4C)	831	344	701	1,394	867	4,137
Percentage (%)	**20.09%**	**8.32%**	**16.94%**	**33.70%**	**20.95%**	**100.00%**

In contrast to lecturers, Table 4 reveals a more nuanced student perspective: 28.41% of student responses (20.09% STS + 8.32% TS) rated existing materials as unsuitable, 16.94% rated them moderately suitable (KS), and 54.65% (33.70% S + 20.95% SS) viewed them as acceptable. This divergence is pedagogically informative: while slightly over half of students felt comfortable with familiar lecture handouts and conventional textbooks, nearly half (45.35% combined STS, TS, and KS) perceived deficiencies in interactivity and practical applicability, whereas lecturers—who evaluate alignment against KKNI Level 6 graduate standards—overwhelmingly identified structural inadequacy (72.50%).

2. Needs Analysis and Qualitative Diagnostic Findings

To map detailed curriculum requirements across all 15 chapters of the course, a 176-item chapter-level needs checklist was completed by 10 lecturers (1,760 item-responses) and 115 students (20,237 valid item-responses; 3 missing). The results are summarized in Tables 5 and 6.

Table 5. Recapitulation of Lecturers' Needs Checklist Results (N = 10; 176 Items)

Assessed Dimension	1(SNN)	2 (NN)	3 (MN)	4 (N)	5 (SN)	Total
Need for Canva- & QR-integrated PjBL model and 15-chapter textbook	0	0	20	605	1,135	1,760
Percentage (%)	**0.00%**	**0.00%**	**1.14%**	**34.38%**	**64.49%**	**100.00%**

Table 6. Recapitulation of Students' Needs Checklist Results (N = 115; 176 Items)

Assessed Dimension	1(SNN)	2 (NN)	3 (MN)	4 (N)	5 (SN)	Total
Need for Canva- & QR-integrated PjBL model and 15-chapter textbook	495	1,117	2,258	7,258	9,109	20,237
Percentage (%)	**2.45%**	**5.52%**	**11.16%**	**35.86%**	**45.01%**	**100.00%**

Note: 1 = Strongly Not Needed (SNN); 2 = Not Needed (NN); 3 = Moderately Needed (MN); 4 = Needed (N); 5 = Strongly Needed (SN).

Using consistent aggregation across categories 4 (Needed) and 5 (Strongly Needed), 98.87% of lecturer responses (34.38% + 64.49%) and 80.87% of student responses (35.86% + 45.01%) indicated that a Canva- and QR Code-integrated PjBL instructional model and textbook were needed to strongly needed. While recognizing that self-reported needs items can reflect positive response tendencies toward novel digital tools, these quantitative patterns were strongly triangulated by qualitative interviews with two senior course lecturers (Lecturer A and Lecturer B) and documentary audits of the KKNI curriculum and course RPS (Khasinah & Elviana, 2022).

Qualitative Findings (Document Audit and Interviews): Documentary analysis of the RPS and interviews with Lecturer A and Lecturer B revealed five concrete instructional gaps: (1) although lecturers had informally attempted project-style tasks using PowerPoint slides and printed handouts, no structured PjBL syntax integrating Canva and QR Codes existed; (2) existing course references relied exclusively on classical Islamic education textbooks—such as Abuddin Nata, Ahmad Tafsir, Moh. Haitami Salim & Syamsul Kurniawan, Ramayulis, Zakiah Daradjat, and Arifin—which were not structured around KKNI Level 6 performance outcomes; (3) these reference texts lacked integration with recent empirical findings published in peer-reviewed academic journals; (4) classroom observation indicated that students predominantly memorized pedagogical terminology rather than producing usable teaching media; and (5) both lecturers emphasized the urgency of a cohesive instructional package linking Islamic pedagogical concepts with contemporary visual and mobile media.

