PERSONALIZED LEARNING WITH AI: A NEW PARADIGM FOR 21ST CENTURY EDUCATION

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Abstract
The purpose of this study was to explore in depth the experiences of third-semester students in participating in AI-based personalized learning. For this purpose, data was collected regarding students' experiences of online learning using exploratory qualitative descriptive methods through in-depth semi-structured interviews involving 10 students of the Public Administration Department at Universitas Swadaya Gunung Jati Cirebon. The results of the semi-structured interview data collection were then made into verbatim transcripts and analyzed using thematic coding, and divided into main themes, secondary themes, and codes. It was concluded that students felt the benefits in the form of increased flexibility, efficiency, and suitability of materials to individual learning needs. However, the limitations of the AI system in responding to students' affective and social aspects are still a challenge. Factors such as digital literacy, the role of lecturers, influence the effectiveness of personalized learning. This study provides a new contribution to understanding how students experience personalized learning contextually and subjectively. These findings also emphasize the importance of a humanistic approach in the development of educational AI systems.
Keywords: Personalized learning, artificial intelligence, higher learning, case study, third-semester students

INTRODUCTION

The transformation of education in the 21st century increasingly requires an approach that is responsive to the needs of each individual student. One innovation that is currently developing rapidly to answer this challenge is personalized learning, which relies on artificial intelligence (AI) technology. AI-based personalized learning allows the education system to adjust the material, speed, and learning methods according to the unique characteristics of each student. This development offers great potential in creating a more effective, relevant, and meaningful learning experience for students, especially in higher education (Holmes et al., 2019). In Indonesia, the use of AI in learning has begun to be introduced at various levels of education, but its implementation is still in the exploration stage and is not evenly distributed. Students in the third semester are considered an important group to study because they are in a transition phase from the academic adaptation process to strengthening their identity as students. At this stage, the need for a learning approach that is responsive to the preferences and abilities of each individual is increasingly urgent. However, the implementation of AI-based personalized learning still faces various

challenges, including technological readiness, lecturer readiness, and students' views on the technology.

Previous studies have examined the application of personalized learning and the role of AI in higher education. For example, research by Zawacki-Richter et al. (2019) shows that AI can improve students' learning motivation and academic outcomes through content recommendation systems. On the other hand, Chen et al. (2020) underscores the potential of AI in instantly identifying students' learning needs. However, many of these studies focus more on the technical aspects and system efficiency, while the subjective experience dimension of students as end users—especially in the context of developing countries like Indonesia—is still underexplored. There is still little research that explores how students react to AI-based learning from a pedagogical and psychosocial perspective. This gap is an important issue that this study aims to answer. By applying a qualitative case study approach, this study seeks to explore the experiences of third-semester students in undergoing personalized learning supported by AI technology. This study is expected to contribute to the development of theories on technology-based learning adaptation, as well as provide practical recommendations for lecturers and system developers in designing more personalized, adaptive, and sustainable learning strategies. Thus, this study is expected to add insight into the literature on personalized learning in the context of higher education in Indonesia and offer new perspectives on how artificial intelligence can be utilized to support students' autonomy and active participation in their learning process.

LITERATURE REVIEW

Personalized Learning Concept

Personalized learning is an approach in education that adapts the learning process according to the needs, preferences, and learning pace of each student. This approach emphasizes that each student has a unique way of learning, so freedom is needed in delivering learning materials and strategies (Pane et al., 2015). In practice, personalized learning includes various elements such as differences in content, learning through projects, and independent learning supported by consistent feedback.

According to Patrick et al. (2013), personalized learning consists of four main components, namely: (1) adjustment of curriculum and teaching based on individual needs; (2) utilization of learning data to support decisions made; (3) active participation of students in determining the path and goals of learning achievement; and (4) use of technology in teaching to increase access and accelerate the adaptation process.

The Role of Artificial Intelligence in the World of Education

Artificial intelligence (AI) in education has transformed itself from being just a technical aid to a more sophisticated teaching support. AI can analyze students' learning patterns, suggest learning materials directly, and identify individual learning strengths and weaknesses (Luckin et al., 2016). AI-powered adaptive learning systems, such as Intelligent Tutoring Systems (ITS), have now been implemented in various e-learning platforms to support personalized learning.

