

Integrative Artificial Intelligence in Civic Education: A Model for Future Civic Education Learning Design

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Abstract

The development of artificial intelligence (AI) demands a transformation in Civic Education learning so that it remains pedagogically relevant, ethically accountable, and democratically meaningful within the digital democracy ecosystem. This study aims to develop and refine an AI-based Civic Education learning design model through Educational Design Research (EDR). The research was conducted in Tuban Regency, East Java, Indonesia, involving 15 Civic Education lecturers, 30 university students, and 5 educational technology experts. The EDR process was carried out through three main phases: analysis and exploration, design and construction, and evaluation and reflection. Data were collected through interviews, focus group discussions, classroom observations, document analysis, expert validation, and limited implementation review. The data were analysed thematically and validated through triangulation, expert judgment, stakeholder feedback, and iterative refinement. The findings show that Civic Education learning requires four integrated components: adaptive civic personalisation, digital civic literacy strengthening, ethical and transparent AI governance, and reflective democratic participation. These components were developed into the AI-Pedagogical Civic Design (AI-PCD) model. The model was refined through formative expert validation and limited implementation involving lecturers and students. This study contributes theoretically to the intersection of AI in education and Civic Education by offering a model that integrates technological adaptation with democratic values, constitutional reasoning, and ethical accountability.

Keywords: *Artificial Intelligence, Civic Education, Digital Civic Literacy, Digital Democracy, Learning Design, AI-PCD*

Introduction

The digital transformation driven by the development of artificial intelligence (AI) has fundamentally changed the global education landscape. AI enables personalized learning, predictive analytics, and assessment automation that expand pedagogical capacities in modern

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classrooms (Baytak, 2024; Chauke et al., 2024; Mohamed Sapawi et al., 2025; Vargas et al., 2024). This development is no longer experimental; it has become mainstream in technology-based educational research (Holmes et al., 2019). Systematic reviews show that AI significantly contributes to the improvement of learning effectiveness through adaptive systems and intelligent tutoring systems (Zawacki-Richter et al., 2019). Ethical, pedagogical, and policy dimensions are also increasingly becoming a focus in the academic discourse on AI in education (Williamson & Eynon, 2020). These developments affirm that AI is not merely a technical tool, but a transformational force reshaping the paradigm of 21st-century learning (Alshammari & Al-Enezi, 2024; Ussainova et al., 2025).

Civic education faces equally complex challenges amid the era of digital disruption and network-based democracy. Civic education is required to equip students with critical thinking skills, digital literacy, and meaningful democratic participation. International literature emphasises that the 21st-century Civic model requires an approach that goes beyond normative memorisation towards justice-oriented civic education (Westheimer & Kahne, 2004). Digital transformation is also changing the political participation patterns of the younger generation, so Civic education must respond to the dynamics of digital participation (Kahne & Bowyer, 2017; Kilinc et al., 2022; Tarman et al., 2023). The global competency framework even emphasises the importance of digital literacy and ethical awareness in building citizens who are adaptive to technological changes (Binkley et al., 2012; Spradley, 1980). These challenges indicate that Civic education requires innovative designs capable of integrating cutting-edge technology without neglecting democratic values.

Research on AI in education has predominantly focused on STEM disciplines and higher education contexts rather than Civic education. Bibliometric analysis shows a concentration of AI research on optimising academic performance and data-driven adaptive systems (Zhai et al., 2021). Other literature highlights the development of learning analytics and the prediction of learning outcomes as the main themes of AI integration (Ifenthaler & Yau, 2020). AI-based pedagogical approaches have also been extensively studied within the framework of enhancing learning efficiency and reducing the administrative burden on lecturers (Luckin & Holmes, 2016). The dominance of this technical orientation indicates a reductionist tendency that has not yet deeply addressed the normative and ethical dimensions of Civic education. The absence of an integrative model that

systematically connects AI with the construction of democratic competencies reveals a conceptual gap in the literature.

The research gap becomes even more apparent when considering the ethical implications, algorithmic governance, and power relations in the use of AI in education. Educational algorithms have the potential to shape students' behaviour and learning preferences through mechanisms that are not always transparent (Selwyn, 2019). The discourse on algorithmic governance emphasises the need for critical literacy towards AI-based systems to avoid creating bias or reproducing inequalities (Coletta & Kitchin, 2017). Recent studies also remind us that without a clear ethical framework, the integration of AI risks shifting humanistic values in education (Holmes & Tuomi, 2022). The absence of Civic education learning design models that integrate pedagogical, democratic, and ethical dimensions of AI highlights the urgency of developing a new conceptual framework. This research is important because it seeks to fill that gap through the development of an integrative artificial intelligence model in Civic education that is not only technologically adaptive but also democratically and normatively reflective.

Tuban Regency was selected as the research context because it reflects a transitional socio-digital environment in which educational institutions are increasingly exposed to digital transformation while civic learning practices remain largely conventional. The region represents a relevant setting for examining how civic education adapts to technological change, particularly in areas experiencing rapid industrialization, increased internet access, and shifting patterns of youth participation in digital public spaces. This context provides an opportunity to explore how AI-supported civic learning can respond to emerging democratic and digital literacy challenges.

This research aims to develop an AI-based Civic education learning design model that is pedagogically, ethically, and democratically integrated. This model is designed to strengthen digital Civic competencies, constitutional reasoning, and reflective participation of learners within the digital democracy ecosystem. The contribution of this research is directed towards enriching the AI literature in education through a Civic perspective that has not been systematically explored until now. The development of this integrative model is expected to provide a theoretical and practical foundation for the transformation of Civic education in the era of artificial intelligence.

Based on these objectives, this research is formulated into several research questions: (1) How can a conceptual model of artificial intelligence integration be constructed to align with the pedagogical principles of Civic Education and democratic values? (2) What components should

be integrated into AI-based learning designs to strengthen students' digital civic competencies and constitutional reasoning? (3) How can the validity and feasibility of the developed model be evaluated through expert assessment and limited implementation testing? (4) How is the developed model perceived to contribute to the transformation of Civic Education learning within the context of digital democracy?

Literature Review

Artificial Intelligence in Education

The development of Artificial Intelligence (AI) in education has been a major focus of international research over the past decade. AI is understood as a computational system capable of performing data analysis, adaptive decision-making, and providing automatic feedback to support the learning process. Comprehensive studies show that the integration of AI in education includes intelligent tutoring systems, learning analytics, assessment automation, and personalised learning recommendation systems (Zawacki-Richter et al., 2019). Large-scale bibliometric analysis also confirms the exponential increase in AI publications in education, with a dominant focus on optimising learning performance and predicting academic achievement (Qiu et al., 2022). The pedagogical perspective positions AI as a catalyst for transforming learning, enabling data-driven personalisation and enhancing instructional efficiency (Luckin & Holmes, 2016).

The ethical dimensions and governance of AI in education have also become significant academic concerns. The use of algorithms in the learning process has the potential to create bias, access inequality, and data privacy issues if not systematically regulated (Selwyn, 2019). The discourse on algorithmic governance emphasises the importance of transparency and accountability in AI-based systems (Coletta & Kitchin, 2017). The ethical framework of AI in education demands the integration of humanistic values so that technology does not replace the reflective role of educators, but rather enhances the quality of pedagogical interactions (Holmes & Tuomi, 2022). The literature shows that the integration of AI must be placed within a comprehensive pedagogical and ethical framework, not merely as a technological innovation.

Civic Education and Democratic

Competence Civic education has a strategic mandate in shaping critical, participatory, and justice-oriented citizens. The modern model of Civic emphasises the importance of developing justice-

oriented Civic that goes beyond normative compliance (Westheimer & Kahne, 2004). Digital transformation is also changing the political participation patterns of the younger generation, so Civic education needs to accommodate the dimensions of digital Civic (Kahne & Bowyer, 2017). The 21st-century competency framework also emphasises the integration of digital literacy, collaboration, and problem-solving as part of global Civic competencies (Binkley et al., 2012; Eizadirad et al., 2026; Kilinc et al., 2023).

The development of digital democracy has created a need for constitutional literacy and critical thinking skills regarding online information (Knowles et al., 2023). Digital participation without critical literacy has the potential to produce polarisation and political disinformation (Mihailidis & Viotty, 2017). Civic education is required to equip students with reflective and ethical abilities in facing the digital information ecosystem (Gerfanova et al., 2025; Isin & Ruppert, 2020). The literature shows that 21st-century Civic education cannot be separated from the context of technological transformation and digital culture (Lumsden, 2026).

