Proceedings of International Conference on Islamic Education (ICIED)
Building an Inclusive and Sustainable Educational System
Volume 11, 2026 (p-ISSN 2477-3638 / e-ISSN 2613-9804)

Implementation Of Project Based Learning Assisted By Artificial Intellligence In Learning Planning Lectures For PAI Students Of UIN Maulana Malik Ibrahim Malang

Ratna Nulinnaja[1], Sovi Amalia[2], Reni Fadhilah[3]

Correspondence:
ratnanulinnaja@uin-malang.ac.id

Affiliation:
Department of Islamic Primary Education, Faculty of Tarbiyah and Teacher Training, Universitas Islam Negeri Maulana Malik Ibrahim Malang, Indonesia[1]
ratna_nulinnaja@uin-malang.ac.id

Department of Islamic Primary Education, Faculty of Tarbiyah and Teacher Training Universitas Islam Negeri Maulana Malik Ibrahim Malang , Indonesia[1]
soviamalia935@gmail.com

Department of Islamic Primary Education, Faculty of Tarbiyah and Teacher Training Universitas Islam Negeri Maulana Malik Ibrahim Malang, Indonesia[1]
renifadhilah957@gmail.com

Abstract
The integration of Artificial Intelligence (AI) into the Learning Planning course provides opportunities to support prospective teachers in developing learning planning tools more effectively, creatively, reflectively, and adaptively. In this course, AI was utilized as a learning support tool to generate instructional ideas, formulate learning objectives, develop the Effective Weeks Plan (RPE), Annual Program (PROTA), Semester Program (PROSEM), Learning Objectives Flow (ATP), teaching modules, instructional media, and assessment instruments, as well as to improve the language and organization of learning planning documents. This study aimed to describe the implementation of AI-assisted Project-Based Learning (PjBL) in the Learning Planning course and to explore students' responses, experiences, challenges, and reflections throughout the learning process. A qualitative approach was employed involving 63 Islamic Education students from Classes C and G. Data were collected through closed-ended and open-ended questionnaires, observations, and documentation, and analyzed using the Miles and Huberman interactive model. The findings revealed that AI-assisted PjBL helped students understand the stages of developing learning planning tools, generate and elaborate instructional ideas, improve the quality of their designs, and participate more actively in project-based activities. AI facilitated idea exploration and the development of initial drafts; however, its outputs required critical review, verification, contextual adaptation, and revision to ensure alignment with students' characteristics and learning objectives. The findings also indicate that meaningful AI integration requires self-awareness, intellectual curiosity, and critical, creative, reflective, and adaptive thinking. Therefore, AI should function as a learning support system that strengthens pedagogical competence, reflective decision-making, and academic responsibility.

Keywords:
Artificial Intelligence; Project-Based Learning; Learning Planning; Pedagogical Competence.

A. INTRODUCTION

Artificial Intelligence (AI) is a technology designed to mimic human thinking skills, such as solving problems, learning, and helping the decision-making process (Alfaid & Hayani, 2024). Its development has been used in various fields, including education, to support lecturers in analyzing student learning needs and helping students provide faster and more appropriate access to various learning resources, as well as supporting more adaptive and student-centered learning through the presentation of materials that are tailored to the abilities and learning needs of each individual (Maretasari et al., 2025).

The use of AI has also begun to be integrated in the education of prospective teachers, especially in the preparation process learning planning (Cai et al., 2025; Kanvaria & Ritika, 2024). In this process, AI can help prospective teachers produce learning ideas, formulate learning objectives, arrange learning activities, and provide recommendations tailored to the needs of students so that the preparation of learning planning tools becomes more effective (Kanvaria & Ritika, 2024). However, AI only serves as a tool so that creativity, analytical skills, and pedagogic considerations remain the responsibility of prospective teachers (Kanvaria & Ritika, 2024).

