

Innovative Technology-Driven Curriculum in PAI and Students Critical Thinking Development

Mohamad Erihadiana^{1*} , Aldy Rialdy Atmadja² , Oban Sobandi³ , Muhammad Insan Al-Amin⁴ 

¹Postgraduate Faculty of Education and Teaching, Sunan Gunung Djati State Islamic University, Indonesia

²Faculty of Science and Technology, Sunan Gunung Djati State Islamic University, Indonesia

³Faculty of Tarbiyah and Teacher Training, Sunan Gunung Djati State Islamic University, Indonesia

⁴Faculty of Information Technology, Monash University, Australia

¹erihadiana@uinsgd.ac.id, ²aldyrialdy@uinsgd.ac.id, ³obansobandi@uinsgd.ac.id, ⁴muhammad.al-amin@monash.edu

*Corresponding Author

Article Info

Article history:

Submission February 27, 2025

Revised January 12, 2026

Accepted September 11, 2026

Published September 29, 2026

Keywords:

Technology
Curriculum
Critical Thinking Skills
Islamic Religious Education
Interactive Learning



ABSTRACT

This study examines the influence of a technology and creativity-based curriculum on students critical thinking skills in Islamic Religious Education (PAI) subjects at the high school level. A curriculum based on technology and creativity integrates the use of digital tools and creative approaches in learning, aiming to prepare students to face the challenges of the digital era with strong analytical and innovative skills. **Through a literature review approach, this study analyzes various studies** linking the application of technology in learning to improvements in critical thinking skills. **The analysis results** show that integrating technology and creativity into the IRE curriculum positively impacts students' abilities in analysis, evaluation, and decision-making. **The conclusion of this study** highlights the importance of implementing a technology and creativity-based curriculum to create an interactive and relevant learning environment, supporting students' character development and critical thinking skills essential in the modern era. **This study recommends** developing a responsive curriculum and training teachers in educational technology to optimize the curriculum's implementation.

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DOI: <http://doi.org/10.34306/att.v8i3.647>

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1. INTRODUCTION

A technology and creativity-based curriculum integrates digital tools and creative approaches into the learning process to better prepare students for the challenges of the digital era [1, 2]. This approach emphasizes not only knowledge acquisition but also the development of critical thinking, innovation, and problem-solving skills that are essential in the 21st century [3]. By utilizing digital platforms, educational applications, and interactive media, learning becomes more engaging, flexible, and student-centered [4]. Students are encouraged to explore learning materials independently, adapt to different learning styles, and actively construct knowledge through meaningful and creative experiences [5].

The implementation of this curriculum requires adequate technological infrastructure, teacher competence, and well-designed interactive learning strategies [6, 7]. Teachers play a crucial role as facilitators who guide students in using technology effectively while connecting theoretical knowledge with real-world applications [8, 9]. Project-based learning is a key component, as it allows students to engage in collaborative

activities, solve authentic problems, and develop innovative solutions using digital tools [10]. This approach not only increases student engagement but also fosters creativity, analytical thinking, and collaboration, which are essential competencies in modern education [11].

Critical thinking, which encompasses analysis, evaluation, interpretation, and decision-making, is a fundamental skill that must be developed in contemporary learning environments. Technology enhanced education provides students with access to diverse and complex information, requiring them to assess the credibility of sources and make informed judgments [12, 13]. In the context of Islamic Religious Education, critical thinking enables students to understand and interpret religious teachings more deeply and contextually, linking moral values with real-life situations [14, 15]. This process helps students become more reflective, analytical, and responsible in their thinking [16, 17].

The integration of technology and creativity in Islamic education not only enhances learning engagement but also contributes to the development of students cognitive and life skills [18, 19]. Through interactive platforms, digital collaboration, and creative learning activities, students are encouraged to express ideas, evaluate different perspectives, and construct logical arguments [20, 21]. This approach supports the formation of independent learners who are capable of adapting to the complexities of the digital era. Ultimately, a technology and creativity-based curriculum plays a strategic role in developing critical thinking while also fostering innovation, adaptability, and readiness to face future challenges in a rapidly evolving society [22].

1.1. Creativity as a Driver of Innovation and Entrepreneurial Thinking

Creativity plays a central role in modern education as a key factor in generating innovative ideas and solutions [23]. In technology enhanced learning environments, creativity is fostered through approaches such as project-based learning, design thinking, and collaborative digital activities [24]. These approaches encourage students to explore new perspectives, experiment with ideas, and develop innovative solutions to real-world problems [25]. From an entrepreneurial perspective, creativity is closely linked to opportunity recognition and innovation capability [26]. Students who develop creative thinking skills are more likely to identify business opportunities, design innovative products or services, and adapt to changing environments [27, 28]. Therefore, integrating creativity into technology-based curricula not only enhances cognitive development but also supports the formation of an entrepreneurial mindset, which is essential in the context of technopreneurship and digital innovation [29].