3. Model Design, 7-Stage PjBL Syntax, and Per-Competency 4c Development Mechanism

To maintain conceptual clarity, the R&D output is differentiated into the core instructional model (a 7-stage Canva- and QR Code-integrated PjBL syntax) and its supporting instructional package comprising five companion deliverables: (a) a KKNI Level 6 Semester Learning Plan (RPS), (b) a 15-chapter, 115-page textbook titled Metodologi Pengajaran PAI, (c) a lecturer implementation manual, (d) a student project manual, and (e) 4C project assessment rubrics (six total deliverables). The 7-stage syntax adapts Gold Standard PjBL principles (Larmer et al., 2015; Thomas, 2000; Kokotsaki et al., 2016) to pre-service PAI teacher preparation by embedding multimedia scaffolding (Mayer, 2014) and seamless mobile inquiry (Abdul Rabu et al., 2019; Sung et al., 2016) at each instructional phase, as mapped in Table 7.

Table 7. Operationalized 7-Stage PjBL Syntax Integrated with Canva, QR Codes, and 4C Assessment Indicators

PjBL Stage	Instructional Syntax & Learning Mechanism	Canva & QR Code Integration	Targeted 4C & Assessment Indicator
1.Orientation	Lecturer introduces an authentic PAI classroom dilemma aligned with KKNI Level 6 outcomes.	Students scan chapter-header QR Codes to watch authentic school micro-teaching case videos.	Critical Thinking: Identifying pedagogical gaps in real PAI classrooms.
2.Problem Formulation	Students dissect the dilemma and formulate specific instructional design questions.	Collaborative brainstorming and problem-tree mapping on shared Canva whiteboards.	Critical Thinking & Communication: Clarity and relevance of formulated problem statements.
3.Hypothesis & Ideation	Lecturer scaffolds students in proposing innovative Islamic teaching methods (e.g., Model Tadzkirah, active PAI strategies).	Drafting concept maps and visual storyboards using Canva graphic templates.	Creativity & Critical Thinking: Originality and theoretical soundness of proposed lesson designs.
4.Group Structuring	Students form teams of 2–3, assign roles, and set production milestones.	Organizing collaborative workspaces, templates, and task boards inside shared Canva class folders.	Collaboration: Equitable role allocation and adherence to milestone schedules.
5.Data Collection & Design	Teams synthesize Qur'anic exegesis (Tafsir Al-Misbah, Ibn Kathir), journals, and PAI theory into teaching media.	QR Codes link directly to curated digital tafsir and journal repositories; Canva is used to design infographics and lesson kits.	Creativity, Collaboration & Critical Thinking: Accuracy of Islamic integration and visual quality of artifacts.
6.Testing & Evaluation	Teams pilot their designed PAI teaching strategies in peer micro-teaching simulations.	Recorded micro-teaching videos are uploaded and converted into student-generated QR Codes embedded in project portfolios.	Communication & Creativity: Pedagogical delivery fluency and functional media integration.
7.Reflection & Defense	Teams defend their final portfolios and reflect on pedagogical improvements.	Final Canva pitch decks presented in class; peers scan QR Codes to submit real-time digital rubric evaluations.	Communication & Collaboration: Defense quality and constructive peer-feedback uptake.

Explicit Pedagogical Mechanisms for Developing Each 4C Competency: To demonstrate precisely how the integrated PjBL–Canva–QR Code architecture cultivates each individual competency, Table 8 disaggregates the instructional syntax stages, concrete PAI project activities, underlying cognitive/pedagogical learning mechanisms, and specific assessment indicators for Critical Thinking, Creativity, Collaboration, and Communication.

Table 8. Explicit Instructional Mechanisms Linking PjBL Syntax, Canva, and QR Codes to Each 4C Competency