Students of the education study program, including Islamic Religious Education (PAI) students, are prospective teachers who are prepared to master various professional competencies, one of which is pedagogic competence ((Ghufron et al., 2022; Purwanti & Suhargo, 2024). Pedagogic competence includes not only the ability to carry out learning, but also the ability to design systematic learning planning through the preparation of perangkat pembelajaran yang sesuai dengan karakteristik peserta didik, tujuan pembelajaran, strategi, media, serta asesmen (Krepf & König, 2022a). Oleh karena itu, kemampuan menyusun learning planning is one of the fundamental competencies that prospective teacher students must possess as a provision in carrying out effective and meaningful learning (Krepf & König, 2022b; Røneid & Børte, 2026).

Courses that play an important role in developing the pedagogic competence of prospective teachers are learning planning. Through this course, students are equipped with the ability to design learning tools systematically, starting from analyzing learning outcomes, formulating learning objectives, compiling teaching modules, choosing learning strategies and media, developing Student Worksheets (LKPD), to designing assessments that suit the characteristics of students.

The complexity of the preparation of learning tools encourages the need to utilize learning innovations that are able to support students in developing their pedagogic competencies more optimally (König et al., 2021). Dalam konteks tersebut, The development of Artificial Intelligence-based technology is starting to be used as a companion in the learning planning process because it can help produce initial designs, develop alternative learning ideas, and provide feedback on the prepared designs (Peikos & Stavrou, 2025).

Project-Based Learning (PjBL) is one of the relevant learning approaches to support the development of pedagogic competencies of prospective teacher students in courses learning planning. This approach provides students with the opportunity to learn through authentic project completion that demands critical thinking, problem-solving, collaboration, creativity, and reflection skills during the learning process (Dewi, 2021). The integration *of Artificial Intelligence* (AI) in PjBL allows AI to function as a

learning support system that helps students explore ideas, develop an initial design of learning tools, and obtain initial feedback on the work developed (Malau, 2026). However, AI results still require a process of analysis, verification, and adjustment by prospective teachers to meet their needs by taking into account the characteristics of students, learning objectives, and the learning context to be carried out (Malau, 2026). Thus, the integration of AI in PjBL not only improves the efficiency of the preparation of learning tools, but also encourages the development of self-awareness, curiosity, and the ability to think critically, creatively, reflectively, and adaptively as important competencies of prospective teachers.

Previous research shows that the use of *Artificial Intelligence* (AI) is able to support the preparation of learning tools through the provision of ideas, the preparation of initial designs, and the improvement of process efficiency learning planning (Kanvaria & Ritika, 2024; Malau, 2026). Other research also reported that the implementation of *Project-Based Learning* (PjBL) was able to increase student engagement through the ability to think critically, effectively, creatively, reflectively, and adaptively during the learning process through authentic project completion (Dewi, 2021). However, research examining the implementation of *Project-Based* Learning-assisted *Artificial Intelligence* in *the Learning Planning* course is still relatively limited, especially in explaining how students use AI as *a learning support system* through the process of preparing learning tools that take place effectively, creatively, reflectively, and adaptively, starting from the exploration of ideas, the preparation of prompt, evaluation, verification, revision, and adjustment of AI outputs to the characteristics of learners and learning objectives. In addition, research that reveals how this process shapes self-awareness, curiosity, and critical thinking skills of students as prospective teachers is also still limited.

Previous research has emphasized the effectiveness of the use of Artificial Intelligence (AI) or Project-Based Learning (PjBL) on learning outcomes and the preparation of learning tools (Kasneci et al., 2023), This study explores the implementation of AI as a learning support system in *Project-Based Learning* to understand students' responses, experiences, challenges, and reflections during the preparation of learning tools. This research also offers a new perspective on how the meaningful use of AI contributes to the development of self-awareness, curiosity, and critical, creative, reflective, and adaptive thinking skills as important competencies of prospective teachers.

B. METHODS

This study uses a qualitative approach with a descriptive research type to describe in depth the implementation of *Project-Based Learning* (PjBL) assisted by *Artificial Intelligence* (AI) in the Learning Planning course. The research was carried out in the Learning Planning course of the Islamic Religious Education Study Program, Maulana Malik Ibrahim State Islamic University Malang in the even semester of the 2025/2026 Academic Year. The research participants totaled 63 fourth semester students from classes C and G.

