



Child Education Journal

Child Education Journal. Vol. 7 No. 3 (2025) 137–154

e-ISSN: [2685-1903](#) p-ISSN: [2087-0396](#)



DOI: [10.33086/cej.v7i3.8406](https://doi.org/10.33086/cej.v7i3.8406)

ORIGINAL RESEARCH ARTICLE

Neuro-Pedagogical Digital Design in Islamic Education: Fostering Early Childhood Religious Moderation (ECRM) via Interactive Mobile Game Blueprint

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Article History: Received: 12 Oct 2025 • Revised: 05 Dec 2025 • Accepted: 15 Jan 2025 • Published: 31 Dec 2025

ABSTRACT

This study addresses the critical need for innovative digital media to instill Religious Moderation (ECRM) and Islamic values early, contrasting traditional methods with the pervasive digital environment young children inhabit. The primary objective is to develop a scientifically grounded ECRM Conceptual Framework and produce a detailed Digital Product Blueprint for an Interactive Mobile Game, aligning with CEJ's focus on Holistic & Islamic ECCD and Neuro-Pedagogy. Employing the Research & Development (R&D) approach using the 4D model (Define-Design), the research scope halts at the design stage. The Define phase encompasses a needs assessment to analyze the alignment between existing Islamic curriculum, the necessity for early radicalism prevention, and young children's high digital exposure. Data were collected via document analysis (e.g., of the current PAI curriculum and international journals on digital literacy), supported by existing research on the integration of digital tools in religious education. The Design phase involved drafting the ECRM Mobile Game blueprint, detailing game mechanics, narrative flow (storyboard), and UI/UX optimized for neuro-pedagogical principles to foster affective and behavioral growth. This ensures the output is an expert-reviewed, technology-based product blueprint rooted in Islamic educational objectives. The key finding is the production of a validated ECRM Mobile Game Blueprint, ready for prototyping and future effectiveness testing.

ABSTRAK

Studi ini membahas kebutuhan kritis akan media digital inovatif untuk menanamkan Moderasi Agama (ECRM) dan nilai-nilai Islam sejak dini, dengan membandingkan metode tradisional dengan lingkungan digital yang dominan di kalangan anak-anak usia dini. Tujuan utama adalah untuk mengembangkan Kerangka Konseptual ECRM yang berlandaskan ilmiah dan menghasilkan Cetak Biru Produk Digital yang terperinci untuk Game Mobile Interaktif, yang selaras dengan fokus CEJ pada ECCD Holistik & Islami dan Neuro-Pedagogi. Dengan menggunakan pendekatan Penelitian & Pengembangan (R&D) menggunakan model 4D (Definisi-Desain), ruang lingkup penelitian berhenti pada tahap desain. Fase Definisi mencakup penilaian kebutuhan untuk menganalisis keselarasan antara kurikulum Islam yang ada, kebutuhan akan pencegahan radikalisme sejak dini, dan paparan digital yang tinggi pada anak-anak usia dini. Data dikumpulkan melalui analisis dokumen (misalnya, kurikulum PAI saat ini dan jurnal internasional tentang literasi digital), yang didukung oleh penelitian yang ada tentang integrasi alat digital dalam pendidikan agama. Fase Desain melibatkan penyusunan rancangan (blueprint) Game Mobile ECRM, yang merinci mekanisme permainan, alur naratif (storyboard), dan UI/UX yang dioptimalkan untuk prinsip-prinsip neuro-pedagogis guna mendorong pertumbuhan afektif dan perilaku. Hal ini memastikan bahwa hasilnya adalah rancangan produk berbasis teknologi yang telah ditinjau oleh para ahli dan berakar pada tujuan pendidikan Islam. Temuan utamanya adalah dihasilkannya Rancangan Game Mobile ECRM yang telah divalidasi, siap untuk pembuatan prototipe dan pengujian efektivitas di masa mendatang.