4C Competency	Activated Syntax Stages	Concrete PAI Project Activities	Canva & QR Code Learning Mechanism	Assessment Indicators (Linked to Table 2)
Critical Thinking	Stages 1, 2, 3, & 5	Diagnosing real PAI classroom dilemmas; comparing 16 traditional vs. modern PAI methods; selecting strategies matching learner characteristics and Qur'anic values.	QR Codes connect printed theory to authentic school case videos and curated tafsir/journal databases, triggering evidence-based inquiry; Canva whiteboards scaffold structured problem-tree analysis (Gunawardena & Wilson, 2021).	Depth of dilemma analysis; accuracy of KKNI Level 6 & tafsir alignment; logical justification of chosen PAI methods.
Creativity	Stages 3, 5, & 6	Designing original visual concept maps (e.g., Model Tadzkirah), PAI strategy flowcharts, 16-method infographics, and interactive lesson kits for Islamic classrooms.	Grounded in Cognitive Theory of Multimedia Learning (Mayer, 2014), Canva's intuitive templates lower extraneous technical load (Gehred, 2020), redirecting cognitive capacity toward generative visual metaphors and dual-coded instructional design.	Originality of visual-pedagogical design; clarity of information hierarchy; iterative refinement of Canva artifacts.
Collaboration	Stages 2, 4, 5, & 7	Forming 2–3 member teams; negotiating designer/researcher/presenter roles; co-producing chapter lesson kits and peer micro-teaching simulations.	Shared Canva classroom folders enable real-time synchronous/asynchronous co-editing, version transparency, and peer commenting, operationalizing positive interdependence and collective accountability (Crespí et al., 2022; Guo et al., 2020).	Equitable role contribution in shared folders; milestone adherence; responsiveness to peer/lecturer feedback.
Communication	Stages 2, 6, & 7	Drafting clear problem statements; filming simulated PAI micro-teaching demos; delivering final oral pitch decks and responding to class Q&A.	Student-generated QR Codes embed recorded micro-teaching videos directly into printed portfolios, while Canva pitch decks and QR-linked digital peer rubrics create multimodal oral-visual-digital feedback loops (Abdul Rabu et al., 2019; Benlaghrissi & Ouahidi, 2024).	Clarity of visual-textual slides; fluency of QR-linked micro-teaching delivery; persuasiveness in oral defense.

Each chapter of the 15-chapter textbook follows a uniform pedagogical architecture: (1) Pre-exposition (learning outcomes, QR-linked case prompt), (2) Content Exposition integrating classical Islamic pedagogy (e.g., Model Tadzkirah in Chapter 2, PAI Teaching Strategies in Chapter 5, and 16 Traditional-to-Modern PAI Methods in Chapter 8) with Qur'anic verses explained through Tafsir Al-Misbah and Tafsir Ibn Kathir, (3) explicit 4C activity boxes (Critical Thinking, Creative Thinking, Communication, Collaboration) paired with scannable QR Codes and Canva design prompts, and (4) Verification sheets and updated journal references. For example, in the Chapter 5 project on PAI Teaching Strategies, student teams scan a textbook QR Code to analyze exegesis of Qur'an Surah Al-Nahl (16:125) on pedagogical wisdom (al-hikmah), good instruction (al-mau'izhah al-hasanah), and constructive dialogue (al-mujadalah) from Tafsir Al-Misbah and Tafsir Ibn Kathir, map secondary-school student characteristics on a shared Canva whiteboard, co-design an interactive infographic lesson kit in Canva, and embed a QR Code linking to their 10-minute peer micro-teaching video for class defense. Figure 1 displays sample layouts from the developed textbook prototype.



Figure 1. *Sample Pages of the Developed Metodologi Pengajaran PAI Textbook Integrating Canva Visuals, QR Codes, and 4C Activity*

4. Expert Feasibility Validation, Formative Revision and Premilinary Practicality

The initial prototype was evaluated by four multidisciplinary experts across four core feasibility domains. As summarized in Table 9, the prototype attained an overall mean feasibility score of 88.48%, falling within the Very Feasible/Excellent category (81%–100%) and approved for field testing with minor formative revisions.