The study employed four research instruments: a 20-item closed-ended questionnaire, an eight-item open-ended questionnaire, an observation sheet, and documentation. The closed-ended questionnaire assessed students' responses to AI-

assisted Project-Based Learning (PjBL), covering PjBL understanding and participation, AI utilization, verification and responsible use, critical and creative thinking, self-awareness, prompt-related challenges, and perceived meaningfulness. The open-ended questionnaire explored students' experiences, AI-assisted learning-tool development, verification and adaptation of AI outputs, challenges, changes in thinking and self-awareness, curiosity, critical, creative, reflective, and adaptive thinking, and suggestions for improving AI-assisted PjBL.

The implementation of learning is carried out through six stages of Project-Based Learning (PjBL) which include determining basic questions, preparing project planning, preparing implementation schedules, monitoring project progress, assessing project results, and reflecting on learning processes and outcomes (Nababan et al., 2023). At each stage, students use AI to explore ideas, develop an initial design of learning tools. Furthermore, lecturers act as facilitators who guide students to verify, evaluate, revise, and adjust AI outputs to suit the characteristics of students, learning objectives, and learning context.

Data was collected through questionnaires, observations during the learning process, and analysis of the documentation of learning tools produced by students. Data were analyzed using the Miles and Huberman interactive analysis model which included data collection, data reduction, data presentation, and conclusion drawing and verification (Asipi et al., 2022). The validity of the data is maintained through triangulation techniques by comparing the results of questionnaires, observations, and documentation.

C. RESULT & DISCUSSION

AI is used to support the preparation of learning tools, while lecturers guide students to use AI critically, creatively, reflectively, and adaptively. This section presents the results of the implementation of *Project-Based Learning* (PjBL) assisted by *Artificial Intelligence* (AI), including the planning process, implementation process, challenges, and implications in Learning Planning lectures.

Project Based Learning Planning Assisted by Artificial Intelelligence in Learning Planning Lectures

The planning stage began with project orientation for the preparation of learning tools through the *Project-Based Learning* (PjBL) approach. The lecturer explained the project objectives, implementation stages, and the use of *Artificial Intelligence* (AI) as a *learning support system*, while emphasizing digital academic integrity. Before starting the project, students developed strategies for using AI by designing appropriate prompts, identifying information needs, and preparing references to verify AI-generated outputs.

Based on the data condensation process, the findings at this stage were categorized into several aspects**:** (1) project orientation and participation, (2) AI utilization, (3) prompt design and exploration, (4) information seeking and verification, and (5) responsible and critical use of AI**.** The analysis showed that students explored various alternative prompts and information sources to obtain outputs relevant to the learning tools they were developing. Students also demonstrated an awareness that AI-generated information could not be used directly and therefore needed to be verified against relevant references. This process indicates that students were beginning to use

AI critically and responsibly while developing their learning tools.

The Process of Implementing Project-Based Learning Assisted by Artificial Intelligence in Learning Planning Lectures

The results of the analysis of student responses showed that during the implementation of the project, AI was used to assist in the preparation of learning tools through the exploration of various alternative ideas, the preparation of initial designs, and the search for supporting references. Students do not use the results of AI outputs directly, but first verify, compare with other sources, revise, and adjust them to the characteristics of students and learning objectives. In addition, students try various *prompts* to obtain more relevant outputs so that AI functions as a support for the learning process, not as a substitute for pedagogical abilities.