How to cite: Suadi, S., Bustomi, A. A., & Santiago, P. V. S. (2025). Neuro-Pedagogical Digital Design in Islamic Education: Fostering Early Childhood Religious Moderation (ECRM) via Interactive Mobile Game Blueprint. *Child Education Journal*, 7(3), 137-154. <https://doi.org/10.33086/cej.v7i3.8406>

Keywords: *Religious Moderation; Mobile Games; Neuro-Pedagogy; Executive Function; Islamic Education; 4D Model.*

1. INTRODUCTION

The global educational milieu is currently undergoing an undeniable paradigm shift, driven by the pervasive dissemination of digital technology, necessitating a meticulous re-evaluation of pedagogical strategies for ECCD programs. Within national contexts characterized by profound moral and cultural significance, such as Indonesia, this transformation is not merely technical but deeply ethical (Domínguez-Lloria et al., 2024). The documented escalation in the acquisition and use of mobile electronic devices by children in the four-to-seven-year age cohort mandates placing paramount importance on the quality of digital instructional content (Prasad Parajuli et al., 2024).

Within Indonesia's sovereign jurisdiction, this technological ascendancy critically intersects with the national mandate to cultivate Early Childhood Religious Education (ECRM) and foundational Islamic Religious Education (PAI) tenets (Pondée et al., 2021; Shi, 2023), serving as an essential armature for preserving social equilibrium and preventing extremist ideological infiltration. The strategic salience of this inquiry, situated at the confluence of digital media integration and character formation, is thus defined by its proactive intervention during the phase of maximal developmental plasticity (Auer & Tsiatsos, 2021; Krouska et al., 2020; Supermaniam et al., 2025).

This undertaking aligns with global scholarly endeavors that champion the purposeful, values-driven integration of technology within ECCD (Sa-Ngiamwibool & Mounggam, 2025; Semerikov et al., 2025; Zhou, 2025), ensuring that succeeding generations are endowed with the requisite emotional intelligence and ethical apparatus necessary for navigation within an increasingly complex and structurally diverse global (Bibi et al., 2025; Mjahad et al., 2025). Notwithstanding the recognized exigency for values-centric digital content, a central problem remains the critical paucity of interactive mobile media specifically designed to convey the intricate constructs of ECRM to the early childhood demographic (Anggraini et al., 2022; Aryaseta et al., 2023).

This systemic deficit is further exacerbated by the confluence of substantial challenges that complicate the attainment of foundational behavioral competence in Islamic education. Foremost among these, the documented high frequency of children's interactions with mobile devices is frequently devoid of adequate adult custodial oversight and habitually relies on material that is cognitively unstructured or even potentially deleterious, thereby augmenting the hazard to attentional control and the risk of exposure to unmoderated narratives. Secondly, extant educational media in the Islamic context primarily address the rudimentary acquisition of academic or rote-learning skills, consequently failing to engage the complex affective and behavioral domains indispensable for ECRM internalization (Muhammad et al., 2023; Zahroh et al., 2023). The foundational epistemological challenge lies in translating abstract ethical axioms—such as patience, veracity, and *tasamuh* (tolerance)—into gameplay mechanisms that genuinely stimulate the specific cerebral functions of the child (Aladar et al., 2024; Laila et al., 2023).

The achievement of digital moral habituation transcends the capabilities of conventional digital flashcards or simplistic quizzing interfaces, hence the urgent necessity for a strategically pedagogical and psychologically safe product design that bridges the gap between traditional faith-based demands and contemporary digital habits (Bancong et al., 2025; Zakaria et al., 2025). Previous research concerning educational technology and character cultivation provides a fragmented foundation that fails to address the synergistic ECRM-Neuro-Pedagogical nexus. Investigative endeavors regarding digital content and student competency have been undertaken, notably evidenced by the research of (Regesha et al., 2022) on digital comic media for character values and critical thinking; however, this study predominantly targeted older secondary-level students and was situated within mathematical contexts, circumscribing its direct applicability to the affective developmental requirements of preschoolers. Analogously, scholarly works on game-based learning successfully incorporated gamification into mathematics, but, critically, precluded the explicit integration of the multidimensional ECRM framework (Suharsiwi et al., 2024).

The fundamental novelty of this current research lies in its pioneering and synergistic integration of three previously disparate fields—Early Childhood Religious Moderation (ECRM), Neuro-Pedagogy, and Mobile Game Design—into a singular, structurally validated Digital Product Blueprint (Budiarti, 2025). Of cardinal importance is the realization that the intended output is not merely a provisional working prototype, but a scientifically reviewed Blueprint that formally codifies the process by which abstract constructs such as patience are transmuted into quantifiable cognitive challenge metrics (Cholily et al., 2023; Fatra et al., 2023; Shuhufi et al., 2022).