Integration of AI in Civic Education

Studies on the integration of AI in Civic education are still relatively limited compared to the STEM fields. Most AI research in education is orientated towards enhancing cognitive learning outcomes without in-depth exploration of the formation of democratic attitudes and competencies (Ifenthaler & Yau, 2020). This gap is very important, considering that standard higher education evaluations often fail to encourage deeper analysis, resulting in generally weak analytical and synthesis performance among students in professional administration scenarios (Kvale & Brinkmann, 2009; Umam & Al-Islami, 2025). Systematic studies on AI in education show a dominance of technical approaches and a lack of integration of normative Civic values (Zhai et al., 2021). Other research highlights that AI has the potential to support public deliberation simulations and social scenario-based learning, but its implementation in Civic curricula has not yet been conceptually structured (Holmes et al., 2019). This conceptual gap indicates the absence of an integrative model that systematically connects AI with digital Civic competencies, constitutional reasoning, and reflective participation. Global literature discusses AI more as a tool for personalising learning rather than as a medium for transforming democratic education (Williamson & Eynon, 2020). The need for pedagogical models that unite AI technology with the principles of deliberative democracy is becoming increasingly urgent in the context of data-driven societies.

This gap opens up space for the development of an AI-based Civic education learning design framework that is pedagogically, ethically, and democratically integrated.

Synthesis and Conceptual Framework

The synthesis of the literature reveals three main findings. AI offers transformational capacity in personalisation and learning analytics (Zawacki-Richter et al., 2019). 21st-century Civic education demands digital competence and reflective participation in networked democracy (Kahne & Bowyer, 2017). The integration of these two domains has not yet been developed in a systematic and validated conceptual model (Zhai et al., 2021). The absence of an integrative framework that combines AI, Civic Education pedagogy, and democratic values underscores the urgency of this research.

This literature review serves as the foundation for the development of an integrative model of artificial intelligence in Civic education that is not only technologically adaptive but also responsive to the needs of digital democracy. The model developed in this research aims to bridge the gap between AI innovation and the transformation of Civic pedagogy through a theory-based and empirically validated approach.

The reviewed literature suggests that AI integration in education should not be understood solely as a technological enhancement but as a pedagogical transformation that reshapes learning interaction, ethical awareness, and democratic engagement. Civic Education provides a normative framework that emphasizes critical reasoning, participation, and constitutional literacy, while AI offers adaptive and data-informed instructional support. The intersection of these domains forms the conceptual basis for developing an integrative model that combines personalization, digital literacy, ethical governance, and reflective participation within a unified civic learning framework.

Method

This study employed Educational Design Research (EDR) to develop and validate an integrative artificial intelligence model for Civic Education learning. Educational Design Research was selected because it supports iterative development, validation, and refinement of educational innovation through collaboration between theory and practice. This approach is relevant for research aimed at developing technology-based pedagogical innovations through an iterative process between theory and practice (Wang & Hannafin, 2005). The design-based research

framework allows for the integration of theoretical reflection and contextual implementation in real learning environments (McKenney & Reeves, 2018). The qualitative approach was selected to deeply understand pedagogical needs, social dynamics, and the context of technology implementation, rather than merely measuring the effectiveness of the outcomes (Creswell & Poth, 2016). This interpretative orientation is important in the development of learning models that are sensitive to democratic values and classroom realities (Tisdell et al., 2025).

The research was conducted in Tuban Regency, East Java. The selection of the location is based on the characteristics of Tuban as a region experiencing social transformation due to industrial development and digitalisation, thereby presenting relevant civic dynamics to be studied in the context of education (Isin & Ruppert, 2020). The transitioning social context provides opportunities to observe the interaction between digital technology and the formation of civic competencies (Mihailidis & Viotty, 2017). Higher Education Institutions in Tuban already have basic digital learning infrastructure, but the integration of AI in the pedagogy of civic education has not been systematically implemented, thus providing space for conceptual and practical exploration. Authentic contexts like this are recommended in educational design research so that the innovations developed have strong ecological validity (Reeves, 2006).

The EDR procedure in this study consisted of three main phases: (1) analysis and exploration, (2) design and construction, and (3) evaluation and reflection. These phases were implemented iteratively so that the model was not produced as a fixed initial concept, but developed through repeated cycles of needs analysis, prototype formulation, expert review, limited implementation, and refinement.

Research Design

The research design followed the logic of Educational Design Research, which emphasizes systematic development through iterative stages of exploration, design, evaluation, and reflection (McKenney & Reeves, 2018). In this study, the EDR process was organized into three interconnected phases.

1. Phase 1: Analysis and Exploration

The first phase aimed to identify the actual conditions, needs, wants, lacks, constraints, and target situation of AI-based Civic Education learning. This phase examined how Civic Education was currently implemented, what difficulties lecturers faced in designing differentiated learning, how

students experienced digital civic issues, and what ethical challenges emerged in the possible use of AI. Data in this phase were collected through interviews with lecturers and students, classroom observations, focus group discussions, and document analysis of curriculum documents, teaching materials, and institutional learning policies.

The analysis and exploration phase produced the empirical basis for the initial design requirements of the model. The needs analysis identified four major design needs: adaptive learning personalisation, digital civic literacy, ethical and transparent AI use, and reflective democratic participation. These needs became the foundation for developing the initial blueprint of the AI–Pedagogical Civic Design model.

2. Phase 2: Design and Construction

The second phase aimed to transform the findings of the needs analysis into a conceptual blueprint and preliminary prototype of the AI-PCD model. The design process involved synthesizing field data with relevant theories on AI in education, Civic Education, digital citizenship, algorithmic governance, and deliberative democracy. The prototype was constructed as a conceptual learning design model containing four main components: Adaptive Civic Personalisation, Digital Civic Literacy Engine, Ethical–Transparent AI Governance Layer, and Reflective Deliberative Participation System.

This stage also included formative expert validation. Five educational technology and digital pedagogy experts reviewed the preliminary model to assess its conceptual clarity, pedagogical relevance, ethical appropriateness, feasibility, and alignment with the objectives of Civic Education. Expert validation was positioned as part of the development stage because it functioned to improve the prototype before limited implementation, consistent with formative evaluation principles in educational design research (Tessmer, 2013).

3. Phase 3: Evaluation and Reflection

The third phase aimed to evaluate the feasibility and practical relevance of the refined AI-PCD model through limited implementation review. This phase involved lecturers and students in simulated learning design sessions. Participants reviewed the model components, instructional flow, learning activities, ethical safeguards, and reflective participation mechanisms. The evaluation focused on whether the model was understandable, relevant to Civic Education learning, feasible to implement, and capable of supporting digital civic competencies.

The results of limited implementation were used as the basis for final refinement. Feedback from lecturers, students, and experts was analysed to revise the structure, terminology, instructional sequence, and ethical indicators of the model. Therefore, the final AI-PCD model was not only derived from theoretical construction, but also from empirical exploration, formative validation, limited implementation, and reflective refinement.

Participants

Participants were selected using purposive sampling to ensure that each participant group had direct relevance to the purpose of each EDR phase (Patton et al., 2015). The study involved three groups of participants: 15 Civic Education lecturers, 30 university students, and 5 educational technology experts. The involvement of participants differed according to the objectives of each research phase.

In the analysis and exploration phase, Civic Education lecturers and students were involved to identify existing learning problems, pedagogical needs, digital civic literacy gaps, and constraints in the integration of AI into Civic Education. Lecturers provided information about instructional practices, curriculum demands, assessment challenges, and classroom participation patterns. Students provided information about their learning experiences, digital media practices, difficulties in understanding civic issues, and expectations for AI-supported learning.

In the design and construction phase, lecturers contributed to reviewing the relevance of the proposed learning flow and the suitability of model components for Civic Education learning. Expert validators were involved to assess the conceptual, pedagogical, ethical, and technological feasibility of the preliminary AI-PCD model.

In the evaluation and reflection phase, selected lecturers and students participated in limited implementation review sessions. They evaluated the clarity, applicability, relevance, and usability of the model in simulated Civic Education learning scenarios. Their feedback was used to refine the final model.