This process has an impact on the development of students' mindset in compiling learning tools. Students demonstrate awareness to use AI responsibly through the process of evaluating and verifying information before use, which reflects critical thinking skills. The exploration of various *prompts* and references also encourages students to develop alternative solutions more effectively, reflect on the results of their work, and adapt to various recommendations provided by AI according to learning needs. These findings show that AI not only improves the efficiency of the preparation of learning tools, but also supports the development of critical, effective, reflective, and adaptive thinking skills of students as prospective teachers. These findings are in line with research (Kasneci et al., 2023) which affirms that the use of generative AI in education requires critical evaluation and verification of AI output. In addition, the research (Lehtinen et al., 2026) shows that AI can support collaboration and the development of critical thinking in teacher education when used as a learning partner, not as a substitute for human thinking processes.

Challenges in the Implementation of Project-Based Learning Assisted by Artificial Intelligence in Learning Planning Lectures

a. Technical Challenges

The results of the questionnaire analysis show that students still face technical challenges in utilizing *Artificial Intelligence* (AI), especially related to general outputs and the preparation of prompts that are not yet specific. These findings indicate that the quality of AI output is influenced by the user's ability to compose instructions clearly and verify and refine the results obtained.

b. Pedagogical challenges

Students face pedagogical challenges in integrating AI into the preparation of learning tools. Student responses show that AI results cannot be used directly, but need to be verified, compared with various references, and adjusted to students' characteristics, learning outcomes, and learning objectives. Students also emphasized that AI should be positioned as an aid, not as a substitute for pedagogical thinking processes and decision-making.

c. Implementation Challenges

Students identify the need for support in the process of implementing AI in lectures. Some students expect lecturer assistance in the use of AI, training related to the preparation of effective *prompts*, and discussions on the ethics of using AI in academic activities. In addition, students consider that the revision and reflection

process is still necessary so that the resulting learning tools have better quality and are in accordance with the learning context.

The Impact of Implementing Project-Based Learning Assisted by Artificial Intelligence on Learning Planning Lectures

a. Integration of *Artificial Intelligence-Assisted Project-Bassed Learning* in Islamic Religious Education

Project-Based Learning (PjBL) assisted by Artificial Intelligence (AI) contributes to the development of the pedagogical competence of prospective Islamic Religious Education (PAI) teachers, especially in the preparation of learning tools. AI is used as a learning support system to support the preparation of various components of learning tools, including the formulation of learning objectives, the preparation of Effective Week Plans (RPE), Annual Programs (PROTA), Semester Programs (PROSEM), Learning Goal Flows (ATP), teaching modules, learning media, and assessment instruments. However, AI outputs are not used directly, but through a process of verification, evaluation, reflection, and adjustment to the curriculum, student characteristics, and lecturer direction.

The findings of the study show that AI plays a role as a support for pedagogical decision-making that strengthens the effectiveness of the preparation of learning tools without replacing the professional competence of prospective teachers. This process encourages students to continue to apply pedagogical considerations in determining goals, strategies, methods, and assessments that are in accordance with the needs of students.

These findings are in line with (Blonder et al., 2025) which states that the use of AI in the education of prospective teachers can support the preparation of lesson planning and facilitate the development of Pedagogical Content Knowledge (PCK) through the process of planning, reflection, and evaluation of learning. In addition, (Saragih et al., 2026) reports that the integration of AI in *Project-Based Learning* improves project completion efficiency, creativity, critical thinking skills, collaboration, and more optimal quality of project outputs.

b. Project-Based Learning Assisted by Artificial Intelligence in Learning Planning Lectures to Support a Positive Learning Environment

The implementation of AI-assisted PjBL has implications for the creation of a learning environment that is more effective, creative, reflective, and adaptive to technological developments (Aprilia et al., 2026). Through the preparation of learning device projects, students not only learn concepts theoretically, but also gain hands-on experience in designing learning tools systematically. The use of AI makes it easier for students to obtain references, explore various alternative ideas, and speed up the process of preparing learning tools so that learning time can be more focused on the process of analysis, discussion, and improvement of project results.

In addition to increasing student engagement, the use of AI also encourages the formation of a reflective learning culture through the process of verification, evaluation, revision, and adjustment of AI outputs with the learning context. This process contributes to the development of critical thinking skills, creativity, adaptation to technology, and awareness of the responsible use of AI.

