

DEVELOPING A DEEP LEARNING-ORIENTED LEARNING ASSISTANCE SYSTEM WITH ARTIFICIAL INTELLIGENCE (AI) CHATBOTS FOR PANCASILA EDUCATION

AIM ABDULKARIM, NEINY RATMANINGSIH,
PITRIA SOPIANINGSIH, DIANA NOOR ANGGRAINI,
ELDA DWI PRATIWI, ANGGITA PUTRI RAMADANI

Universitas Pendidikan Indonesia, Bandung, Indonesia

*Corresponding Author: aimabdulkarim@upi.edu

Abstract

This study develops a learning assistance system for Pancasila Education that integrates a deep learning pedagogy with AI chatbots to strengthen character and critical reasoning. Using a design-based research approach, we designed, iterated, and validated a web platform featuring conversational tutoring and moderated discussion, with expert reviews and user tryouts informing revisions. The system was judged feasible in media design and material substance, aligned with the junior high curriculum, and supportive of reflective, interactive learning. Chatbots and structured forums promote sustained engagement and metacognitive reflection because learners receive timely guidance while being prompted to justify positions grounded in Pancasila values. The approach offers a scalable model for character education that augments teacher facilitation, improves access to learning resources, and encourages responsible, critical use of artificial intelligence in civics education. It also outlines implementation guidance for classroom practice and pathways for future improvement and evaluation cycles. This study supports sustainable development goals (SDGs).

Keywords: AI Chatbot technology, Character education, Deep learning, Learning assistance system, Pancasila education.

1. Introduction

The rapid advancement of digital technology has significantly transformed education, bringing both opportunities and challenges. Emerging technologies such as artificial intelligence (AI), the internet of things (IoT), and automation have enhanced learning engagement and accessibility [1]. However, they also pose potential threats to students' moral and civic values. In Indonesia, the massive adoption of AI (ranked among the top globally) raises concerns about its unregulated use, including issues such as reduced reading interest, passive learning, and over-reliance on automated responses without critical evaluation [2-4]. Studies have also highlighted that generative AI can undermine academic integrity through undetectable plagiarism and ghostwriting [5].

To mitigate these risks, educators must integrate technological tools that not only enhance learning outcomes but also reinforce national identity and character education based on civic education [6]. Character formation serves as a moral filter for students navigating the openness of digital information [7]. This moral grounding is particularly important given the influence of global content that may conflict with local cultural norms [8, 9]. Therefore, character education must not only be embedded in curricula but also operationalized through innovative and reflective digital pedagogies that encourage critical reasoning, empathy, and civic responsibility [10, 11].

Pancasila Education, a mandatory subject in Indonesian schools, serves as a key medium for building national character. However, its traditional delivery is often perceived as overly formal, didactic, and disconnected from students' real-life experiences. To address this gap, technological innovations such as AI chatbot-supported learning systems can offer interactive, accessible, and personalized learning experiences. AI chatbots, when integrated with a deep learning framework, have the potential to facilitate student reflection, engage them in dialogic learning, and support the internalization of Pancasila values. These tools can serve as virtual tutors, stimulate metacognitive processes, and promote social interaction through peer and teacher discussion forums [12-14].

This study aims to develop a learning assistance system called AI-Learn, which integrates AI chatbot technology within a deep learning pedagogy to support Pancasila Education at the junior high school level. Using a Design-Based Research (DBR) methodology, this study explores the system's design, validation, and implementation. The novelty of this research lies in three key contributions:

- (i) The deployment of AI chatbot technology as an accessible and responsive learning medium;
- (ii) The integration of deep learning pedagogy that emphasizes character development alongside cognitive achievement; and
- (iii) The contextual focus on junior high school education, where character formation is particularly formative.

The findings are expected to offer scalable strategies for character-based education in the era of artificial intelligence. This study supports sustainable development goals (SDGs).

2. Literature Review

Figure 1 presents a visualization of the conceptual framework of AI chatbot technology adapted for educational purposes. AI chatbots offer virtual conversational services that are programmed to interpret user input and respond appropriately, enabling dynamic and personalized learning interactions [12, 15]. This technology operates by recognizing messages from users, processing linguistic elements, determining user intent, and executing corresponding commands [16, 17].