Table 9. Multidisciplinary Expert Feasibility Validation Results

No	Validated Aspect	Expert Validator Specialization	Score (%)	Feasibility Category
1	Content / Material Feasibility	PAI Teaching Methodology Expert	100.00	Very Feasible / Excellent
2	Presentation Feasibility	Educational Psychology Expert	81.70	Very Feasible / Excellent
3	Graphic / Media Design Feasibility	Instructional Technology Expert	82.20	Very Feasible / Excellent
4	Linguistic Feasibility	Applied Indonesian Language Expert	90.00	Very Feasible / Excellent
	Overall Mean	4 Multidisciplinary Reviewers	88.48	Very Feasible / Excellent

Formative Revisions and Practicality Trials: Although all four domains exceeded the 81% feasibility threshold, experts recommended targeted minor revisions that were systematically executed prior to field testing: (1) enriching every Qur'anic pedagogical verse with structured exegesis from Tafsir Al-Misbah and Tafsir Ibn Kathir to deepen Islamic epistemological integration; (2) adding concrete PAI classroom case scenarios and step-by-step Canva/QR project examples; (3) tightening typographical accuracy and cross-chapter coherence; and (4) refining layout contrast in QR Code boxes to ensure rapid mobile scanning. Subsequent one-to-one and small-group qualitative formative usability trials prior to the main field experiment confirmed smooth QR Code scan responsiveness across student smartphones, intuitive navigation of shared Canva templates, and clear comprehension of the 7-stage project instructions.

5. Quasi- Experimental Field Testing of Students' 4c Skills

The cultural context of Madura forms part of Lora Abbas's strategy for delivering religious teaching within a military setting. As a figure steeped in the pesantren tradition, he recognises the importance of adapting the language of instruction to the character of the participants and their official duties. Lora Abbas (LR-01) stated:

Following formative revisions, an eight-week quasi-experimental field trial was conducted comparing the experimental group (Class 5D, n = 22) and the control group (Class 5F, n = 17). Prerequisite normality testing on the verified N = 39 dataset using both the Kolmogorov-Smirnov test (with Lilliefors significance correction) and the Shapiro-Wilk test is presented in Table 10.

Table 10. Tests of Normality for Pre-Test and Post-Test Total 4C Skills Scores (N = 39)

Test Phase	Group	n	K-S Statistic (D)	K-S Sig. (p)	Shapiro-Wilk (W)	S-W Sig. (p)	Distribution
Pre-Test 4C Skills	Experimental (Class 5D)	22	0.117	> 0.200*	0.943	0.226	Normal
Pre-Test 4C Skills	Control (Class 5F)	17	0.115	> 0.200*	0.973	0.872	Normal
Post-Test 4C Skills	Experimental (Class 5D)	22	0.096	> 0.200*	0.961	0.512	Normal
Post-Test 4C Skills	Control (Class 5F)	17	0.132	> 0.200*	0.933	0.247	Normal

**Lower bound of true significance (Lilliefors Significance Correction; exact p = 0.596, 0.788, 0.862, and 0.588, respectively).*

As shown in Table 10, both pre-test and post-test 4C scores in the experimental and control classes satisfied normality assumptions across both Kolmogorov-Smirnov (all p > 0.200) and Shapiro-Wilk tests (p = 0.226 to 0.872). Levene's test confirmed homogeneous variances for both pre-test (F(1, 37) = 0.250, p = 0.620 > 0.05) and post-test scores (F(1, 37) = 0.253, p = 0.618 > 0.05). Accordingly, an independent samples t-test was conducted on pre-test scores to establish baseline group equivalence (Table 11).

Table 11. Independent Samples t-Test of Pre-Test Total 4C Skills Scores

Group	n	Mean (24–120)	Mean (%)	SD	SE	t	df	Sig. (2-tailed)	Mean Diff. (95% CI)
Experimental (5D)	22	68.95	57.46%	11.458	2.443	–0.502	37	0.619	–1.987 (–10.01, 6.04)
Control (5F)	17	70.94	59.12%	13.250	3.214				

Table 11 demonstrates that |t| = 0.502 < t-table = 2.026 (df = 37, α = 0.05, two-tailed; p = 0.619 > 0.05), confirming no statistically significant difference in baseline 4C skills between the experimental group (M = 68.95 [57.46%], SD = 11.46; range = 51–87) and the control group (M = 70.94 [59.12%], SD = 13.25; range = 49–98) prior to the intervention. Because all parametric assumptions—including normality, homogeneity of variance, and homogeneity of regression slopes (Group × Pre-Test interaction F(1, 35) = 0.019, p = 0.892 > 0.05)—were satisfied, post-test effectiveness was evaluated using one-way Analysis of Covariance (ANCOVA) controlling for baseline pre-test scores, alongside within-group paired t-tests and Hake's normalized gain (N-Gain), as summarized in Table 12.