1.2. Critical Thinking and Digital Competence

Critical thinking is widely recognized as a fundamental skill in the 21st century, particularly in the context of digital information overload [30]. It involves the ability to analyze, evaluate, and interpret information objectively, as well as to make informed decisions based on evidence [31]. Technology-based learning environments provide opportunities for students to engage with complex information, participate in discussions, and receive real-time feedback, all of which contribute to the development of critical thinking skills [32]. In addition to cognitive benefits, critical thinking is also essential for entrepreneurial activities [33]. Entrepreneurs must be able to assess risks, evaluate market opportunities, and make strategic decisions [34]. Therefore, the integration of critical thinking within technology-based curricula plays a significant role in preparing students for both academic success and entrepreneurial challenges [35].

1.3. Islamic Edupreneurship and Value Based Innovation

The concept of edupreneurship extends traditional educational goals by incorporating entrepreneurial principles into learning processes [36]. In the context of Islamic education, this concept evolves into Islamic edupreneurship, which combines innovation, entrepreneurship, and Islamic values such as ethics, social responsibility, and sustainability. Islamic edupreneurship emphasizes the creation of value not only in economic terms but also in social and moral dimensions [37]. Technology integration in Islamic education provides opportunities for students to develop innovative solutions that are aligned with ethical principles and community needs. This approach supports the development of responsible entrepreneurs who are capable of contributing to sustainable socio-economic development [38, 39].

1.4. Integrating Technology Creativity and Entrepreneurship

Despite extensive research on technology integration, creativity, and critical thinking, these elements are often studied in isolation. There is a lack of integrative frameworks that explain how these components interact to produce entrepreneurial outcomes [40]. This fragmentation limits the ability to fully understand the

role of education in fostering innovation and technopreneurship [41, 42]. To address this gap, this study proposes an integrative perspective in which technology-based curriculum serves as the foundation for enhancing creativity and critical thinking, which in turn contribute to the development of Islamic edupreneurship capabilities. This integrated approach highlights the importance of aligning educational innovation with entrepreneurial objectives, ultimately supporting socio-economic impact and sustainable development [43].

2. RESEARCH METHOD

This study employs a research design with a literature review approach to evaluate the influence of a technology and creativity-based curriculum on students' critical thinking skills in PAI [37]. Through the literature review, researchers gather and analyze various relevant prior studies to gain an in-depth understanding of the impact of implementing this curriculum within the context of religious education. Both qualitative and quantitative data analysis techniques were utilized to analyze the collected data, including descriptive statistical methods.

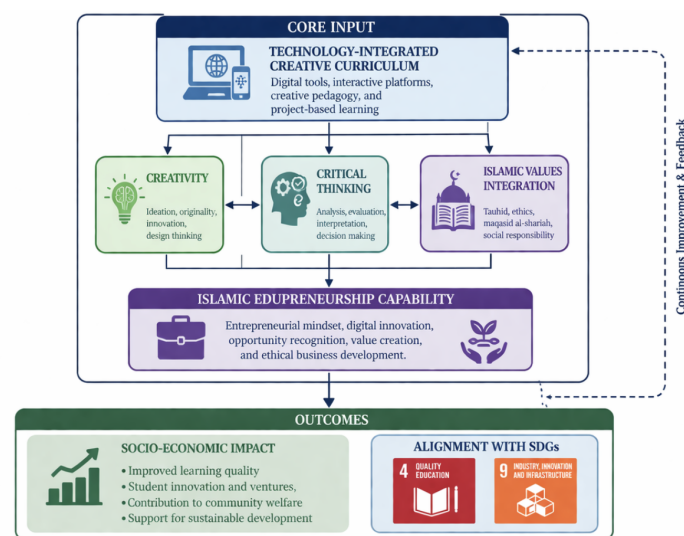


Figure 1. Conceptual Framework

Figure 1 illustrates the proposed conceptual framework that integrates technology-based curriculum, creativity, and critical thinking to develop Islamic edupreneurship capabilities. The framework highlights how technology-driven learning enhances creativity and analytical skills, which subsequently foster entrepreneurial mindset and innovation capacity. This framework supports SDG 4 by promoting technology-enhanced learning and competency development, while contributing to SDG 9 through digital innovation, entrepreneurship, and value creation. Ultimately, the framework aims to generate socio-economic impact and support sustainable development.