The findings show that the integration of AI in PAI learning not only supports the

development of pedagogical competencies, but also creates a *student-centered learning* environment. This condition provides space for students to collaborate, reflect, think critically, and use technology ethically in accordance with the demands of 21st century learning.

D. CONCLUSION

This study shows that the implementation of *Project-Based Learning* (PjBL) assisted by *Artificial Intelligence* (AI) in the Learning Planning course is able to support the learning process of Islamic Religious Education students of UIN Maulana Malik Ibrahim Malang. The use of AI helps students explore ideas, develop an initial design of learning tools, improve structure and language, and develop components of learning tools. However, the results generated by AI are not used directly, but through a process of verification, evaluation, reflection, and adjustment based on the characteristics of the learners, learning objectives, and learning context.

This research also shows that the application of AI-assisted PjBL encourages students to develop critical, creative, reflective, and adaptive thinking skills during the project completion process. Students view AI as *a learning support system* that helps the learning process, not as a substitute for pedagogical competence or professional decision-making of a prospective teacher. On the other hand, students still face various challenges, including the limited quality of AI outputs, the ability to compile effective prompts, and the importance of lecturer assistance and understanding of the ethics of using AI in learning.

The implications of this study show that the integration of AI in project-based learning has the potential to strengthen the pedagogic competency development of prospective teachers while creating a more effective, creative, reflective, and adaptive learning environment. Therefore, the use of AI in teacher education needs to be directed as a means of supporting pedagogical thinking and decision-making processes that still prioritize academic responsibility, reflective abilities, and professional considerations. Further research is suggested to involve a wider range of subjects, using a mixed methods or experimental approach, and examine the effect of the implementation of Project-Based Learning (PjBL) assisted by Artificial Intelligence (AI) in the Learning Planning course on improving pedagogic competence, high-level thinking skills, and the quality of learning tools produced by students.

ACKNOWLEDGMENTS

The author would like to thank the Islamic Religious Education Study Program, Faculty of Tarbiyah and Teacher Training, Maulana Malik Ibrahim State Islamic University Malang for the support provided during the implementation of the research. Appreciation was also expressed to the lecturers in the Learning Planning course who have facilitated the research process, as well as to all students of the Islamic Religious Education Study Program in grades C and G who have actively participated in the learning process and data collection.

REFERENCES

alfaid, A., & Hayani, A. (2024). Analisis Dampak Artificial Intelligence (AI) Pada Pembelajaran Pai Di Universitas Alma Ata Yogyakarta. *Al-Mahira : Jurnal Pendidikan Agama Islam*, *1*(1), 30–41.

Aprilia, T. H., Haq, M. E., Mubarok, N. F., Hibatulloh, M. F., & Firmansyah, M. A. (2026). *Desain Pembelajaran Berbasis Artificial Intelligence: Strategi, Model, Dan Praktik Implementatif*. Perkumpulan Akademi Pesantren Nusantara.

Asipi, L. S., Rosalina, U., & Nopiyadi, D. (2022). The Analysis Of Reading Habits Using Miles And Huberman Interactive Model To Empower Students' Literacy At Ipb Cirebon. *International Journal Of Education And Humanities*, *2*(3), 117–125. Https://Doi.Org/10.58557/Ijeh.V2i3.98

Blonder, R., Feldman-Maggor, Y., & Rap, S. (2025). Are They Ready To Teach? Generative Ai As A Means To Uncover Pre-Service Science Teachers' Pck And Enhance Their Preparation Program. *Journal Of Science Education And Technology*, *34*(6), 1301–1310. Https://Doi.Org/10.1007/S10956-024-10180-2

Cai, H., Han, B., Sun, J., Li, X., & Wong, L.-H. (2025). Harnessing Ai For Teacher Education To Promote Inclusive Education: Investigating The Effects Of Chatgpt-Supported Lesson Plan Critiques On The Development Of Pre-Service Teachers' Lesson Planning Skills. *The Internet And Higher Education*, *67*, 101022. Https://Doi.Org/10.1016/J.Iheduc.2025.101022

Dewi, P. S. (2021). *E-Learning: Pjbl Pada Mata Kuliah Pengembangan Kurikulum Dan Silabus*.