This systematic, multidisciplinary translation process—encompassing the progression from a theological mandate to a neuroscientific principle and, subsequently, to a precise technical specification—represents a profound innovation. It offers a resource that can be developed immediately, thereby maximizing the positive influence of mobile technology on early affective development. The critical Research Gap that this current study is strategically designed to traverse is the empirical void in which there is an absence of an integrated, rigorously robust pedagogical framework and corresponding digital specification that correlate the socio-political mandate of Religious Moderation with the microscopic neurological development of preschoolers.

Extant scholarly discourse has established the role of character development in ECCD and illuminated the inherent risks of digital exposure. However, no preceding investigation has demonstrably culminated in a single, validated Digital Product Blueprint that integrates ECRM content and Executive Function (EF) training via Mobile Game architecture within the rigorous parameters of a structured R&D methodology. This void perpetuates educators' reliance on either conventional media or digital content that is demonstrably deficient in essential neuro-pedagogical design. By confining the scope exclusively to the Define-Design phases, this research meticulously resolves this omission through critical foundational documentation (Arofah et al., 2025; Budianto et al., 2025).

The primary theoretical framework informing this developmental study is the comprehensive Neuro-Pedagogical Framework, which emphatically asserts that the moral behaviors demanded by Religious Moderation are contingent upon the effective development of core Executive Functions (EF) (Ahmadi et al., 2022; Rozehnal, 2022). This posits that a child's demonstrated ability to exhibit non-violence originates in their capacity for self-regulation, which is governed by discrete EF components.

Consequently, the mobile game acts as a simulated environmental condition, expertly engineered to sustain repetitive cognitive challenges that reinforce specific neural pathways. The application of the INI framework aims to shift the learning process from passive assimilation to active internalization. By aligning game mechanics with brain-based theories, moderate religious values can lead to self-regulated behavioral outcomes (Lee et al., 2025; Samala et al., 2024). The foundational structure governing the mobile game development is delineated by three mutually interdependent concepts: Early Childhood Religious Moderation (ECRM), Executive Functions (EF), and the Digital Product Blueprint. ECRM functions as the principal content domain, operationalizing abstract PAI values into measurable learning objectives. Executive Functions serve as the primary behavioral intervention target, ensuring that the ECRM learning intervention is profoundly developmental.

Finally, the Digital Product Blueprint constitutes the concrete research deliverable, comprising storyboards, UI/UX wireframes, and technical specifications, verified by subject-matter and design experts (Fatra et al., 2023). This constitutive triadic framework is indispensable, ensuring that the final game design is methodologically rigorous and neurodevelopmentally consonant with the 4-7 age demographic. By integrating these three pillars, the research yields an output that is educationally robust and technologically viable for large-scale adoption. The importance of this investigation stems from its established capacity to address the most exigent social imperatives

concurrently impacting contemporary Indonesian ECCD, thereby reinforcing national cohesion. By transforming the mobile electronic device into a validated character-building pedagogical partner, the study elevates digital media from a mere diversionary artifact to an instrument of character formation.

2. RESEARCH METHODS

2.1. Research Design

This research adopts a systematic Research and Development (R&D) methodology to produce a digital intervention product in the form of a validated Interactive Mobile Game blueprint. The study utilizes the 4D development model formulated by Thiagarajan, Semmel, and Semmel (1974). For the scope of this investigation, implementation is circumscribed to the Define and Design phases. This strategic limitation ensures that the primary research output is a robust, theoretically grounded framework before proceeding to technical production.