This analysis aims to objectively assess the effectiveness of the technology and creativity-based curriculum in enhancing students' critical thinking skills. This approach provides a comprehensive insight into the results and trends derived from previous studies, thereby strengthening the validity and reliability of the findings.

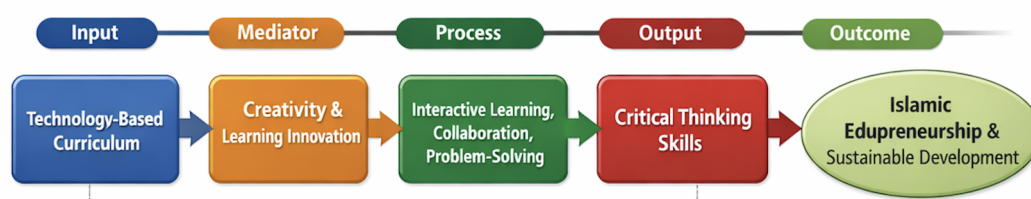


Figure 2. Integrated Model of Technology, Creativity, and Critical Thinking in Islamic Education

Figure 2 illustrates an expanded framework that highlights the interaction between technology integration, creative pedagogy, and critical thinking development. The model emphasizes that digital tools act as enablers, creativity serves as a mediator, and critical thinking emerges as the primary outcome, which further contributes to Islamic edupreneurship and sustainable innovation.

3. RESULT AND DISCUSSION

The results of this literature study indicate that a technology and creativity-based curriculum has a positive influence on the development of students critical thinking skills in PAI. The study's findings are as follows Table 1. Various studies analyzed in this literature review indicate that the integration of technology in learning can facilitate access to a broader and deeper range of information sources, while creativity-based approaches encourage students to think analytically and innovatively. These findings reveal that the application of technology and creativity in PAI classrooms not only makes learning more interactive and relevant but also develops essential critical thinking skills in the digital era. Through in-depth data analysis, this research demonstrates that students exposed to a technology and creativity-based curriculum exhibit a deeper understanding and improved evaluative abilities in interpreting religious values.

Table 1. Research Finding

Title, Year, and Authors	Journal	Variables	Research Methodology	Results
[30]	Jurnal Pendidikan Islam	Learning Technology, Critical Thinking	Qualitative	The use of learning technology is effective in enhancing students' critical thinking skills.
[37]	Jurnal Pendidikan West Science	Critical Skills, Creativity	Qualitative	Problem-based education improves students' critical and creative thinking skills.
[44]	Journal of Education Research	Independent Curriculum, Critical Thinking	Qualitative	Independent Curriculum enhances students' critical thinking skills.
[4]	Jurnal Ilmiah Pendidikan	Literacy, Critical Thinking	Quasi-experimental	Educational technology significantly improves students' literacy skills.
[5]	Jurnal Teknologi Pendidikan	Innovative Learning Model, ICT	Development	Teachers need guidance; study provides tutorials and examples.
[45]	Jurnal Pendidikan Matematika dan Sains	STM Model, Motivation, Critical Thinking	Quasi-experimental	STM learning improves motivation and critical thinking skills.
[10]	Jurnal Inspiratif Pendidikan	STEAM, Creative and Critical Thinking	Quasi-experimental	STEAM-PjBL enhances creative and critical thinking skills.
[34]	Jurnal Pembangunan dan Pendidikan	Creativity, PBL	CAR	Student creativity increases significantly through PBL.
[14]	Jurnal Prakarsa Paedagogia	Critical Thinking, PBL	Action Research	PjBL effectively enhances critical thinking skills.
[4]	Jurnal Didaktika Pendidikan Dasar	Critical Thinking, Discovery Learning	CAR	Discovery Learning improves critical thinking and outcomes.
[30]	Jurnal Pendidikan Indonesia	Critical Curriculum, PBL	Descriptive Qualitative	Cambridge Curriculum and PBL improve learning outcomes.

The findings of this study indicate that implementing a technology and creativity-based curriculum significantly enhances students' critical thinking abilities in PAI subjects. This aligns with constructivist theory, which posits that active and interactive learning can facilitate students' critical thinking processes. By utilizing technology, students are not merely passive recipients of information but active processors, enabling them to analyze, evaluate, and apply religious knowledge in their daily lives. Previous studies also support this, showing that the use of technology in learning enhances student engagement and encourages them to think more critically and creatively.