Table 12. Descriptive Statistics, Normalized Gain (N-Gain), and One-Way ANCOVA of Post-Test Total 4C Skills

Group	n	Pre-Test M ± SD (Min–Max)	Post-Test M ± SD (Min–Max; %)	Mean N-Gain ± SD	Adj. Post Mean ± SE	ANCOVA F (1, 36)	p-value	Partial ηp^2
Experimental (5D)	22	68.95 ± 11.46 (51–87)	102.18 ± 7.57 (89–117; 85.15%)	0.661 ± 0.101	102.65 ± 0.92	238.652	< 0.001	0.869
Control (5F)	17	70.94 ± 13.25 (49–98)	81.59 ± 8.34 (62–92; 67.99%)	0.190 ± 0.162	80.98 ± 1.05			

As reported in Table 12, paired-samples t-tests showed that while both groups improved from pre-test to post-test, the experimental class achieved a mean gain of +33.23 points ($t(21) = 23.522$, $p < 0.001$) compared to +10.65 points in the control class ($t(16) = 5.802$, $p < 0.001$). Using Hake's normalized gain formula, the experimental group attained a mean N-Gain of 0.661 (66.07%, SD = 0.101; 27.27% [6/22] High [$g > 0.70$] and 72.73% [16/22] Medium [$0.30 \leq g \leq 0.70$], with 0% Low), substantially outperforming the control group's mean N-Gain of 0.190 (19.04%, SD = 0.162, Low category; 0% High, 23.53% [4/17] Medium, and 76.47% [13/17] Low; independent $t(37) = 11.134$, $p < 0.001$, Cohen's d = 3.591). Crucially, after controlling for pre-test scores (grand mean = 69.82; covariate $F(1, 36) = 87.516$, $p < 0.001$, $\eta p^2 = 0.709$), one-way ANCOVA confirmed a highly significant main effect of the instructional intervention on post-test 4C skills ($F(1, 36) = 238.652$, $p < 0.001$, $\eta p^2 = 0.869$), with an adjusted post-test mean difference of +21.67 points (95% CI [18.83, 24.51]) favoring the experimental class ($M_{adj} = 102.65$ vs. 80.98). (A supplementary non-parametric Mann-Whitney U check corroborated this conclusion: $U = 10.500$, $W = 163.500$, $Z = –5.004$, $p < 0.001$, $r = 0.80$; Mean Rank = 28.02 vs. 9.62.) To determine which specific competencies accounted for this overall effect, disaggregated pre-test, post-test, N-Gain, and ANCOVA analyses across all four 4C sub-dimensions (each scored on a 6–30 scale) are presented in Table 13, while the shift in student competency proficiency categories is summarized in Table 14.

Table 13. Disaggregated Pre-Test, Post-Test, N-Gain, and ANCOVA Comparisons Across Each 4C Competency (Scale: 6–30)

4C Sub-Dimension	Group	Pre-Test M ± SD	Post-Test M ± SD (%)	N-Gain ± SD	Adj. Post Mean	ANCOVA F (1, 36)	p-value	Partial ηp^2
Critical Thinking (P1–P6)	Exp (n=22)	16.82 ± 2.48	25.59 ± 2.63 (85.30%)	0.679 ± 0.167	25.85	92.527	< 0.001	0.720
	Ctrl (n=17)	17.82 ± 3.81	20.18 ± 2.60 (67.25%)	0.159 ± 0.208	19.85			