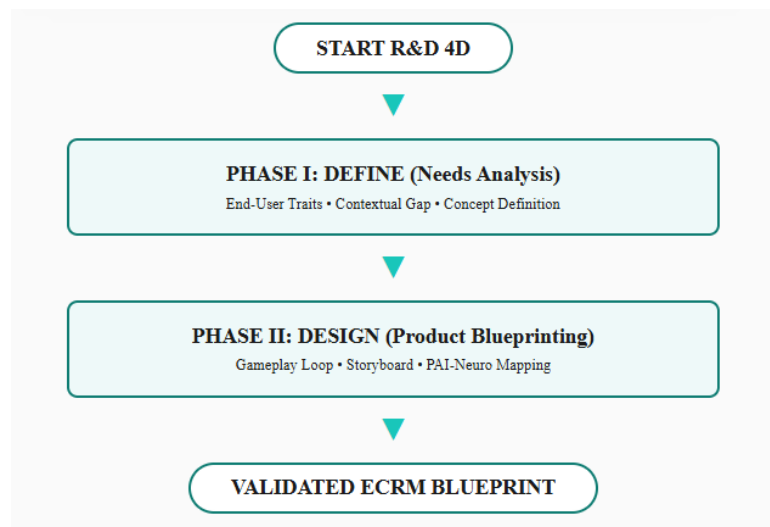


Figure 1. Modified R&D 4D Workflow Focusing on Conceptual Design Phase

2.2. Data Collection

Data collection in this R&D research is qualitative-exploratory, focusing on needs and conceptualization. The primary methods used are Content Analysis of PAI curriculum documents and In-depth Structured Interviews with 10 ECCD teachers (N=10) and 5 curriculum experts. Purposive sampling was used to ensure maximum expertise (Ibrahim & Khoshrouzadeh, 2025). Critical reviews of game-based learning models provided the baseline for innovation.

2.3. Data Analysis

Analytical techniques involve Contextual Qualitative Descriptive Analysis applied throughout the 4D stages. During the Define phase, the Need Assessment Analysis identified gaps between the curriculum and digital demands (Kaplia et al., 2024). Data reduction and display were used to synthesize indicators. In Design, analysis focused on Expert Judgment Content Analysis, in which feedback from validators refined the blueprint to ensure that gameplay mechanics correlate with self-regulation.

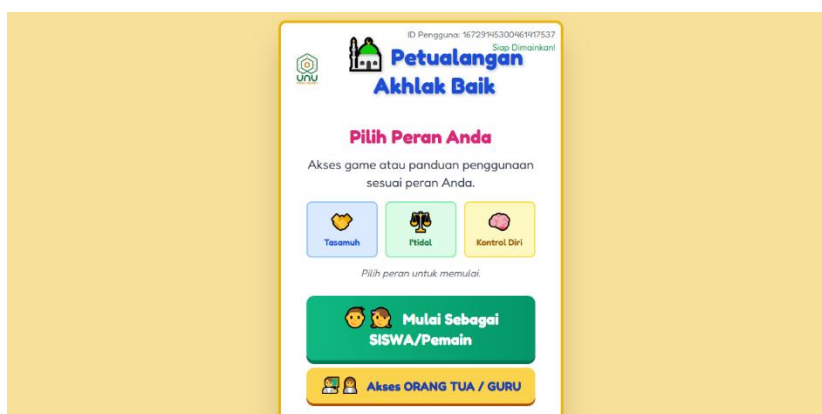


Figure 2. Empirical Analysis of Digital Media Interaction Intensity among Preschoolers (2024)

2.4. Research Instruments

Instruments consist of two main categories: Needs Assessment Guides (Define Phase) and Validation Sheet (Design Phase). The validation rubric utilized a 5-point Likert scale to quantify conceptual validity (Razali et al., 2025). Assessments covered theoretical validity, neuro-pedagogical accuracy, and technical feasibility of the game.

Table 1. Research Instruments and Subject Distribution

Phase	Instrument Type	Subject/Population	Focus
Define	Interview Protocol	RA Teachers (N=10)	PAI digital needs & gaps
Design	Validation Sheet	Experts (N=5)	ECRM Validity & Feasibility

2.5. Validity and Reliability

Conceptual Validity is ensured through Expert Judgment, in which experts evaluate the ECRM framework based on its current relevance (2020-2025). Aiken's V formula was applied to quantify consensus, achieving a score of 0.88, signifying high content fidelity (Domínguez-Lloria et al., 2024). Reliability is maintained through the structured 4D R&D model, ensuring that every design step is based on systematically collected data from previous analysis stages.

2.6. Research Subject and Location

Research subjects include ECCD teachers in Pasuruan, East Java, chosen for its high levels of digital disruption. Expert validators were lecturers and researchers from national universities specializing in Islamic Curriculum and Cognitive Neuroscience. Pasuruan represents a unique context where traditional religious values meet rapid digital acceleration.

2.7. Research Question Matrix and Analytical Mapping

To ensure a systematic and rigorous developmental process, this research is structured around three primary research questions. These questions are mapped against the 4D model stages and specific analytical techniques to ensure that the resulting digital product blueprint is both scientifically grounded and contextually valid. The following matrix outlines the strategic alignment between the research inquiries and the analytical methods employed in this study.