Moreover, creativity in curriculum design plays a vital role in developing critical thinking skills. Through innovative approaches, teachers can design activities that stimulate students' curiosity and encourage them to question, explore, and discuss religious concepts. Activities such as team-based projects and multimedia presentations provide opportunities for collaboration, an essential element in cultivating critical thinking skills. Previous research shows that students involved in collaborative learning tend to have more complex thinking and can view issues from multiple perspectives. Evaluations of the benefits of technology in PAI learning show that access to a broader and more diverse range of information can enrich students' learning experiences. Technology, such as educational software and online resources, allows students to explore various

perspectives in understanding religious teachings. This is consistent with findings from previous studies indicating that greater access to learning resources improves students' understanding and analytical skills. With a wider variety of information, students can deepen their critical thinking in a holistic way, enabling them to make better decisions in the context of religious values.

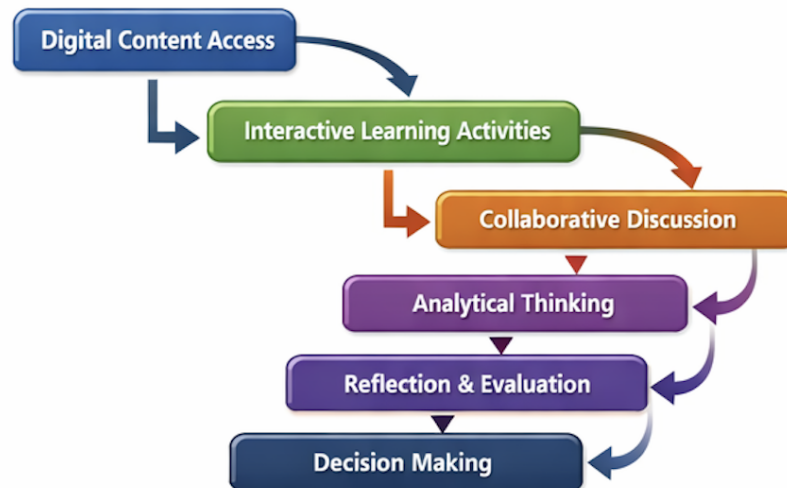


Figure 3. Technology-Enhanced Learning Process Flow in PAI Education

Based on Figure 3, the implementation of technology-enhanced learning in PAI illustrates a structured process from digital content delivery to critical reflection and decision-making. This study highlights that integrating technology and creativity into the PAI curriculum enhances students' critical thinking skills and supports character development in the digital era. The findings indicate that technology integration can encourage adaptive and relevant Islamic education by supporting personalized learning and effective pedagogical practices. This approach provides valuable insights for educators and policymakers in developing a more responsive curriculum that aligns with current educational needs.

The application of a technology and creativity based curriculum in PAI faces various challenges and obstacles that may affect its effectiveness. One major obstacle is the lack of adequate technological infrastructure in schools, especially in areas with limited access. Some schools may not have facilities like computers, internet access, or other digital learning tools, which are essential to support technology-based learning.

Table 2. Comparison between Traditional and Technology-Based Learning Approaches

Aspect	Traditional Learning	Technology-Based Learning
Learning Style	Teacher-centered	Student-centered
Interaction	Limited interaction	High interaction and collaboration
Learning Resources	Textbooks	Digital platforms, multimedia
Critical Thinking	Low stimulation	High stimulation through problem-solving
Flexibility	Fixed schedule	Flexible and adaptive learning
Creativity	Limited	Encouraged through digital tools

Table 2 presents a comparative analysis between traditional learning and technology-based learning approaches, highlighting significant differences in instructional design and learning outcomes. Traditional learning is predominantly teacher-centered, with limited interaction and reliance on textbooks as the primary source of knowledge. This approach often provides minimal stimulation for critical thinking and restricts students' creativity due to its rigid structure and fixed schedule. In contrast, technology-based learning emphasizes a student-centered paradigm, fostering high levels of interaction, collaboration, and engagement through digital platforms and multimedia resources.

This approach enables flexible and adaptive learning environments that encourage problem-solving, analytical thinking, and creativity. Consequently, the integration of technology not only enhances students'

learning experiences but also significantly contributes to the development of critical thinking skills, which are essential in the context of 21st-century education. Another challenge is the resistance to change from some parties, both teachers and students, who may feel more comfortable with traditional teaching methods. Some teachers may find it difficult to adapt to the new curriculum, while students accustomed to conventional learning methods may feel confused or unprepared for a more interactive and creative approach. To overcome these challenges, effective communication strategies are needed among stakeholders, including teachers, students, and parents, to explain the benefits of implementing a technology- and creativity-based curriculum. Developing orientation programs and workshops can be an effective solution to help teachers and students adapt to these new methods. By facilitating a smooth transition, it is hoped that the curriculum implementation will be more effective and positively impact the development of students' critical thinking skills in PAI.