4C Sub-Dimension	Group	Pre-Test M ± SD	Post-Test M ± SD (%)	N-Gain ± SD	Adj. Post Mean	ANCOVA F (1, 36)	p-value	Partial ηp^2
Creativity (P7–P12)	Exp (n=22)	17.64 ± 3.50	26.00 ± 1.83 (86.67%)	0.675 ± 0.135	26.02	110.686	< 0.001	0.755
	Ctrl (n=17)	17.76 ± 3.47	20.53 ± 2.32 (68.43%)	0.161 ± 0.386	20.50			
Collaboration (P13–P18)	Exp (n=22)	16.95 ± 3.20	25.50 ± 2.39 (85.00%)	0.663 ± 0.142	25.81	97.860	< 0.001	0.731
	Ctrl (n=17)	18.24 ± 3.60	20.12 ± 2.93 (67.06%)	0.140 ± 0.176	19.72			
Communication (P19–P24)	Exp (n=22)	17.55 ± 3.08	25.09 ± 2.07 (83.64%)	0.608 ± 0.141	25.02	57.103	< 0.001	0.613
	Ctrl (n=17)	17.12 ± 3.44	20.76 ± 2.11 (69.22%)	0.250 ± 0.203	20.86			

Table 14. Frequency Distribution of Students' 4C Competency Proficiency Categories Before and After Intervention

Proficiency Category	Score Range (%)	Pre-Test Exp (n = 22)	Post-Test Exp (n = 22)	Pre-Test Ctrl (n = 17)	Post-Test Ctrl (n = 17)
Very High	81% – 100%	0 (0.00%)	17 (77.27%)	1 (5.88%)	0 (0.00%)
High	61% – 80%	7 (31.82%)	5 (22.73%)	7 (41.18%)	15 (88.24%)
Moderate	41% – 60%	15 (68.18%)	0 (0.00%)	8 (47.06%)	2 (11.76%)
Low	21% – 40%	0 (0.00%)	0 (0.00%)	1 (5.88%)	0 (0.00%)
Very Low	≤ 20%	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Total	100%	22 (100.00%)	22 (100.00%)	17 (100.00%)	17 (100.00%)

As detailed in Table 13, baseline pre-test scores were statistically equivalent across all four sub-dimensions (all $p > 0.24$). Following the eight-week intervention, ANCOVA revealed statistically significant post-test advantages for the experimental group across every individual competency (all $p < 0.001$), with the largest adjusted effect sizes observed in Creativity ($F(1, 36) = 110.686$, $\eta p^2 = 0.755$; N-Gain = 0.675) and Collaboration ($F(1, 36) = 97.860$, $\eta p^2 = 0.731$; N-Gain = 0.663), followed closely by Critical Thinking ($F(1, 36) = 92.527$, $\eta p^2 = 0.720$; N-Gain = 0.679) and Communication ($F(1, 36) = 57.103$, $\eta p^2 = 0.613$; N-Gain = 0.608). Correspondingly, Table 14 illustrates a pronounced upward proficiency shift: whereas 68.18% of experimental students began in the Moderate tier and 0% in Very High, 77.27% (17 of 22) reached the Very High tier (81%–100%) and 22.73% (5 of 22) reached High at post-test, whereas 0% of control students attained the Very High tier. Consequently, H0 is rejected and Ha is supported.

B. Discussion

1. The Integration of Fiqh and Sufism as a Form of Non-Formal Islamic Education within the Military

The empirical findings of this R&D study demonstrate that integrating Canva collaborative visual design and QR Code mobile resource conduits into a structured 7-stage PjBL syntax is both pedagogically feasible (expert mean = 88.48%) and associated with substantially higher covariate-adjusted post-test 4C skill ratings among pre-service PAI teachers compared to conventional lecturing (ANCOVA $F(1, 36) = 238.652$, $p < 0.001$, $\eta p^2 = 0.869$; mean N-Gain = 0.661 vs. 0.190). These outcomes corroborate recent international meta-analytic and systematic review evidence in higher education. Both Chen and Yang (2019) and Zhang and Ma (2023) established across large syntheses of experimental and quasi-experimental studies that PjBL produces significant medium-to-large positive effects on students' academic achievement, thinking skills, and affective engagement compared to traditional lecturing, particularly when sustained over multi-week project cycles such as the eight-week implementation in this study. Similarly, Guo et al. (2020), Almulla (2020), and Kokotsaki et al. (2016) emphasized that university-level PjBL yields the strongest competency gains when learners are guided through explicit inquiry phases culminating in authentic, publicly defended artifacts—a principle

operationalized across Stages 1–7 of the developed model. In the Indonesian pre-service teacher education context, these findings align with Hujjatusnaini et al. (2022), who reported that blended PjBL explicitly integrated with 21st-century skill scaffolding significantly enhanced prospective teachers' higher-order thinking skills.