AI technologies also enhance the implementation of deep learning approaches, which emphasize conceptual understanding, long-term retention, and the ability to transfer knowledge across contexts. These approaches foster students' mastery of competencies through reflection, integration, and application of concepts in real-life situations. Prior studies have demonstrated that deep learning can reshape educational paradigms by making learning more meaningful, student-centred, and aligned with global competency standards [18, 19].

In the context of Indonesia, Pancasila Education (mandated as a core component of the national curriculum) requires a similarly in-depth and reflective learning model. This subject is intended to instill values consistent with the moral foundations of the nation. Its purpose is to ensure that every citizen not only understands but internalizes these values as a guiding philosophy for civic life [20].

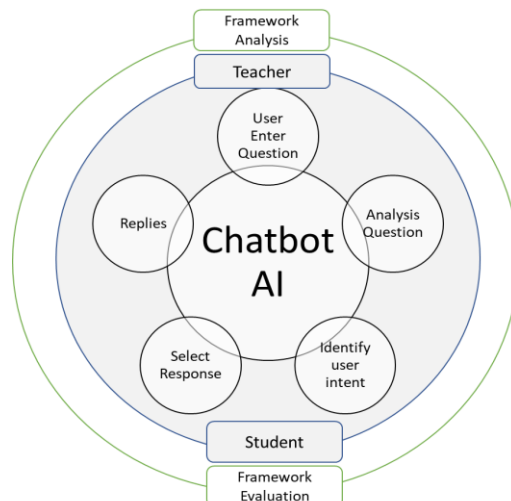


Fig. 1. Visualization of the AI chatbot technology concept in learning assistance systems.

3. Research Methodology

This study employed a design-based research (DBR) approach to develop, evaluate, and refine the AI-Learn system for Pancasila Education. The research involved a sample of 240 junior high school students selected through purposive sampling from five schools in Purwakarta Regency: SMPN 1 Purwakarta, SMPN 3 Purwakarta, SMPN 4 Purwakarta, SMP Yos Sudarso Purwakarta, and SMP Al-Muhajirin Purwakarta.

Data were collected through multiple methods, including interviews, trial questionnaires, and focus group discussions (FGD). These instruments were designed to assess user needs, evaluate system usability, and validate content alignment with educational goals. Expert validations were conducted by both media experts and material experts to evaluate the system's design and instructional content.

Quantitative data were analysed using the Gregory formula: $V = DA + B + C + D$, where A, B, C, and D represent the levels of agreement and disagreement among raters. This formula measured the level of agreement among validators regarding the feasibility of the system. Meanwhile, qualitative data were analysed through interactive model analysis, involving data reduction, data display, and conclusion drawing, following the model.

4. Results and Discussion

Figure 2 illustrates the overall flow of developing the AI-Learn Pancasila Education system using AI chatbot technology. The process began by identifying system requirements, selecting an appropriate web-based platform, and customizing existing features to fit user needs. A homepage was designed to facilitate separate access for students and teachers, enabling two core functions: interactive question-and-answer sessions with the chatbot and participation in discussion forums. This structured approach ensured pedagogical alignment with the goals of character education, supported by digital tools that promote deep and reflective learning.

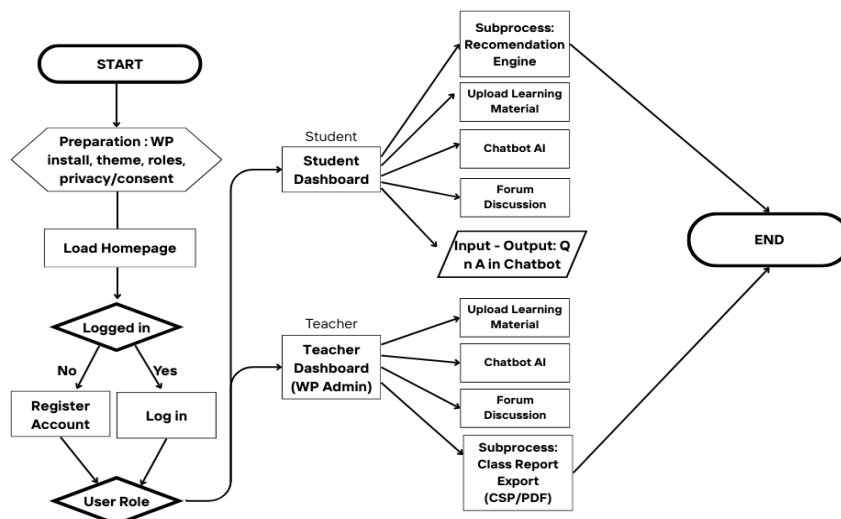


Fig. 2. Flowchart for creating a learning assistance system.