Table 1*Participants Based on EDR Phases*

EDR Phase	Participant Group	Number	Role in the Research
Analysis and Exploration	Civic Education lecturers	15	Identifying pedagogical problems, instructional needs, curriculum constraints, and expectations for AI-supported Civic Education
Analysis and Exploration	University students	30	Identifying learning experiences, digital civic literacy gaps, participation constraints, and expectations for adaptive learning
Design and Construction	Civic Education lecturers	15	Reviewing the relevance of the preliminary model to Civic Education learning practices
Design and Construction	Educational technology experts	5	Conducting formative expert validation of the model blueprint and prototype
Evaluation and Reflection	Lecturers and students	45	Reviewing limited implementation, model clarity, feasibility, and relevance in simulated learning scenarios

The use of participant codes was intended to maintain confidentiality and anonymity. Civic Education lecturers were coded as D-01 to D-15, students as M-01 to M-30, and expert validators as A-01 to A-05. These codes were used in reporting qualitative findings to protect participants' identities while maintaining traceability of data sources.

Data Collection

Data were collected through multiple techniques according to the objectives of each EDR phase. The use of multiple data sources was intended to strengthen methodological triangulation and support the credibility of the model development process (Lincoln & Guba, 1985).

In the analysis and exploration phase, data were collected through semi-structured interviews, focus group discussions, classroom observations, and document analysis. Interviews with lecturers explored teaching practices, differentiation challenges, assessment problems, ethical concerns, and expectations regarding AI-supported Civic Education. Interviews and focus group discussions with students explored learning experiences, digital literacy practices, online participation, and difficulties in understanding democratic and constitutional issues. Classroom observations were used to identify participation patterns, instructional interactions, and the extent to which digital civic issues were integrated into learning. Document analysis was conducted on curriculum documents, lesson plans, teaching materials, and institutional policies to identify structural opportunities and constraints.

In the design and construction phase, data were collected through design synthesis notes, expert validation sheets, and expert review discussions. The expert validation process assessed the model's conceptual clarity, pedagogical relevance, ethical appropriateness, technological feasibility, and alignment with Civic Education objectives. Expert feedback was used as formative input for revising the preliminary prototype.

In the evaluation and reflection phase, data were collected through limited implementation review, stakeholder reflection, observation notes, and feedback forms. Lecturers and students reviewed the refined model in simulated learning design sessions. Their responses were used to evaluate the model's clarity, practicality, relevance, and potential contribution to strengthening digital civic competencies.

Table 2

Data Collection Techniques Based on EDR Phases

EDR Phase	Data Collection Technique	Data Source	Purpose
Analysis and Exploration	Semi-structured interviews	Lecturers and students	Identifying needs, wants, lacks, constraints, and expectations
Analysis and Exploration	Focus group discussions	Students and lecturers	Exploring shared meanings, collective concerns, and expectations for AI-supported Civic Education
Analysis and Exploration	Classroom observations	Civic Education classes	Observing learning practices, participation patterns, and digital civic learning issues
Analysis and Exploration	Document analysis	Curriculum, teaching materials, and institutional policies	Identifying structural opportunities and constraints
Design and Construction	Design synthesis	Research findings and literature	Constructing the AI-PCD model blueprint
Design and Construction	Expert validation	Educational technology experts	Conducting formative evaluation of the prototype
Evaluation and Reflection	Limited implementation review	Lecturers and students	Evaluating clarity, feasibility, relevance, and usability
Evaluation and Reflection	Stakeholder reflection	Lecturers, students, and experts	Refining the final model

Research Instruments

Several research instruments were developed to support the EDR process. In the analysis and exploration phase, the instruments consisted of lecturer interview guidelines, student interview guidelines, focus group discussion protocols, classroom observation sheets, and document analysis checklists. The lecturer interview guideline focused on learning practices, differentiation challenges, curriculum demands, assessment limitations, and views on AI integration. The student interview guideline focused on learning experiences, digital media practices, digital civic literacy, participation barriers, and expectations for adaptive learning. The observation sheet focused on classroom interaction, student participation, learning methods, digital technology use, and reflective discussion practices. The document analysis checklist examined curriculum structure, learning outcomes, assessment components, and the presence of digital citizenship or AI-related content.

In the design and construction phase, the main instrument was the expert validation sheet. The validation sheet assessed five dimensions: conceptual clarity, pedagogical relevance, ethical and democratic alignment, technological feasibility, and model coherence. These dimensions were developed based on the theoretical foundation of AI in education, Civic Education, digital citizenship, and educational design research (Plomp, 2013).

In the evaluation and reflection phase, the instruments consisted of limited implementation review forms and stakeholder reflection sheets. These instruments were used to collect feedback on the clarity of model components, feasibility of learning activities, relevance to Civic Education objectives, ethical safeguards, and potential contribution to students' digital civic competencies.

Data Analysis

Data analysis was conducted according to the logic of Educational Design Research. The analysis was not only intended to identify themes, but also to transform empirical findings into design requirements, model components, validation input, and refinement decisions.

In the analysis and exploration phase, interview transcripts, FGD notes, observation records, and document analysis results were analysed using thematic analysis. The study followed Braun and Clarke's thematic analysis framework, consisting of familiarisation with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final report (Braun & Clarke, 2006, 2019). Initial codes were developed around learning

personalisation, digital civic literacy, ethical concerns, algorithmic transparency, and democratic participation. Codes were then grouped into broader themes that represented the main needs, wants, lacks, constraints, and target situation of AI-based Civic Education learning.

In the design and construction phase, the themes from the needs analysis were translated into design principles and model components. Constant comparison was used to connect empirical findings with theoretical perspectives on AI-supported learning, digital citizenship, algorithmic governance, and deliberative democracy (Thornberg & Charmaz, 2014; Corbin & Strauss, 2014). The design synthesis resulted in the preliminary AI-PCD model blueprint.

In the expert validation phase, expert comments were analysed descriptively and thematically. Expert feedback was grouped into several categories: conceptual clarity, pedagogical feasibility, ethical appropriateness, technological feasibility, and model improvement. The validation results were used to revise the model structure, clarify component definitions, strengthen ethical indicators, and improve the instructional flow.

In the evaluation and reflection phase, feedback from limited implementation review sessions was analysed through descriptive qualitative analysis. Participants' responses were categorized according to model clarity, practicality, relevance, feasibility, and contribution to digital civic competence. The results were used to refine the final AI-PCD model. This iterative movement between data reduction, data display, conclusion drawing, and model refinement is consistent with systematic qualitative analysis in educational research (Miles et al., 2014).

Trustworthiness and Evaluation Rigor

Trustworthiness was established through credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985). Credibility was strengthened through triangulation across interviews, focus group discussions, classroom observations, document analysis, expert validation, and limited implementation review. The use of multiple data sources enabled the researchers to compare participants' statements, observed learning practices, and documentary evidence.

Transferability was supported through thick description of the research context, participant characteristics, institutional setting, and Civic Education learning conditions. This description enables readers to assess the relevance of the findings and the AI-PCD model for other educational contexts.

Dependability was maintained through an audit trail documenting the stages of the research, including needs analysis, coding decisions, design synthesis, expert feedback, model revisions, limited implementation review, and final refinement. This documentation helped ensure that the development of the model followed a systematic and traceable process.

Confirmability was strengthened through systematic documentation of data analysis and model refinement decisions. The researchers ensured that the components of the AI-PCD model were derived from empirical findings, theoretical synthesis, expert validation, and stakeholder feedback rather than from researcher assumptions alone (Nowell et al., 2017).

In addition to qualitative trustworthiness, evaluation rigor was also maintained through formative and summative logic within the EDR process. Formative evaluation was conducted through expert validation during the design and construction phase, while summative-oriented evaluation was conducted through limited implementation review in the evaluation and reflection phase. The combination of expert judgment and stakeholder feedback ensured that the final model was conceptually valid, pedagogically relevant, ethically accountable, and practically feasible.

Findings

The findings of this study are presented according to the three stages of Educational Design Research, moving from (1) analysis and exploration, (2) design and construction (including formative expert validation), to (3) evaluation and reflection.. This structure is used to demonstrate how the AI–Pedagogical Civic Design model was developed from empirical needs, translated into a conceptual prototype, validated by experts, reviewed through limited implementation, and refined into a final model.