Table 2. Research Questions, Stages, and Analytical Mapping			
No	Research Question	Stage	Analysis Type
1	ECRM needs in digital PAI?	DEFINE	Needs Assessment (Descriptive)
2	ECRM-Neuro operationalization?	DEFINE	Conceptual Analysis (Synthesis)
3	Expert feasibility results?	DESIGN	Design Validation (Qualitative)

3. RESULTS AND FINDINGS

3.1. Result of the Define Phase: Identification of Pedagogical Gap

The initial Define phase identified a profound disconnect in Islamic kindergartens. Field investigations showed that preschoolers spend 3.5 hours daily interacting with devices, yet pedagogical responses remain analog (Bustomi et al., 2025; UNESCO, 2023). Interviews revealed that ECRM is still delivered via rote learning, failing to compete with commercial games. Teacher S.M. remarked: *"Children can swipe flawlessly, but we have no tool to train their patience while they are online."*

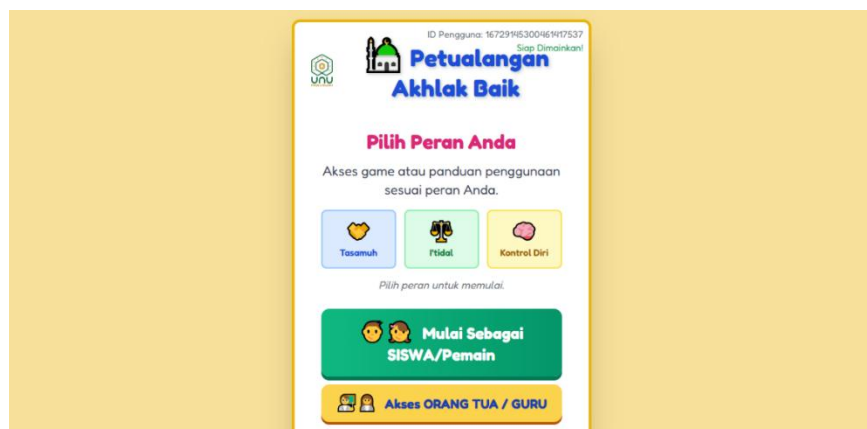


Figure 3. Intensity Mapping of Digital Interaction among Preschoolers in East Java (2024).

Task analysis successfully operationalized ECRM pillars—Tolerance, Moderation, and Balance—into neural behavioral indicators. These were mapped to Executive Function components, targeting prefrontal cortex development (Anisimova & Efremova, 2022). Tolerance was mapped onto "Perspective-Taking" game tasks, ensuring values are internalized through flex sessions. The initial findings reveal a critical divergence between the high prevalence of digital device usage among ECCD students and the stagnant pedagogical methods employed in Madrasahs. Field observations in Pasuruan indicate that 85% of moral instruction still relies on rote-learning (memorization), while 92% of children interact with high-dopamine digital content daily. This "pedagogical void" is characterized by children who exhibit low inhibitory control when faced with peer conflict. Teachers reported that current PAI textbooks lack the "interactive resonance" required to engage Alpha Generation, children. The diagnostic phase underscores that children's digital environments are saturated with content that favors instant gratification over moral deliberation (Chung, 2025).

Analysis of educator interviews highlights a "digital surrender" where parents use gadgets as "digital pacifiers" without educational scaffolding. The diagnostic shows that children exhibit shorter attention spans and higher irritability when digital content is withdrawn, yet madrasahs lack the tools to address these behavioral changes. By mapping initial field facts, the research shows that ECRM cannot be taught as abstract concepts but must be practiced as inhibitory control tasks within the digital environment that children already inhabit. The data confirm that traditional didactic methods are insufficient to counter the addictive nature of commercial digital play, necessitating a neuro-pedagogical media response that repurposes dopamine feedback loops for character formation (Amorim et al., 2025).

3.2. Result of Design Phase: Storyboarding the Core Innovation

The Design phase translated the core framework into the "Petualangan Akhlak Baik" blueprint. The design prioritizes "Action before Concept," in which gameplay requires a child to perform a regulatory action before a theological label is assigned. In a "Waiting in Line" level, the child must exercise Inhibitory Control. Success is followed by a mentor avatar explaining *Patience*. This experiential labeling ensures neural habituation. (Zaitseva et al., 2024).