Crucially, the disaggregated sub-dimension findings in Table 13 illuminate how the complementary affordances of Canva and QR Codes selectively amplify each individual 4C competency. First, Creativity exhibited the largest covariate-adjusted effect size (ηp^2 = 0.755; post-test mean = 86.67%). Consistent with Mayer's (2014) Cognitive Theory of Multimedia Learning and van Laar et al.'s (2017) systematic review, digital authoring environments foster creative synthesis when they minimize extraneous technical friction. As highlighted by Gehred (2020), Canva's accessible template ecosystem allowed pre-service PAI teachers without graphic-design backgrounds to allocate their cognitive energy toward transforming abstract Islamic pedagogical frameworks (such as Model Tadzkirah and the 16 PAI teaching methods) into original, visually coherent infographics and teaching kits, extending earlier secondary-level observations by Zulhandayani (2023) and Fatihah and Ruhiat (2023) into KKNI Level 6 teacher education. Second, Collaboration achieved the second-largest adjusted effect (ηp^2 = 0.731; N-Gain = 0.663 vs. 0.140 in control). Supporting Crespí et al. (2022), who demonstrated that structured PjBL strengthens interpersonal and teamwork competences in higher education, shared Canva classroom folders in Stages 4 and 5 operated as transparent collaborative workspaces where 2–3 member teams co-edited visual artifacts synchronously, monitored milestone completion, and reconciled pedagogical perspectives in real time.

Third, Critical Thinking recorded the highest normalized gain in the experimental group (N-Gain = 0.679 vs. 0.159 in control; ηp^2 = 0.720). As Gunawardena and Wilson (2021) argued, critical thinking in higher education develops not as a passive byproduct of content exposure, but as a scaffolded, iterative process of structured questioning and evidence evaluation. In Stages 1, 2, 3, and 5, QR Codes connected printed PAI chapters directly to authentic classroom dilemma videos, peer-reviewed journals, and classical/contemporary Qur'anic exegesis (Tafsir Al-Misbah and Tafsir Ibn Kathir), requiring teams to map problem trees on Canva whiteboards before justifying instructional strategies. Fourth, Communication also showed substantial gains (ηp^2 = 0.613; N-Gain = 0.608 vs. 0.250), echoing mobile-assisted PjBL findings by Benlaghrissi and Ouahidi (2024), active QR-mediated higher education learning by Abdul Rabu et al. (2019) and Hernando and Macías (2023), and mobile learning meta-analytic evidence by Sung et al. (2016). Converting recorded peer micro-teaching simulations into scannable QR Codes embedded inside project portfolios and defending Canva pitch decks before peers (Stages 6–7) shifted communication from static written essays to multimodal teacher performance.

At the same time, rigorous interpretation requires considering alternative explanations for the large ANCOVA effect size ($\eta p^2 = 0.869$). First, because the experimental intervention bundled multiple instructional upgrades simultaneously—the 7-stage PjBL syntax, the new 15-chapter textbook, Canva design activities, and QR Code resources—while the control group received conventional lecturing, the current design cannot statistically isolate the incremental contribution of Canva and QR Codes from the well-documented main effect of PjBL itself (Almulla, 2020; Chen & Yang, 2019; Zhang & Ma, 2023). Second, the novelty effect of introducing interactive cloud design tools and mobile scanning into a traditionally lecture-heavy course may have elevated short-term student enthusiasm. Third, because 4C outcomes were measured through a 24-item student self-report rating scale rather than independent blinded performance scoring, responses may partially reflect social desirability bias or heightened self-efficacy rather than objective skill mastery alone (Thornhill-Miller et al., 2023). Finally, the perception survey finding that 54.65% of students initially viewed conventional materials as acceptable underscores that students often normalize passive instruction until exposed to active, digitally scaffolded alternatives.