1. Analysis and Exploration: Needs, Wants, Lacks, Constraints, and Target Situation

The analysis and exploration stage aimed to identify the existing condition of Civic Education learning, the needs of lecturers and students, the gaps in current pedagogical practices, and the target situation expected from AI-supported Civic Education. Data were obtained through interviews, focus group discussions, classroom observations, and document analysis. The findings show that Civic Education learning in higher education remains largely conventional, homogeneous, and insufficiently responsive to students' diverse abilities, digital civic experiences, and participation patterns (Morgan, 1997).

The needs analysis identified four main areas that should be addressed in the development of an AI-based Civic Education learning model: adaptive learning personalisation, strengthening of digital civic literacy, ethical and transparent AI governance, and facilitation of reflective democratic participation. These four needs became the empirical foundation for the development of the AI–Pedagogical Civic Design model.

1.1 Need for AI-Based Learning Personalisation

The first major finding concerns the need for AI-based learning personalisation. Data analysis shows that Civic Education learning at the higher education level still tends to use a uniform approach in material delivery, assignment design, and assessment. Lecturers generally provide the same learning content and activities to all students, even though students have different levels of prior knowledge, learning pace, interest, and ability to understand constitutional and democratic issues.

Lecturers acknowledged that differentiating instruction remains difficult because of limited time and administrative burdens. One lecturer stated:

“In one class, some students grasp the material very quickly, while others need it explained repeatedly. But our time is limited, so it’s difficult to create different approaches for each student.” (D-02)

Another lecturer emphasized the potential of AI to help map students’ learning needs:

“If there is a system that can assess students’ initial abilities and then recommend different materials or exercises, it would be very helpful for lecturers.” (D-08)

Students also expressed that the current learning process does not always match their learning pace or preferred learning style. One student stated:

“Sometimes the civic education material feels too theoretical and lengthy. If there were a system that could adjust to our abilities, it might be easier to understand.” (M-05)

Another student added:

“I prefer learning through case studies or simulations. If it’s just reading books and listening to explanations, I get bored quickly.” (M-14)

These statements indicate that students expect Civic Education learning to be more adaptive, contextual, and interactive. The need for immediate feedback was also emphasized by students:

“If after solving the problem you immediately know where you went wrong and it is explained automatically, it’s better than waiting until next week.” (M-22)

The need for personalisation is also related to students’ different levels of understanding of abstract civic concepts, such as popular sovereignty, rule of law, constitutional rights, and democratic participation. One lecturer explained:

“There are students who can already relate the material to current events, but there are also those who still struggle to understand the basic concepts.” (D-11)

An educational technology expert also highlighted that AI can support adaptive learning through learning analytics:

“AI allows the system to map students’ answer patterns and then adjust the difficulty level of the next material. That is very relevant for civic education, which has many layered concepts.” (A-02)

However, expert feedback also emphasized that personalisation in Civic Education should not only focus on academic performance, but also on reflective and ethical development:

“Personalisation should not only focus on academic achievements but also on the formation of reflective attitudes and constitutional awareness.” (A-04)

Classroom observations further showed that students with higher confidence and stronger academic ability tended to dominate class discussions, while others were more passive. This condition indicates the need for an AI-supported system that can provide more equitable learning opportunities and encourage broader student participation. One student stated:

“If the discussion is through a digital platform, maybe everyone can express their opinions, not just those who are brave enough to speak.” (M-27)

Based on these findings, the target situation for the model is a learning environment in which AI supports diagnostic assessment, differentiated content, adaptive learning pathways, immediate feedback, and more inclusive participation. Personalisation in this model is therefore understood not only as adaptation to learning speed and ability, but also as support for constitutional reasoning, democratic reflection, and civic engagement.

Table 3*Findings on AI-Based Personalized Learning*

No	Aspect Analyzed	Key Findings	Data Sources	Implications for the Model
1	Differentiation of student ability	There is a gap in constitutional analysis skills among students within the same class.	D-02, D-11	The model requires AI-based diagnostic assessment.
2	Learning pace	Students have different learning speeds; some feel the pace is too fast, while others find it too slow.	M-05, M-14	The model requires adaptive learning pathways and difficulty adjustment.
3	Learning style preferences	Students are more interested in interactive case studies and simulations than lectures.	M-14, M-27, Observation	The model should integrate multimodal content, simulations, and digital case studies.
4	Learning feedback	Feedback is often delayed due to lecturers' time constraints.	D-08, M-22	The model requires automated feedback and learning analytics.
5	Discussion participation	Class discussions are dominated by certain students.	Observation, M-27	The model requires an AI-supported digital discussion platform.
6	Lecturer workload	Lecturers struggle to create differentiated materials due to limited time.	D-02, D-08	AI should function as a pedagogical assistant.
7	Democratic value orientation	Personalisation must continue to emphasize reflective and ethical values.	A-02, A-04	The model must integrate ethical indicators and democratic literacy.

1.2 Need for Strengthening Digital Civic Literacy

The second major finding concerns the need to strengthen digital civic literacy. The findings show that students have relatively good access to digital technology, but their ability to critically evaluate information, verify sources, identify misinformation, and communicate ethically in digital spaces remains limited. Their digital literacy is still largely technical-operational rather than critical-reflective.

Lecturers acknowledged that Civic Education learning has not systematically addressed digital citizenship issues. One lecturer stated:

“We discuss the concepts of democracy and the constitution a lot, but we have not systematically taught how to deal with hoaxes or hate speech on social media.” (D-03)

Another lecturer emphasized that the main challenge is not access to technology, but the ability to filter and evaluate information:

“Children are very active on social media, but they rarely check the source of information. Sometimes they immediately believe it if it aligns with their views.” (D-09)

Students also admitted that they often receive and share political or public issue information without adequate verification. One student stated:

“If there’s a viral news story, it’s usually shared directly in the group. Rarely is its truth checked first.” (M-08)

Another student said:

“Sometimes it’s hard to distinguish between opinion and fact, especially if it’s packaged in convincing language.” (M-17)

Some students also stated that Civic Education materials are still more focused on constitutional articles and normative concepts than on their application in digital public spaces:

“The material is mostly about the articles of the Constitution, but it doesn’t really discuss how they are applied on social media.” (M-21)

Classroom observations showed that digital issues were usually discussed only when there was a current viral event, not as a structured component of the learning design. This indicates a gap between the realities of students’ digital lives and the content of Civic Education learning.

Expert validators emphasized that digital civic literacy should be positioned as a core competency in Civic Education in the AI era. One expert stated:

“Digital civic literacy is not just about using technology, but about responsibility, ethics, and reflective ability in the digital public space.” (A-01)

Another expert highlighted the potential of AI to support information verification exercises:

“AI can be designed to provide digital news case studies and then ask students to analyse the credibility of the sources.” (A-05)

The findings also show that students have initial awareness of digital ethics, but this awareness has not been systematically developed through structured learning. One student explained:

“We know we shouldn’t spread hate speech, but sometimes we don’t realise that our comments can offend other groups.” (M-26)

Lecturers also observed that social media algorithms may strengthen opinion polarization among students:

“Sometimes students already have very strong views because they frequently see similar content. Class discussions become difficult because they are less open.” (D-12)

Based on these findings, the target situation is a Civic Education learning model that explicitly integrates digital civic literacy as a central component. AI can be used to support news verification simulations, fact-opinion classification, misinformation analysis, algorithmic bias awareness, and ethical digital communication. Therefore, digital civic literacy in this study is not positioned as an additional skill, but as a core competency for democratic citizenship in the digital era.

Table 4

Findings on Strengthening Digital Civic Literacy

No	Aspect Analyzed	Key Findings	Data Sources	Implications for the AI Model
1	Information verification skills	Students rarely check the credibility of sources before sharing information.	M-08, M-17, D-09	The model should include AI-supported news source analysis.
2	Understanding facts and opinions	Students struggle to distinguish between opinion, propaganda, and factual information.	M-17, M-21	The model should include AI-based digital content classification.
3	Digital communication ethics	Ethical awareness exists but has not been reflectively internalized.	M-26, D-03	The model should include ethical reflection and feedback.
4	Opinion polarization	Exposure to social media algorithms reinforces bias and polarization.	D-12, Observation	The model should introduce algorithmic bias and perspective diversity.
5	Curriculum integration	Digital literacy is not structurally embedded in Civic Education learning design.	D-03, Observation	Digital civic literacy must become a core model component.
6	Utilization of AI	AI can support case studies, data analysis, and reflective discussions.	A-01, A-05	The model should use AI to support critical and democratic thinking exercises.