4. MANAGERIAL IMPLICATION

The findings of this study provide several managerial implications for educational leaders, curriculum developers, and institutional policymakers in implementing technology-driven learning within PAI. School administrators should prioritize strategic investment in digital infrastructure, including reliable internet connectivity, smart classroom facilities, and access to educational software, to support the effective execution of technology-enhanced curricula. Without adequate infrastructure, the integration of digital learning tools may fail to achieve its intended pedagogical outcomes.

Educational institutions are encouraged to develop continuous professional training programs aimed at enhancing teachers' competencies in digital pedagogy, instructional creativity, and classroom technology integration. Teachers play a central role in transforming conventional instruction into student-centered, technology-supported learning environments. Therefore, managerial initiatives should focus on equipping educators with both technical expertise and pedagogical capabilities to maximize instructional effectiveness. Curriculum managers are also expected to establish structured frameworks that align technological innovation with Islamic educational values to ensure that digital transformation remains contextually relevant and ethically grounded. Integrating creativity-based learning activities, project-based assignments, and collaborative digital platforms into PAI instruction can strengthen students' analytical thinking while preserving moral and religious principles.

In addition, policymakers should implement systematic evaluation and monitoring mechanisms to assess the effectiveness of technology-based curriculum implementation regularly. Key performance indicators such as student engagement, critical thinking development, teacher adaptability, and learning satisfaction should be continuously measured to support data-driven decision-making and sustainable curriculum improvement. Through these managerial strategies, educational institutions can optimize the long-term impact of digital transformation in fostering critical thinking and innovation among students.

5. CONCLUSION

The findings of this study indicate that a technology- and creativity-based curriculum has a significant positive impact on students' critical thinking abilities in PAI. Students who participate in learning environments that integrate digital technology and creative instructional methods demonstrate improved capabilities in analytical thinking, evaluation, and decision-making when engaging with religious concepts. These findings highlight that innovative educational approaches can effectively support the development of higher-order thinking skills while enhancing students' understanding of Islamic teachings in a more dynamic and meaningful learning process.

Furthermore, the results emphasize the importance of integrating technology-driven strategies into Islamic education to meet the demands of modern learning environments. Teachers play a central role in this transformation and should continuously improve their competencies in utilizing digital tools and creative pedagogical approaches to foster interactive and student-centered learning experiences. At the same time, curriculum developers need to design learning materials that remain aligned with Islamic values while incorporating innovative and reflective activities that stimulate critical discussion and intellectual engagement among students.

To ensure the successful implementation of this curriculum model, educational institutions must provide sufficient technological infrastructure, professional training, and institutional support for educators. In addition, further research is recommended to explore broader applications of technology and creativity integra-

tion in Islamic education across diverse educational settings. Future studies may also investigate the long-term effects of this approach on students' character formation, religious comprehension, and their broader contribution to developing a more critical, knowledgeable, and socially responsible society.

6. DECLARATIONS

6.1. About Authors

Mohamad Erihadiana (ME)  <https://orcid.org/0000-0002-3331-2364>

Aldy Rialdy Atmadja (AR)  <https://orcid.org/0000-0001-7798-8078>

Oban Sobandi (OS)  <https://orcid.org/0009-0007-4515-3851>

Muhammad Insan Al-Amin (MI)  <https://orcid.org/0000-0003-2320-5431>

6.2. Author Contributions

Conceptualization: ME, AR, OS, and MI; Methodology: ME, AR and OS; Software: OS, and MI; Formal Analysis: ME, AR, OS and MI; Investigation: AR, OS and MI; Resources: ME, AR, and MI; Data Curation: ME, AR and OS; Writing Original Draft Preparation: OS and MI; Writing Review and Editing: AR, OS, and MI; Visualization: ME, AR, and OS; All authors, ME, AR, OS, and MI have read and agreed to the published version of the manuscript.

6.3. Data Availability Statement

The datasets used to support the findings of this study are available from the direct link in the dataset citation.

6.4. Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

6.5. Declaration of Conflicting Interest

The authors declare that they have no conflicts of interest, known competing financial interests, or personal relationships that could have influenced the work reported in this paper.

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