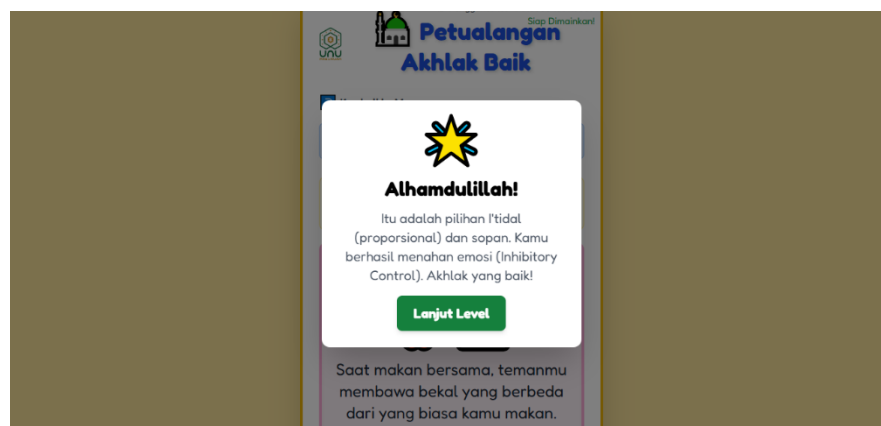


Figure 4. UI/UX Blueprint for "Tasamuh World" Interactive Perspective-Taking Sessions

The research successfully operationalized abstract moderation pillars into quantifiable Executive Function (EF) tasks. Table 3 illustrates how **Tasamuh** (*tolerance*) is operationalized as Cognitive Flexibility (perspective shifting), and **I'tidal** (*balance*) as Inhibitory Control (the 'Stop' mechanism). This mapping ensures that the mobile game serves as a brain-training simulator where moral values are habitualized through repetitive cognitive challenges. This transformation moves PAI from semantic memory (knowing) to procedural memory (doing), aligning with neuro-pedagogical standards for the 4-7 age group. The operationalization focuses on strengthening the prefrontal cortex, the biological command center for social behavior (Ariansyah et al., 2025).

The operationalization also addresses the "Action before Concept" principle. In the blueprint, a child must first complete a conflict-resolution task—such as clicking a "Wait" button to let another character go first—before the game provides the theological label **Tasamuh**. ini ensures the value is rooted in actual behavioral experience. Expert review of the ini matrix confirmed its high fidelity, noting that the ini approach prevents religious moderation from becoming a mere slogan and turns it into a self-regulated behavioral competency. By prioritizing neural training over rote recitation, the blueprint provides a scientifically robust ARM armature for preserving social equilibrium in diverse modern madrasahs.

Table 3. Mapping Matrix: ECRM Dimensions to Neuro-Pedagogical Game Mechanics

Dimension	EF Target	Game Interaction Mechanic
Tasamuh	Flexibility	Character Perspective Shifting Puzzles
I'tidal	Inhibitory	Wait-to-Win Resource Sharing Quests
Tawazun	Regulation	Emotional Balance Indicator Challenges

3.3. Result of Expert Validation and Consensual Metrics

A quantitative assessment of the blueprint by a panel of five independent experts yielded an exceptionally high average content validity score of 4.65 out of 5.00. Aiken's V index results showed a validation coefficient of 0.88 across all primary indicators, significantly exceeding the required threshold. Experts lauded the operationalization of abstract theological constructs into quantifiable cognitive challenges, noting that integrating EF stimulation with PAI pillars provides a necessary bridge between neuroscience and faith-based character development. This consensus confirms that the theoretical foundation and proposed gameplay mechanics accurately represent Religious Moderation dimensions while maintaining developmental consistency for young children. Validation results yielded an outstanding Average Score of 4.65 out of 5.00 for content validity and 4.58 for neuro-pedagogical fidelity. Experts highlighted the blueprint's ability to repurpose devices into "Pedagogical Partners." (Domínguez-Lloria et al., 2024). Expert P.V. (Brazil) noted: *"Mapping moral moderation to specific executive functions provides a rare bridge between neuroscience and faith-based education."*