Theoretical and Practical Contributions: Theoretically, this study advances higher education PjBL scholarship by demonstrating how Gold Standard PjBL principles (Larmer et al., 2015) can be adapted to religious teacher education through an explicit 7-stage syntax integrating multimedia learning theory (Mayer, 2014), scaffolded critical inquiry (Gunawardena & Wilson, 2021), and seamless mobile access (Abdul Rabu et al., 2019; Sung et al., 2016) with classical Islamic epistemology. Practically, it equips Islamic higher education institutions (PTKI/LPTK) and PAI lecturers with a validated, ready-to-use instructional ecosystem—comprising a KKNI Level 6 RPS, a 15-chapter QR-enabled textbook, lecturer and student manuals, and analytical 4C scoring rubrics—to transition prospective teachers from passive note-taking to active digital instructional design.

IV. **Conclusion**

This Research and Development study produced six integrated instructional deliverables for the Teaching Methodology of Islamic Education (PAI) course: (1) a 7-stage Canva- and QR Code-integrated PjBL instructional model framework; (2) a KKNI Level 6-aligned Semester Learning Plan (RPS); (3) a 15-chapter, 115-page QR-enabled textbook; (4) a lecturer implementation manual; (5) a student project manual; and (6) analytical 4C project assessment rubrics. Needs and perception analyses confirmed that 72.50% of lecturer responses viewed existing materials as misaligned with contemporary demands, while 98.87% of lecturer responses and 80.87% of student responses indicated that a Canva- and QR Code-integrated PjBL model was needed to strongly needed. Multidisciplinary expert validation rated the prototype Very Feasible with an overall mean score of 88.48% (content 100.00%, presentation 81.70%, graphic

design 82.20%, language 90.00%), followed by formative revisions strengthening Qur'anic exegesis (Tafsir Al-Misbah and Ibn Kathir) and contextual classroom examples.

In the eight-week quasi-experimental field trial, pre-test analysis established baseline parity between the experimental and control groups ($|t| = 0.502 < t\text{-table} = 2.026$, $df = 37$, $p = 0.619 > 0.05$). Controlling for pre-test scores, one-way ANCOVA confirmed a statistically significant post-test difference favoring the experimental group ($F(1, 36) = 238.652$, $p < 0.001$, $\eta p^2 = 0.869$; adjusted means = 102.65 vs. 80.98; mean N-Gain = 0.661 vs. 0.190; 77.27% of experimental students achieving the Very High proficiency category), with significant improvements across Creativity ($\eta p^2 = 0.755$), Collaboration ($\eta p^2 = 0.731$), Critical Thinking ($\eta p^2 = 0.720$), and Communication ($\eta p^2 = 0.613$). Within the boundaries of this quasi-experimental study, the Canva- and QR Code-integrated PjBL model demonstrates promising effectiveness in enhancing prospective PAI teachers' perceived 4C competencies.

Limitations and Recommendations: Several methodological limitations warrant caution in generalizing these findings: (1) the field trial involved a modest sample (N = 39) from two intact classes within a single department at one institution over eight weeks without longitudinal retention tracking into school teaching internships (PPL); (2) the quasi-experimental design without random assignment and the bundled intervention (PjBL + textbook + Canva/QR) prevent isolating individual media effects from PjBL itself; (3) 4C skills were evaluated via a student self-report rating scale rather than blinded, multi-rater rubric scoring of final artifacts; (4) preliminary one-to-one and small-group practicality checks were conducted qualitatively without a separate standardized practicality survey instrument, and each expert validation domain was evaluated by a single specialist rather than multiple raters permitting inter-rater reliability (e.g., Aiken's V); and (5) potential researcher-developer bias must be acknowledged. Accordingly, PAI lecturers are recommended to adopt the 7-stage syntax alongside the analytical 4C rubrics; PTKI/LPTK institutions should invest in faculty training for digital PjBL course design; and future researchers should conduct multi-site factorial experiments comparing PjBL-only versus PjBL-with-Canva/QR conditions, triangulate self-reports with blinded performance assessments, and track long-term competency transfer during pre-service teaching practice.

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