1.3 Need for Ethical and Transparent AI Governance

The third major finding concerns ethics and transparency in the use of AI. Lecturers, students, and expert validators agreed that AI integration in Civic Education cannot be treated merely as a technical or instructional issue. It is also a normative issue related to academic integrity, fairness, data protection, accountability, and democratic values.

Lecturers expressed concern about students' potential dependency on AI. One lecturer stated:

“If AI is used without control, students might just copy answers without understanding the thought process.” (D-04)

Another lecturer highlighted the problem of unclear rules regarding AI use in assignments:

“We still don’t have clear guidelines on how to regulate the use of AI in Civic Education assignments. Is it considered assistance or a violation?” (D-10)

Lecturers also admitted that they do not always understand how AI systems generate recommendations or answers:

“Sometimes we just use the application, but we don’t know how the system determines recommendations or answers.” (D-13)

Students had mixed responses to AI. Some viewed it as helpful for simplifying difficult material:

“AI helps explain difficult material in simpler language.” (M-03)

However, others admitted that AI could encourage shortcut learning:

“When there’s an essay assignment, sometimes I think about just asking AI to summarise it.” (M-18)

Concerns about bias and neutrality also emerged. One student stated:

“We don’t know if the answers provided by AI are neutral or have certain biases.” (M-24)

Classroom observations showed that students tended to accept AI-generated information without critically questioning sources, data, or possible bias. This finding indicates the need to develop algorithmic literacy as part of Civic Education.

Expert validators emphasized that AI transparency is part of democratic accountability. One expert stated:

“In the perspective of citizenship, every public technology must be ethically accountable. Transparency is part of democratic education.” (A-02)

Another expert added:

“Learning models must include explainability features so that students understand how the system generates recommendations.” (A-05)

Data protection also became a significant concern. Lecturers and students questioned how student learning data would be collected, stored, and used:

“If AI collects student learning data, who guarantees that the data is safe?” (D-06)

“We are concerned that our grades or opinions might be used for other purposes.” (M-29)

Lecturers emphasized that institutions need clear internal regulations regarding AI use:

“There needs to be an ethical code for AI use in higher education institutions to clearly define the boundaries.” (D-01)

Based on these findings, the target situation is an AI-supported Civic Education model that integrates ethics and transparency as a governance layer. The model must include explainability, academic integrity guidelines, data protection, algorithmic literacy, bias awareness, and democratic accountability. Therefore, ethics is not treated as an additional feature, but as a structural component of the AI-PCD model.

Table 5

Findings on Ethics and Transparency in AI Use

No	Aspect Analyzed	Key Findings	Data Sources	Implications for the AI Model
1	Academic integrity	AI may be misused to complete assignments without reflective learning.	D-04, M-18	The model requires ethical guidelines and originality awareness.
2	Clarity of usage regulations	There are no clear internal regulations regarding AI use.	D-10, D-01	The model should include a code of ethics for AI-supported learning.
3	Algorithm transparency	Students and lecturers do not fully understand how AI systems work.	D-13, M-24	The model should integrate explainable AI principles.
4	Bias and neutrality	There are concerns about bias in AI-generated responses.	M-24, Observation	The model should include algorithmic literacy and bias analysis.
5	Data protection	Students and lecturers are concerned about learning data security.	D-06, M-29	The model should include anonymization and data protection mechanisms.
6	Democratic accountability	AI must align with justice, responsibility, and democratic values.	A-02, A-05	Ethical-democratic indicators must be integrated into the model.

1.4 Need for Reflective Democratic Participation

The fourth major finding concerns the need to facilitate reflective democratic participation. Data from interviews, observations, and focus group discussions show that student participation in Civic Education classes is still largely procedural. Participation is often measured by whether students speak in class, but not by the depth of their reasoning, openness to different perspectives, or ability to connect arguments with constitutional values.

Lecturers acknowledged that class discussions tend to be dominated by verbally active students:

“Usually, the active ones are students who are already confident. The others tend to just follow without expressing their opinions.” (D-05)

Another lecturer stated that classroom discussions often focus more on correct answers than on reasoning processes:

“Discussions often focus on right or wrong answers, not on the thinking process or the reasoning behind students’ opinions.” (D-12)

Classroom observations showed that when current civic or political issues were discussed, many students responded normatively without deeper argumentation. Students also expressed hesitation in voicing different opinions:

“Sometimes I’m afraid if my opinion is different from my classmates’.” (M-04)

“If the topic is sensitive, like politics, we prefer to stay silent.” (M-19)

Some students also felt that discussions did not provide enough time or space to explore diverse perspectives:

“Discussions are usually closed quickly because time runs out, so we don’t get to explore other viewpoints.” (M-23)

In focus group discussions, students suggested that digital platforms could make participation more inclusive:

“If discussions were conducted through a digital platform, we might feel more confident expressing our opinions since we’re not speaking directly in front of the class.” (M-28)

Lecturers also considered that AI could assist them in monitoring and facilitating student participation:

“The system could detect who hasn’t participated and then provide them with opportunities or specific questions.” (D-07)

Expert validators emphasized that democratic participation must involve normative reflection and constitutional awareness. One expert stated:

“Participation is not merely about speaking, but about the ability to weigh values, laws, and the social impact of a decision.” (A-03)

Another expert added:

“AI can analyze students’ argument structures and offer suggestions to strengthen their reasoning or evidence.” (A-05)

Students were more engaged when discussions used contextual cases. However, without structured reflective guidance, discussions often remained at the level of personal opinion:

“Real cases are more engaging, but sometimes the discussion becomes just sharing opinions without reaching a shared conclusion.” (M-11)

Based on these findings, the target situation is a Civic Education learning model that supports inclusive, argumentative, reflective, and constitutionally grounded participation. AI can function as a digital dialogue facilitator, argumentation feedback provider, participation analytics tool, and reflective guide. In this model, participation is not only about speaking more frequently, but about improving the quality of democratic reasoning.

Table 6

Findings on Reflective Democratic Participation

No	Aspect Analyzed	Key Findings	Data Sources	Implications for the AI Model
1	Classroom participation	Discussions are dominated by certain students.	D-05, Observation	The model requires adaptive digital discussion spaces.
2	Argumentative reflection	Students' responses tend to be normative and lack in-depth analysis.	D-12, Observation	AI should support argument structure analysis.
3	Self-confidence	Students hesitate to express different opinions.	M-04, M-19	The model should include semi-anonymous discussion features.
4	Perspective exploration	Discussions do not sufficiently accommodate diverse viewpoints.	M-23, M-11	AI should provide alternative perspectives and case-based prompts.
5	Constitutional values	Reflection is not strongly connected to legal and democratic principles.	A-03	The model should include constitutional value indicators.
6	Moderation and monitoring	Lecturers face difficulty monitoring participation quality.	D-07, A-05	AI should function as co-facilitator and participation analytics provider.

2. Design and Construction: Development of the AI-PCD Blueprint

The design and construction stage transformed the exploration findings into the initial blueprint of the AI–Pedagogical Civic Design model. The model was developed by synthesizing empirical findings with theoretical perspectives on AI in education, Civic Education, digital citizenship, algorithmic governance, and deliberative democracy.

The first design component is Adaptive Civic Personalisation. This component responds to the need for differentiated Civic Education learning. It positions AI as a pedagogical assistant that can support diagnostic assessment, mapping of students' learning profiles, recommendation of learning materials, adjustment of learning pace, and provision of automatic feedback. However, in the context of Civic Education, personalisation is also directed toward strengthening constitutional understanding, democratic reasoning, and civic reflection.

The second component is the Digital Civic Literacy Engine. This component responds to students' limited critical-reflective digital literacy. It is designed to support learning activities related to information verification, fact-opinion distinction, misinformation analysis, algorithmic bias awareness, and digital communication ethics. Through this component, AI functions as a simulation and reflection tool that helps students become more critical and responsible digital citizens.