Figure 3(a) shows the homepage interface of the AI-Learn platform, where users are introduced to the system and guided to interact with the AI chatbot in accordance with defined rules. Figure 3(b) presents the interface for key features, including the Smart Chatbot AI and the Active Discussion Forum. These components are designed to support the internalization of Pancasila values by

enabling meaningful interactions and reflective discussions. The system integrates the roles of teachers, students, and AI technology into a single digital ecosystem, making the learning experience more modern, contextual, and participatory.

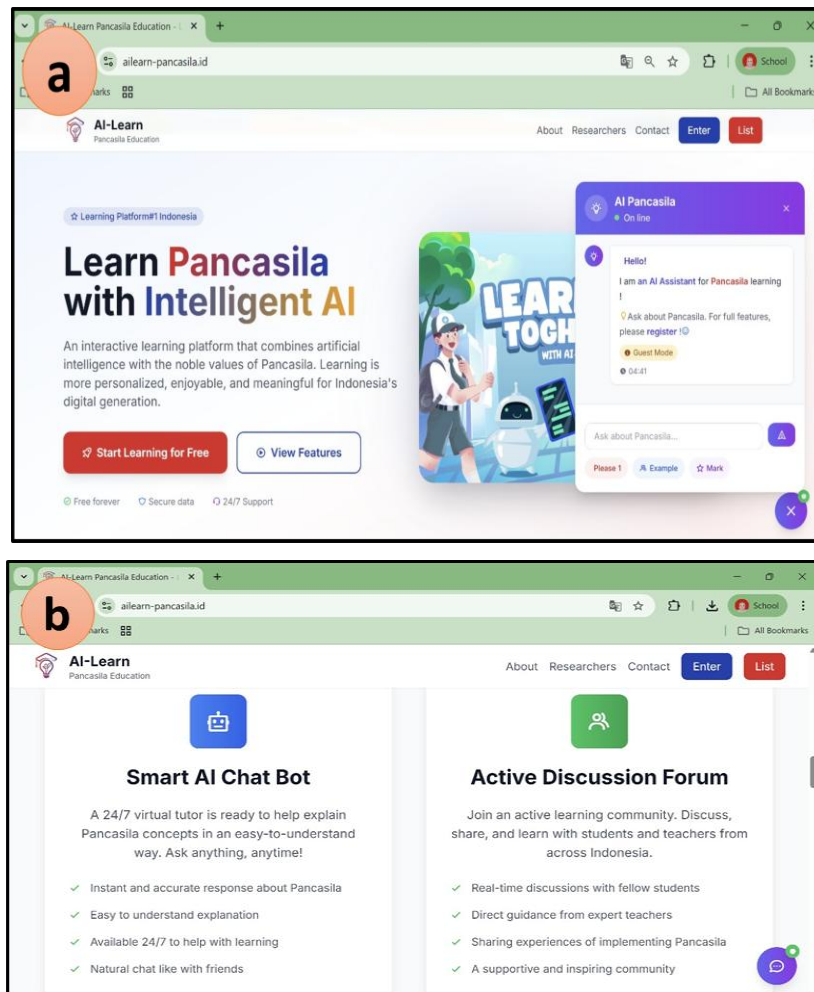


Figure 3. Product view of the Learning Assistance System:
(a) home interface design of the web integrated with
the AI chatbot, and (b) feature design of the web.

The chatbot functions as a virtual tutor, offering students the ability to engage in autonomous learning while encouraging them to reflect critically and collaborate through the discussion forum. This integration facilitates independent exploration, strengthens metacognitive skills, and supports the development of Graduate Profile attributes, particularly critical reasoning [13, 14, 21-23]. Moreover, this approach responds to students' digital learning styles and bridges the gap between technology and character development in civics education.

Expert validation was conducted to evaluate the system's feasibility. Using the Gregory formula, assessments from media and content experts showed the system

achieved a “very high validity” category. Media validation focused on visual design, content suitability, interactivity, technical performance, language clarity, and ethical considerations. Meanwhile, material experts assessed content relevance, instructional coherence, and curricular alignment. Minor revisions were recommended, particularly for visual layout and technical functionality.