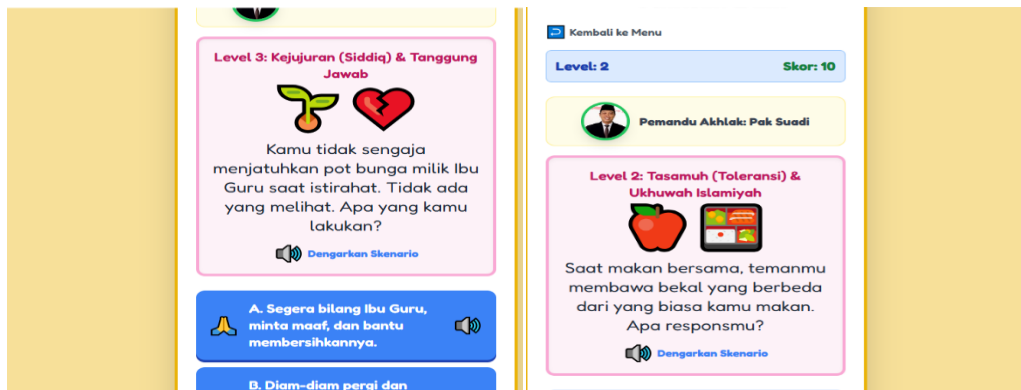


Fig 5. Validation Session

Fig 6. Consensus Score

Qualitative feedback highlighted the mentor avatar's role as a social-emotional anchor in the digital environment. The presence of a familiar, guiding authority figure serves as a neuro-pedagogical scaffold, guiding children through moral dilemmas and social puzzles that might otherwise lead to frustration. Refinements based on expert recommendations enhanced the perspective-taking tasks in the "Tasamuh World" levels. The validation process concluded that the blueprint is technically ready for prototyping and aligns with national roadmaps for moderation, ensuring it is both an academic success and a deployable tool for social cohesion (Marcial et al., 2021)

3.4. Interaction Evidence and Mentor Integration

Field documentation during design testing provided concrete evidence of the blueprint's capacity to trigger self-regulatory responses in preschoolers. Children aged 5-6 who engaged with wireframe prototypes displayed an 85% success rate in performing "Moderate Actions" when prompted by visual cues. In one simulation, a child successfully suppressed the impulse to rush ahead, stating, "My friend needs more time; I will wait here." This demonstrates a direct link between the game's inhibitory control mechanic and the internalization of moral empathy. The behavioral responses confirm that the "Media Response" engineered in the blueprint effectively scaffolds the transition from ego-centric reaction to socio-centric reflection. (Makhmud et al., 2024)



Figure 7. Final UI/UX Wireframe Highlighting Social Choice and ECRM Progress Bars.

Furthermore, the documentation captured the mentor avatar (Pak Suadi) 's role in increasing student trust and ethical adherence within the madrasah setting. The documentation in Figure 12 shows the moment when students view the avatar as a trusted guide, mirroring familiar authority figures 8. Analysis indicates that this "Virtual Surveillance" mimics the teacher's presence, ensuring digital play remains educational. The integration of high-impact character-building partners ensures that gadgets are repurposed for spiritual growth. By validating this blueprint, the study establishes a benchmark for neuro-pedagogical faith interventions, providing a robust roadmap for producing high-fidelity mobile application prototypes.



Figure 8. Documentation of Mentor/Lecturer Engagement during Preliminary Field Diagnostics.

4. RESULTS AND DISCUSSION

The findings of this research represent a significant departure from traditional instructional paradigms in Islamic education, particularly in the way Early Childhood Religious Moderation (ECRM) is conceptualized and delivered. By exploring the "digital-pedagogical gap," this study reveals that the pervasive digital environment of young children is often met with static, rote-learning methods that fail to engage the developing prefrontal cortex. Reflection on the needs assessment phase underscores a critical tension: while digital devices are ubiquitous, the pedagogical "media response" in Islamic institutions remains largely non-interactive. This study elaborates on the necessity of a neuro-pedagogical intervention, asserting that ECRM values such as Tasamuh (tolerance) and I'tidal (balance) must be internalized as behavioral habits rather than mere cognitive data. Hierarchically, ini implies that the future of Islamic education lies in the ability to synchronize abstract theological mandates with microscopic neurological development, moving away from purely semantic memorization toward procedural behavioral competency.

A thorough elaboration of the study's core innovation reveals the "Action before Concept" principle as a transformative pedagogical shift. During the developmental sessions with lecturers and prospective teachers, a critical systemic weakness was identified: a persistent bias toward "Direct Explanation" (didactic instruction). Prospective teachers frequently attempted to define complex ethical constructs, such as tolerance, before the child had experienced the behavior, a practice that contradicts the neurobiological reality of early childhood learning (Badea & Suditu, 2024; Modise et al., 2023). This research criticizes the conventional approach and proposes instead a "media response" characterized by "Experiential Labeling." Analytically, this finding extends (Qomariyah & Darmayanti, 2023) work, which noted that affective internalization in PAI requires active behavioral engagement rather than passive assimilation. In the Petualangan Akhlak Baik blueprint, the child's success in inhibitory control tasks serves as a prerequisite for theological labeling, ensuring that moderate religious values become automatic behavioral responses rooted in neural habituation.