The third component is the Ethical–Transparent AI Governance Layer. This component responds to concerns about academic integrity, bias, data protection, and lack of transparency in AI use. It includes explainability, ethical guidelines, data protection mechanisms, academic integrity principles, and democratic accountability indicators. This layer ensures that all AI-supported learning activities remain aligned with fairness, responsibility, and democratic values.

The fourth component is the Reflective Deliberative Participation System. This component responds to the need for more inclusive and reflective democratic participation. It positions AI as a co-facilitator that supports digital discussion, participation monitoring, argument analysis, alternative perspective generation, and constitutional reflection. This component helps students move beyond procedural participation toward reasoned and responsible democratic engagement.

The four components are designed as an interconnected cycle. Adaptive personalisation supports students in accessing relevant civic learning materials. Digital civic literacy strengthens students' ability to critically navigate information in digital democracy. Reflective participation provides space for students to express, test, and revise their civic reasoning. Ethical and transparent governance ensures that AI-supported learning remains accountable, fair, and democratically oriented.

3. Formative Expert Validation and Model Revision

After the preliminary AI-PCD blueprint was developed, formative expert validation was conducted with five educational technology experts. The validation focused on conceptual clarity, pedagogical relevance, ethical appropriateness, technological feasibility, and alignment with Civic Education objectives.

Expert validators generally considered the AI-PCD model relevant to the needs of Civic Education learning in the era of artificial intelligence. The four components were viewed as logically

connected and able to address the major challenges found during the exploration stage. However, experts also provided several important recommendations for improvement.

First, experts recommended that ethics should not be placed as a supplementary feature, but as a governance layer that regulates the entire learning model. Based on this feedback, the Ethical–Transparent AI Governance Layer was strengthened as a cross-cutting component that covers explainability, data protection, academic integrity, fairness, and democratic accountability.

Second, experts advised that digital civic literacy should be positioned as a core competency rather than an additional learning outcome. Therefore, the Digital Civic Literacy Engine was refined to include information verification, misinformation analysis, algorithmic bias awareness, digital communication ethics, and reflective responsibility.

Third, experts suggested that democratic participation should not be measured only by the frequency of student interaction. The quality of reasoning, argumentation, and constitutional reflection must also be emphasized. Based on this recommendation, the Reflective Deliberative Participation System was revised to include argument structure analysis, perspective comparison, and reflective prompts based on constitutional values.

Fourth, experts emphasized that adaptive learning must remain connected to Civic Education values. Therefore, the Adaptive Civic Personalisation component was refined so that it does not only adjust learning content and difficulty level, but also supports contextual civic cases, democratic reasoning, and value-based reflection.

The formative expert validation process therefore improved the model by clarifying the conceptual structure, strengthening the ethical governance component, sharpening digital civic literacy indicators, and aligning AI-supported learning activities with democratic and constitutional values.

Table 7

Expert Validation and Model Revision

No	Component Reviewed			Expert Feedback	Revision Made
1	Adaptive Personalisation	Civic		Personalisation should not only focus on cognitive adaptation.	Added constitutional reasoning and value reflection indicators.
2	Digital Civic Literacy Engine			Digital civic literacy should be a core competency.	Added information verification, bias analysis, and digital ethics indicators.
3	Ethical–Transparent Governance Layer	AI		Ethics should become a governance layer, not an additional feature.	Strengthened explainability, data protection, fairness, and accountability mechanisms.

4	Reflective Participation System	Deliberative Participation System	Participation should emphasize reasoning quality, not only interaction frequency.	Added argument analysis, alternative perspectives, and constitutional reflection prompts.
5	Model coherence		The relationship among components should be clearer.	Revised the model into a cyclical and interconnected structure.

4. Evaluation and Reflection: Limited Implementation Review and Final Refinement

The evaluation and reflection stage was conducted through limited implementation review involving lecturers and students. The purpose of this stage was to examine the clarity, relevance, feasibility, and practical usability of the refined AI-PCD model in Civic Education learning scenarios.

During the review sessions, participants examined the instructional flow, model components, learning activities, ethical safeguards, and reflective participation mechanisms. Lecturers considered the model useful because it could assist them in designing more adaptive, contextual, and reflective Civic Education learning. The model was also perceived as helpful in addressing classroom participation imbalance and integrating digital civic issues into learning.

Students responded positively to AI-supported case studies, simulations, digital discussion spaces, and immediate feedback mechanisms. They perceived that Civic Education learning would become more engaging if it included real digital civic issues, such as misinformation, hate speech, online polarization, public policy debates, and constitutional issues in digital spaces. They also considered semi-anonymous discussion features useful for increasing participation, especially when discussing sensitive social and political topics.

However, the limited implementation review also identified several aspects that required refinement. First, the learning instructions needed to be simplified so that lecturers and students could more easily understand how each AI-supported activity should be implemented. Second, ethical guidelines needed to be made more explicit, especially regarding acceptable and unacceptable uses of AI in assignments. Third, reflective questions needed to be more directly connected to constitutional values and democratic principles. Fourth, indicators for assessing digital civic literacy and reflective participation needed to be clarified.

Based on this feedback, the final AI-PCD model was refined in four ways. The instructional flow was simplified, the ethical governance layer was clarified, digital civic literacy indicators were expanded, and reflective participation mechanisms were strengthened. The final model therefore

represents the result of iterative development involving empirical exploration, theoretical synthesis, expert validation, limited implementation review, and reflective refinement.

Table 8

Limited Implementation Review and Final Refinement

No	Aspect Reviewed	Feedback from Participants	Final Refinement
1	Instructional flow	Some steps needed clearer explanation.	The learning flow was simplified and sequenced more clearly.
2	Ethical guidelines	AI use in assignments needed clearer boundaries.	Ethical guidelines and academic integrity indicators were clarified.
3	Digital civic literacy	Digital literacy indicators needed to be more specific.	Indicators were expanded to include verification, bias analysis, and digital ethics.
4	Reflective participation	Reflection needed stronger connection to constitutional values.	Reflective prompts were linked to democratic and constitutional principles.
5	Feasibility	The model was considered relevant but needed practical guidance.	Model components were clarified into implementable learning activities.

5. Final Form of the AI–Pedagogical Civic Design Model

Based on the analysis and exploration stage, design and construction process, formative expert validation, and limited implementation review, this study produced the final AI–Pedagogical Civic Design model. The model consists of four interconnected components: Adaptive Civic Personalisation, Digital Civic Literacy Engine, Ethical–Transparent AI Governance Layer, and Reflective Deliberative Participation System.

The Adaptive Civic Personalisation component enables AI to support the mapping of students' learning profiles, learning pace, and levels of constitutional understanding. This component provides differentiated learning support while maintaining the civic mission of developing democratic awareness and constitutional reasoning.

The Digital Civic Literacy Engine component strengthens students' ability to verify information, distinguish facts from opinions, identify misinformation, analyse algorithmic bias, and communicate ethically in digital spaces. This component positions digital civic literacy as a core competency of Civic Education in the era of digital democracy.

The Ethical–Transparent AI Governance Layer component ensures that AI integration is guided by explainability, academic integrity, fairness, data protection, and democratic accountability. This component functions as the normative foundation of the model and prevents AI-supported learning from becoming technocentric or ethically uncontrolled.

The Reflective Deliberative Participation System component supports inclusive discussion, argument analysis, perspective comparison, and constitutional reflection. AI functions as a co-facilitator that helps lecturers monitor participation, provide feedback, and guide students toward more reflective democratic engagement.

Overall, the AI-PCD model is not merely a technology-based learning model. It is an integrative Civic Education learning design that combines adaptive AI systems with democratic values, ethical governance, digital civic literacy, and reflective participation. The model is designed to support the formation of critical, reflective, ethical, and responsible digital citizens.

Discussion

The findings of this study show that the development of an AI-based Civic Education learning model cannot be reduced to the technical use of artificial intelligence in classroom instruction. Through the Educational Design Research process, this study found that AI integration in Civic Education requires a comprehensive learning design that connects pedagogical adaptation, digital civic literacy, ethical governance, and reflective democratic participation. These four dimensions emerged from the analysis and exploration phase, were transformed into the AI–Pedagogical Civic Design model during the design and construction phase, strengthened through expert validation, and refined through limited implementation review.