The effectiveness of AI-Learn is not only measured by expert assessments but also by its pedagogical potential. The system is designed to enhance the internalization of Pancasila values through reflective dialogue and contextual inquiry. Because AI chatbots and structured forums enable consistent feedback and student engagement, they serve as an extension of teacher facilitation rather than a replacement. However, to ensure full optimization, teachers must be proficient in operating the system and act as active facilitators, guiding students, moderating discussions, and reinforcing learning objectives [14, 24]. This study supports sustainable development goals (SDGs), as reported elsewhere [25-30].

5. Conclusions

This study shows that the AI-Learn system developed through the design-based research (DBR) approach is effective as a character-based learning medium in Pancasila Education. The AI-Chatbot feature and active discussion forum can encourage active participation of students with teachers and peers, thereby strengthening collaborative learning. The results of expert validation regarding AI-Learn show that based on media and material validation, it is proven to be suitable for use.

References

1. Al Husaeni, D.F.; Al Husaeni, D.N.; Nandiyanto, A.B.D.; Rokhman, M.; Chalim, S.; Chano, J.; Al-Obaidi, A.S.M.; and Roestamy, M. (2024). How technology can change educational research? Definition, factors for improving quality of education and computational bibliometric analysis. *ASEAN Journal of Science and Engineering*, 4(2), 127-166.
2. Juanita, G. (2024). Pemanfaatan artificial intelligence/AI) dalam kerangka Pancasila. *Jurnal Interpretasi Hukum*, 5(2), 1141-1151.
3. Rizki, M.Z. (2024). Tantangan pendidikan Indonesia di era digitalisasi artificial intelligence (AI). *Jurnal Intelek Insan Cendikia*, 1(7), 2921-2929.
4. Zhai, C.; Wibowo, S.; and Li, L.D. (2024). The effects of over-reliance on AI dialogue systems on students' cognitive abilities: A systematic review. *Smart Learning Environments*, 11(28), 1-37.
5. Bittle, K.; and El-Gayar, O. (2025). Generative AI and academic integrity in higher education: A systematic review and research agenda. *Information*, 16(4), 296.
6. Sulyman, H.T.; Jimoh, F.A.; and Giwa, A.B. (2025). Effect of cross-over learning on pupils' academic performance in civic education. *ASEAN Journal of Educational Research and Technology*, 4(1), 81-90.
7. Indra, S.; Fauziah, R.S.P.; Lathifah, Z.K.; Ramdhani, M.R.; Kholik, A.; and Fauziah, N. (2026). Utilization of application-based technology for strengthening students' religious character through the hidden curriculum. *ASEAN Journal of Educational Research and Technology*, 4(1), 57-70.