Ghufron, M. A., Taufiq, A., & Riskiyanto, M. (2022). Pre-Service English Teachers' Pedagogical Competence In Teaching English: A Case Of Teaching Internship Program (Tip). *English Learning Innovation*, *3*(1), 27–41. (Research Article). Https://Doi.Org/10.22219/Englie.V3i1.19382

Kanvaria, V. K., & Ritika. (2024). Exploring The Integration Of Artificial Intelligence In Lesson Planning For Pre-Service Teachers. *Indian Journal Of Educational Technology*, *6*(Ii), 340–345.

Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günnemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeffer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., … Kasneci, G. (2023). Chatgpt For Good? On Opportunities And Challenges Of Large Language Models For Education. *Learning And Individual Differences*, *103*, 102274. Https://Doi.Org/10.1016/J.Lindif.2023.102274

König, J., Krepf, M., Bremerich-Vos, A., & Buchholtz, C. (2021). Meeting Cognitive Demands Of Lesson Planning: Introducing The Code-Plan Model To Describe And Analyze Teachers' Planning Competence. *The Teacher Educator*, *56*(4), 466–487. Https://Doi.Org/10.1080/08878730.2021.1938324

Krepf, M., & König, J. (2022a). Structuring Lessons As An Aspect Of Pre-Service Teachers' Planning Competence: A Scaling-Up Analysis. *Zeitschrift Für Erziehungswissenschaft*, *25*(4), 917–946. Https://Doi.Org/10.1007/S11618-022-01125-9

Krepf, M., & König, J. (2022b). Structuring Lessons As An Aspect Of Pre-Service Teachers' Planning Competence: A Scaling-Up Analysis. *Zeitschrift Für Erziehungswissenschaft*, *25*(4), 917–946. Https://Doi.Org/10.1007/S11618-022-01125-9

Lehtinen, A., Channa, F., Naykki, P., Ahlstrom, E., & Hiljanen, M. (2026). *Generative Ai For Collaborative Learning: Fostering Critical Thinking In Teacher Education*. Https://Doi.Org/10.1002/Jcal.70256

Malau, E. P. (2026). *Pelatihan Pemanfaatan Artificial Intelligence (Ai) Dalam Penyusunan Rencana Pelaksanaan Pembelajaran Dan Modul Ajar Serta Instrumen Evaluasi Pembelajaran Guru Smp Negeri 2 Sibolangit*. *5*.

Maretasari, D., Widiasari, S., & Fikri, A. M. (2025). *A Juridical Analysis Of Copyright For Artificial Intelligence-Generated Works In The Education Sector*. *10*(1).

Nababan, D., Marpaung, A. K., Koresy, A., & Tarutung, I. (2023). *Strategi Pembelajaran Project Based Learning (Pjbl)*. *2*.

Peikos, G., & Stavrou, D. (2025). Chatgpt For Science Lesson Planning: An Exploratory Study Based On Pedagogical Content Knowledge. *Education Sciences*, *15*(3), 338. Https://Doi.Org/10.3390/Educsci15030338

Purwanti, E., & Suhargo, G. I. (2024). Enhancing Pedagogical Competencies In Pre-Service Teachers' Through Microteaching: A Qualitative Study. *Indonesian Journal Of Learning And Instruction*, *7*(1). Https://Doi.Org/10.25134/Ijli.V7i1.9553

Røneid, K. N., & Børte, K. (2026). Learning To Plan Lessons: How Feedback Supports Pre-Service Teachers' Lesson Planning. *Frontiers In Education*, *11*. Https://Doi.Org/10.3389/Feduc.2026.1812418

Saragih, S. F., Putra, I., & Kurniadi, R. (2026). *Penggunaan Project-Based Learning Dan Artificial Intelligence Dalam Pembelajaran Mahasiswa*. *14*(1).