The discussion is organized around four major dimensions of the AI-PCD model: adaptive civic personalisation, digital civic literacy, ethical-transparent AI governance, and reflective deliberative participation. These dimensions are then synthesized into the theoretical and practical contribution of the AI-PCD model for the transformation of Civic Education in the era of artificial intelligence.

Adaptive Civic Personalisation and the Reconstruction of Civic Pedagogy

The first major finding of this study indicates that Civic Education learning still tends to be homogeneous, while students have different levels of prior knowledge, learning pace, learning preferences, and ability to understand constitutional and democratic concepts. This condition shows the need for adaptive learning design in Civic Education. The findings support previous studies which argue that AI has the capacity to support personalised learning through learning analytics, intelligent tutoring systems, adaptive feedback, and data-driven instructional recommendations (Holmes et al., 2019; Roll & Wylie, 2016; Zawacki-Richter et al., 2019).

However, this study expands the existing literature by showing that personalisation in Civic Education cannot be understood merely as technical adaptation to students' cognitive abilities. In many AI-supported learning models, personalisation is often directed toward improving academic performance, accelerating mastery of content, or increasing instructional efficiency. In contrast, the findings of this study show that personalisation in Civic Education must also support constitutional reasoning, civic reflection, ethical judgment, and democratic awareness.

This means that AI-based personalisation in Civic Education should not only answer the question of "what material is suitable for students," but also "how students can develop more reflective, responsible, and democratic civic understanding." Therefore, the Adaptive Civic Personalisation component in the AI-PCD model is designed to map students' learning profiles while maintaining the normative mission of Civic Education.

This finding addresses a gap in the literature on AI in education. Previous studies have mostly discussed AI in relation to cognitive learning outcomes, learning prediction, academic achievement, and instructional automation (Chassignol et al., 2018; Pedro et al., 2019). The present study contributes a civic-oriented perspective by proposing that AI personalisation should be connected to value-based learning, constitutional literacy, and democratic competence. In this sense, AI does not replace civic pedagogy but strengthens the capacity of Civic Education to respond to students' diverse learning needs while preserving its democratic purpose.

From the perspective of Educational Design Research, this finding also confirms the importance of contextual exploration before designing technology-based learning innovation. The need for

personalisation was not assumed only from the literature, but emerged from lecturers' difficulties in differentiating instruction and students' experiences of mismatch between learning materials, learning pace, and learning preferences. Therefore, the AI-PCD model was developed as a response to actual pedagogical problems in Civic Education learning.

Digital Civic Literacy and the Transformation of Democratic Competence

The second major finding shows that students' digital literacy is still largely technical-operational rather than critical-reflective. Students are familiar with digital platforms and social media, but they do not always verify information, distinguish facts from opinions, identify misinformation, or understand algorithmic bias. This finding is consistent with previous studies emphasizing that digital citizenship requires more than the ability to use technology; it requires critical thinking, ethical communication, participation awareness, and reflective judgment in digital public spaces (Livingstone, 2014; Ng, 2012; Ribble & Bailey, 2011).

The findings also support the argument that digital democracy creates new challenges for Civic Education. In the digital public sphere, citizens are exposed to misinformation, polarization, hate speech, and algorithmically filtered information. Without critical digital literacy, digital participation may weaken democratic deliberation rather than strengthen it. This is in line with Mihailidis and Viotty (2017), who argue that media literacy is increasingly important in responding to fake news and post-fact digital culture. Kahne and Bowyer (2017) also emphasize that democratic education must prepare learners to face motivated reasoning and misinformation in partisan digital environments.

This study extends the literature by arguing that digital civic literacy should not be treated as an additional skill in Civic Education. Instead, it must become a core component of Civic Education learning in the era of artificial intelligence. The findings show that Civic Education materials still tend to focus on constitutional articles, normative concepts, and formal democratic principles, while students' civic experiences increasingly occur in digital spaces. This creates a gap between classroom Civic Education and the realities of students' digital citizenship.

The Digital Civic Literacy Engine in the AI-PCD model was developed to bridge this gap. AI is positioned as a tool for supporting information verification simulations, fact-opinion classification, misinformation analysis, algorithmic bias awareness, and digital ethics reflection. Through this

component, students are not only expected to understand democratic concepts, but also to apply them critically in digital public spaces.

This finding contributes to the development of the concept of digital civic competence. Digital civic competence refers to the ability to participate in digital society with critical awareness, ethical responsibility, and democratic judgment. This competence is closely related to the work of Isin and Ruppert (2020), who emphasize that digital citizenship involves new forms of rights, responsibilities, participation, and identity in digital environments. The AI-PCD model strengthens this perspective by showing how AI can be pedagogically designed to support digital civic competence in formal Civic Education learning.

Ethical-Transparent AI Governance and Civic-Algorithmic Accountability

The third major finding shows that ethics and transparency are central concerns in the integration of AI into Civic Education. Lecturers and students expressed concerns about academic integrity, dependency on AI, unclear usage regulations, algorithmic bias, data protection, and lack of explainability. These concerns confirm previous studies which emphasize that AI in education involves ethical risks related to fairness, accountability, transparency, bias, and privacy (Binns, 2018; Floridi et al., 2018; Jobin et al., 2019).

This study strengthens the argument that AI governance in education should not only be discussed at the policy or institutional level, but also at the pedagogical level. In Civic Education, ethical AI governance becomes especially important because the subject itself is concerned with citizenship, justice, responsibility, rights, participation, and democratic accountability. Therefore, the use of AI in Civic Education must be aligned with the values that Civic Education seeks to cultivate.

The findings show that lecturers and students do not always understand how AI systems produce answers or recommendations. This indicates the importance of explainability as part of learning design. Explainable AI is not only a technical requirement, but also a civic learning opportunity. When students learn to question how AI works, what data it uses, and what biases it may contain, they are also learning about power, accountability, and transparency in digital society.

For this reason, the AI-PCD model introduces the Ethical–Transparent AI Governance Layer as a structural component. This layer includes explainability, academic integrity, data protection, fairness, bias awareness, and democratic accountability. Unlike AI learning models that place

ethics as a general recommendation, this model positions ethics as a governance layer that regulates all AI-supported learning activities.

The theoretical contribution of this component is the development of civic-algorithmic accountability in Civic Education. Civic-algorithmic accountability refers to the ability to understand, evaluate, and question algorithmic systems as part of democratic citizenship. This concept connects AI ethics with Civic Education by emphasizing that citizens in the digital era need to understand not only laws and institutions, but also digital systems that increasingly shape public opinion, access to information, and participation.

This finding also responds to the critique that AI in education is often technocentric. AI is frequently promoted as a tool for efficiency, automation, and performance improvement. However, in Civic Education, AI must be critically governed so that it does not reproduce inequality, weaken academic integrity, or reduce reflective learning. The AI-PCD model therefore proposes that every AI-supported learning process must be guided by ethical and democratic principles.

Reflective Deliberative Participation and AI-Supported Democratic Learning

The fourth major finding shows that student participation in Civic Education remains largely procedural. Discussions are often dominated by confident students, while others remain silent or follow the majority opinion. Students also tend to provide normative responses without deeper argumentation or constitutional reflection. This finding reflects a common challenge in Civic Education: participation does not automatically mean democratic learning unless it is supported by reasoning, openness to different perspectives, and value reflection.

This finding is consistent with deliberative democracy theory, which emphasizes that democratic participation should involve rational argumentation, mutual respect, justification of opinions, and reflection on the common good (Dryzek, 2002; Gutmann & Thompson, 2004; Habermas, 1996). Civic Education should therefore not only encourage students to speak, but also help them develop the capacity to listen, reason, evaluate evidence, consider alternative perspectives, and connect their arguments with constitutional and democratic values.

The findings of this study show that AI can support this process if it is designed as a co-facilitator of reflective democratic participation. AI can help monitor participation patterns, provide prompts for students who are less active, analyse argument structures, present alternative viewpoints, and guide reflection based on constitutional values. In this sense, AI does not replace the role of

lecturers, but supports lecturers in creating more inclusive and reflective deliberative learning environments.

The Reflective Deliberative Participation System in the AI-PCD model responds to the problem of unequal participation and weak argumentation. It provides digital discussion spaces, semi-anonymous participation features, argumentation feedback, and constitutional reflection prompts. These features are intended to increase not only the quantity of student participation, but also the quality of democratic reasoning.