8. Una, L.M.W.; and Laksana, D.N.L. (2022). Pentingnya pendidikan karakter bagi siswa sekolah dasar di era 4.0. *Jurnal Citra Pendidikan Anak*, 1(3), 301-310.
9. Febriani, F.; Sinring, A.; and Harum, A. (2024). Pengembangan prototype buku jujur untuk meningkatkan sikap jujur pada siswa. *Indonesian Journal of School Counseling: Theory, Application, and Development*, 4(2), 114.
10. Nurantono, A.; Hidayat, S.; and Jinan, M. (2024). Implementasi proyek penguatan profil pelajar Pancasila (P5) dalam kurikulum merdeka di pondok pesantren Daarussunnah Wangon. *Reslaj Religion Education Social Laa Roiba Journal*, 6(12), 5223-5242.
11. Sartika, R.; and Ndonga, J. (2024). Peran pendidikan Pancasila dalam implementasi pendidikan karakter di era 4.0. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 9(4), 121-134.
12. Hart, R.; Ivztan, I.; and Hart, D. (2013). Mind the gap in mindfulness research: A comparative account of the leading schools of thought. *Review of General Psychology*, 17(4), 453-462.
13. Chang, J.; Park, J.; and Park, J. (2023). Using an artificial intelligence chatbot in scientific inquiry: Focusing on a guided-inquiry activity using inquirybot. *Asia-Pacific Science Education*, 9(1), 44-74.
14. Ye, X.; Zhang, W.; Zhou, Y.; Li, X.; and Zhou, Q. (2025). Improving students' programming performance: An integrated mind mapping and generative AI chatbot learning approach. *Humanities and Social Sciences Communications*, 12(558), 1-13.
15. Nurjain, A.; Nurjain, L.R.; Fajriah, Y.N.; Nurjain, A.K.; and Firdaus, H.A. (2026). Integrating generative artificial intelligence (AI)-based multimodal learning in education to enhance literacy aligned with Sustainable Development Goals (SDGs). *ASEAN Journal of Educational Research and Technology*, 4(1), 71-88.
16. Parina, R.; Wijaya, A.; and Apridiansyah, Y. (2022). Aplikasi chatbot sebagai media pembelajaran interaktif SD N 17 Kota Bengkulu berbasis Android. *Jurnal Media Infotama*, 18, 1-7.
17. Putri, T.E.; and Ramadhan, G. (2024). Penerapan chatbot sebagai alat pembelajaran untuk pengembangan pendidikan karakter. *Indonesian Journal of Computer Science and Engineering (IJCSE)*, 1, 1-8.
18. Susanti, S.; Aminah, F.; Mumtazah Assa'idah, I.; Aulia, M. W.; and Angelika, T. (2024). Dampak negatif metode pengajaran monoton terhadap motivasi belajar siswa. *Pedagogik: Jurnal Pendidikan dan Riset*, 2(2), 86-93.
19. Sugden, N.; Brunton, R.; Macdonald, J.B.; Yeo, M.; and Hicks, B. (2021). Evaluating student engagement and deep learning in interactive online psychology learning activities. *Australasian Journal of Educational Technology*, 37(6), 1-18.
20. Nurgiansah, T.H. (2021). Pendidikan Pancasila sebagai upaya membentuk karakter jujur. *Jurnal Pendidikan Kewarganegaraan Undiksha*, 9(1), 33-41.
21. Pongoh, D.; Lumapow, H.R.; Lengkon, J.S.J.; Rotty, V.N.J.; and Tuerah, I.J.C. (2022). Sumbangan Pemikiran Filsafat Pendidikan Paulo Freire bagi sistem pendidikan tinggi Indonesia. *Media Jurnal Filsafat Dan Teologi*, 3(1), 103-115.

22. Muhammad, G.; Zakiah, Q.Y.; and Erihadia, M. (2021). Implementasi pendidikan karakter religius melalui media pembelajaran berbasis teknologi. *Ta Dibun Jurnal Pendidikan Islam*, 10(4), 481.
23. Li, Y.; Zhou, X.; Yin, H.; and Chiu, T.K.F. (2025). Design language learning with artificial intelligence (AI) chatbots based on activity theory from a systematic review. *Smart Learning Environments*, 12(1), 24.
24. Fang, X.; Chen, C.; Wang, Z. X.; Zhao, Y.; Jiang, L.Q.; Fang, Y. (2023). Serum DKK-1 level in ankylosing spondylitis: Insights from meta-analysis and Mendelian randomization. *Frontiers in Immunology*, 14, 1193357.
25. Ragadhita, R.; Fiandini, M.; Al Husaeni, D.N.; and Nandiyanto, A.B.D. (2026). Sustainable development goals (SDGs) in engineering education: Definitions, research trends, bibliometric insights, and strategic approaches. *Indonesian Journal of Science and Technology*, 11(1), 1-26.
26. Xing, G.; Chano, J.; Thadanattaphak, Y.; and Wu, C.C. (2025). Physical adaptation of college students in high-altitude training: Empirical findings and curriculum development insights to support Sustainable Development Goals (SDGs). *ASEAN Journal of Educational Research and Technology*, 4(2), 215-236.
27. Imaniyati, N.; Ratnasari, C.D.; and Adman, A. (2025). Enhancing job satisfaction through human resource information systems and communication: A commitment-based approach to achieve sustainable development goals (SDGs) in education-oriented organizations. *ASEAN Journal of Educational Research and Technology*, 4(2), 237-254.
28. Di, R.; Sawangboon, T.; and Chano, J. (2025). Enhancing innovative thinking through a theory-based instructional model in design education to support sustainable development goals (SDGs). *ASEAN Journal of Educational Research and Technology*, 4(3), 311-332.
29. Wiyanarti, E.; and Nurjannah, A.N. (2026). Influence of self-efficacy on affective learning outcomes in social studies education toward achieving sustainable development goals (SDGs). *ASEAN Journal of Educational Research and Technology*, 4(1), 1-18.
30. Yu, X.; Chano, J.; and Wongsaphan, M. (2026). Enhancing occupational identity and self-efficacy through a self-education model in art and design education aligned with sustainable development goals (SDGs). *ASEAN Journal of Educational Research and Technology*, 4(1), 19-46.