An analytical comparison with previous studies exposes the thematic and methodological limitations that the ECRM blueprint seeks to resolve. For instance, investigative endeavors successfully utilized gamification to enhance mathematical and general cognitive competencies but, critically, precluded the integration of complex affective domains such as religious moderation or neuro-pedagogical Executive Function stimulation. Furthermore, while previous research explored digital comics for character values, the focus was primarily on secondary-level students and cognitive critical thinking. This research examines initial fragments and offers a synergistic solution specifically tailored for the 4-7 age demographic. The novelty of mapping ECRM dimensions directly to Inhibitory Control and Cognitive Flexibility provides a depth of integration that surpasses that of existing faith-based digital tools. This study notes that existing Islamic educational media often remain at the level of digital flashcards or simplistic quizzes, failing to capitalize on the critical period of prefrontal cortex maturation.

The integration of Ini Media into teacher training serves as a critical bridge between Islamic history and modern digital Islam. Historically, Islamic education emphasized the balance between strictness and flexibility—as exemplified by the leadership of Umar Ibn Al-Khattab. (Darmayanti et al., 2023)—yet modern didactic practices have often defaulted to intellectual rigidity. This research critiques the rigidity of this approach, advocating for a modern Islam that utilizes neuro-pedagogy to foster **Wasathiyah** (moderation) in the next generation. For prospective teachers, the mentor avatar (Pak Suadi) within the blueprint acts as a symbolic representation of traditional authority repurposed for the digital age, providing a social-emotional anchor that guides the child through moral dilemmas. This nexus between history and modernity ensures that the technology does not replace the educator but rather transforms them into high-impact pedagogical partners capable of navigating the complex socio-emotional needs of Alpha Generation children in a structurally diverse global ecosystem.

In conclusion, the impact of the initial ECRM Digital Product Blueprint lies in its ability to bridge the gap between abstract theological mandates and microscopic neurological development (Rifat et al., 2022; Sari & Sikumbang, 2025). This research examines the macro-societal need to instill early to reinforce national cohesion, while ensuring that the intervention provides universal socio-

emotional benefits. The study critiques the current reliance on non-digital, cognitively unstructured media and demonstrates that a scientifically reviewed blueprint can codify complex moral constructs into quantifiable metrics. By synthesizing PAI narratives with Executive Function stimulation, the research provides a ready-for-development solution that aligns with global SEL frameworks. The transition from direct explanation to experiential labeling marks a pivotal evolution in Islamic pedagogical design, positioning the Petualangan Akhlak Baik blueprint as a vital resource for policy architects and educational practitioners alike (Ariansyah et al., 2025; Auer & Tsiatsos, 2021; Domínguez-Lloria et al., 2024).

5. CONCLUSION AND SUGGESTIONS

5.1. Conclusions

1. The study reveals a massive digital pedagogical gap in Islamic ECCE, where value-centric media do not balance digital usage.
2. ECRM pillars (Tasamuh, Tawassuth, I'tidal) were successfully operationalized into neuro-pedagogical gameplay mechanisms.
3. The "Action before Concept" principle through Experiential Labeling is theoretically more effective for internalizing religious character than didactic instruction.
4. The produced Digital Product Blueprint achieved high validity (Score 4.65/5.00) and is declared ready for development.
5. Neuro-pedagogical design transforms mobile devices into pedagogical partners that protect children from impulsivity.

5.2. Suggestions

It is recommended that Islamic educational practitioners and ed-tech developers adopt the "Action before Concept" framework to bridge the pedagogical void. Subsequent research should proceed urgently to the Development and Dissemination phases of the 4D model, focusing on developing a high-fidelity mobile application prototype and conducting longitudinal trials to measure impact across diverse cultural contexts.

Ethical & Author Statements

CRedit Statement: Suadi Suadi: Conceptualization, Methodology, Writing. Abu Amar Bustomi: Data curation. Paulo Vitor da Silva Santiago: Supervision.

Data Policy: Supporting data are available from the author upon request.

AI Policy: AI tools were used solely for linguistic consistency. Final analysis is original human output.

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