This study contributes to the literature by linking AI-supported learning with deliberative democracy. Previous literature on AI in education has rarely connected intelligent learning systems with democratic deliberation. Most studies focus on adaptive learning, prediction, assessment automation, or learning analytics. The AI-PCD model expands this discussion by showing that AI can be used to strengthen democratic pedagogy when it is designed to support argumentation, inclusiveness, reflection, and constitutional reasoning.

However, this study also emphasizes that AI-supported participation must be carefully governed. If AI is used only to increase interaction metrics, such as the number of comments or frequency of participation, it may fail to promote meaningful democratic learning. Therefore, the AI-PCD model emphasizes reflective deliberation, not merely digital interaction.

Integration of the Four Components into the AI-Pedagogical Civic Design Model (AI-PCD)

The four findings of this study are interconnected and form the foundation of the AI-Pedagogical Civic Design model. Adaptive Civic Personalisation responds to the diversity of students' learning needs. The Digital Civic Literacy Engine responds to the challenges of misinformation, digital ethics, and algorithmic bias. The Ethical-Transparent AI Governance Layer ensures that AI-supported learning remains accountable, fair, and aligned with democratic values. The Reflective Deliberative Participation System supports inclusive, argumentative, and constitutionally grounded participation.

The integration of these four components distinguishes the AI-PCD model from other AI-supported learning models. Many AI models in education focus on personalisation, prediction, assessment, or efficiency. The AI-PCD model, however, places citizenship formation as its central orientation. Its goal is not only to improve learning outcomes, but also to develop critical, reflective, ethical, and responsible digital citizens.

The AI-PCD model also responds to the gap between AI in education and Civic Education. The literature on AI in education has grown rapidly, but much of it remains concentrated in STEM fields, learning analytics, intelligent tutoring systems, and performance prediction (Zawacki-Richter et al., 2019; Zhai et al., 2021). Meanwhile, Civic Education literature emphasizes democratic competence, participation, and citizenship values, but has not yet systematically integrated AI as a pedagogical design element. This study bridges the two fields by proposing a model that integrates AI technology with civic pedagogy and democratic values.

From an Educational Design Research perspective, the AI-PCD model was not produced only through theoretical synthesis. It was developed through an iterative process involving needs analysis, model construction, expert validation, limited implementation review, and final refinement. This process strengthens the ecological validity of the model because it was grounded in the actual context of Civic Education learning in Tuban Regency, while also informed by broader theoretical frameworks.

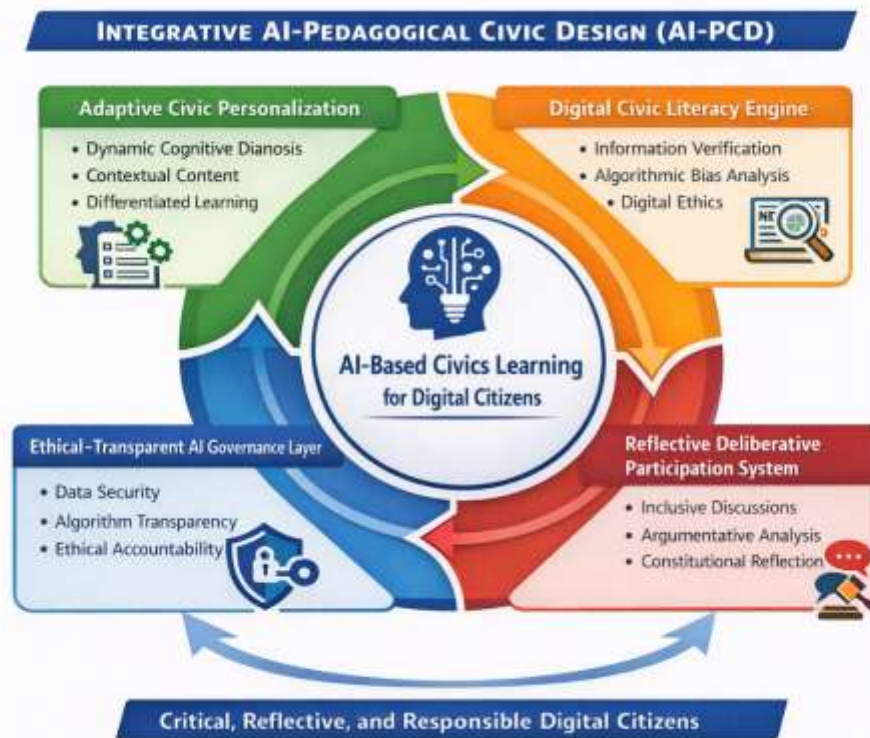


Figure 1. Integrative AI-Pedagogical Civic Design

Source: Research Analysis Results

Theoretical Contribution

The theoretical contribution of this study lies in the development of an integrative model at the intersection of AI in education, Civic Education, digital citizenship, AI ethics, and deliberative democracy. The AI-PCD model offers a new conceptual framework that positions AI not merely as a learning technology, but as part of a civic pedagogical ecosystem.

First, the model expands the concept of AI-based personalisation by connecting it with constitutional reasoning and democratic reflection. Second, the model strengthens the concept of digital civic literacy by integrating information verification, algorithmic bias awareness, and digital ethics into Civic Education learning. Third, the model introduces ethical-transparent AI governance as a structural layer in learning design. Fourth, the model connects AI-supported learning with reflective deliberative participation.

These contributions show that AI in Civic Education should be guided by democratic purposes. The value of AI does not lie only in its ability to automate learning, but in its potential to support students' critical engagement with digital society, public information, constitutional values, and democratic participation.

Conclusion

This study aimed to develop and refine an artificial intelligence-based Civic Education learning design model through Educational Design Research. The study shows that the integration of AI in Civic Education should not be understood merely as the use of digital tools, but as a pedagogical transformation that must be adaptive, ethical, transparent, and democratically oriented.

The analysis and exploration phase identified four major needs in Civic Education learning: adaptive learning personalization, strengthening digital civic literacy, ethical and transparent AI governance, and facilitation of reflective democratic participation. These needs emerged from lecturers' challenges in differentiating instruction, students' limited critical digital literacy, concerns about AI ethics and data protection, and the lack of reflective participation in classroom discussions.

The design and construction phase translated these needs into the AI-Pedagogical Civic Design model. The model consists of four interconnected components: Adaptive Civic Personalisation, Digital Civic Literacy Engine, Ethical-Transparent AI Governance Layer, and Reflective

Deliberative Participation System. These components form a cyclical learning design that integrates AI-supported adaptation with the democratic mission of Civic Education.

The expert validation phase strengthened the conceptual and pedagogical quality of the model. Expert feedback emphasized the importance of positioning ethics as a governance layer, clarifying digital civic literacy as a core competency, strengthening constitutional reflection, and ensuring that personalization remains connected to democratic values. The limited implementation review further refined the model by improving its instructional clarity, feasibility, ethical indicators, and reflective participation mechanisms.

The main contribution of this study is the development of the AI-PCD model as an integrative framework for Civic Education in the era of artificial intelligence. The model expands the literature on AI in education by placing citizenship, democratic values, constitutional reasoning, and ethical accountability at the center of AI-supported learning design. Practically, the model offers a framework for lecturers and institutions to design Civic Education learning that is more adaptive, reflective, and responsive to the challenges of digital democracy.

This study has several limitations. First, the research was conducted in a limited geographical context in Tuban Regency, East Java, so the transferability of the findings should be considered carefully. Second, the limited implementation was conducted as an initial feasibility review rather than a large-scale experimental test. Third, the model has not yet been tested quantitatively to measure its long-term impact on students' digital civic competence, constitutional reasoning, and democratic participation.

Future research should test the AI-PCD model through broader implementation, mixed-methods design, or experimental studies in different educational and socio-cultural contexts. Further studies may also develop quantitative instruments to measure digital civic literacy, algorithmic literacy, reflective democratic participation, and ethical AI awareness in Civic Education learning.

Overall, this study confirms that AI integration in Civic Education must be guided by pedagogical, ethical, and democratic principles. The AI-PCD model offers a theoretical and practical foundation for transforming Civic Education toward the formation of critical, reflective, responsible, and democratically engaged digital citizens.

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