In a study conducted by Holmes et al. (2019), it was revealed that AI not only has the potential to improve academic achievement but can also strengthen the role of students as active individuals in the learning process. Although AI technology has developed rapidly, there are still various challenges related to ethics, algorithm transparency, and resistance from teachers and students that are obstacles to its widespread implementation.

AI-Based Personalized Learning in the Context of Students

Several studies have shown the positive effects of AI-based personalized learning in higher education. For example, a study by Chen et al. (2020) showed that students who used an AI-based learning platform experienced significant improvements in understanding the material and learning satisfaction. Meanwhile, Zawacki-Richter et al. (2019) stated that AI can help teachers identify students who experience learning difficulties early, so that teaching interventions can be carried out appropriately. However, many of these studies focus more on quantitative measurements of learning outcomes, without delving into students' subjective experiences in undergoing personalized learning. Aspects such as student perspectives, intrinsic motivation, and the relationship between technology and learning autonomy are still lacking.

Research Gaps and Focus of This Research

Although there is a lot of literature discussing personalized learning and the use of AI in education, most previous studies emphasize technological outcomes or characteristics. There are still few studies that prioritize student experience as the main focus, especially in the local context of Indonesia and among students in semester III. Therefore, there is a gap in understanding the qualitative and contextual dimensions of the application of AI-based personalized learning. This study aims to fill this gap by exploring more deeply the narratives, reflections, and dynamics of students' learning experiences. By adopting a qualitative case study approach, this study not only provides deeper contextual insights, but can also be a source of empirical data for the development of a more humanistic and inclusive AI-based learning system.

METHOD

This study applies a qualitative approach with a case study type. This approach was chosen because it is suitable for investigating more deeply the subjective experiences, personal meanings, and social interpretations of students related to the personalized learning process supported by AI. On the other hand, a case study is used because the focus of this study is on one specific case, namely the experience of third-semester students who use an AI-based learning system at a particular college (Creswell and Poth, 2018). This study is exploratory and descriptive in nature with the aim of revealing in detail the context, process, and views of students, and understanding how they react to personalized learning supported by AI. This study was conducted at a private college in Cirebon that has implemented a limited AI-based learning system in several courses. The subjects of the study were third-semester students from study programs that utilize the AI platform in their learning process. Participants were selected based on the following criteria: 1) Active students in the third semester; 2) Taking courses that have integrated AI in learning; 3) Willing to participate voluntarily in interviews and group discussions. The number of participants was adjusted to the principle of data saturation, where data collection will be stopped when no new information is obtained (Merriam and Tisdell, 2016). The initial estimate was 6–10 students as key informants. Data collection was carried out using several methods, namely: 1) In-depth interviews; Interviews were conducted in a semi-structured manner using open-ended question guides to facilitate in-depth exploration of students' experiences and views. 2) Non-participatory observation; Researchers observed students' learning activities on the AI platform, recorded interaction patterns, system reactions, and how students accessed learning materials and assignments. The data collected were analyzed using thematic analysis techniques as described by Braun and Clarke (2006). The analysis process was carried out through six main steps: 1) Reading and understanding the data thoroughly; 2)

Producing systematic initial codes from the data; 3) Identifying potential themes; 4) Reviewing and refining themes; 5) Defining and naming themes; 6) Compiling narratives based on the results of the analysis. This analysis was carried out repeatedly and reflectively to maintain the depth of interpretation of students' experiences. To ensure the validity and credibility of the data, this study uses several strategies, namely: 1) Source triangulation, namely comparing data from interviews, observations, and documentation; 2) Member checking, namely confirming the results of the interpretation to participants to ensure the accuracy of the meaning; 3) Audit trail, namely recording in detail the process of data collection and analysis to maintain transparency; 4) Peer debriefing, namely discussing with fellow researchers to test the sharpness of interpretation and avoid subjective bias.

RESULTS AND DISCUSSION

This study involved eight third-semester students from the Public Administration study program at a private university in Cirebon City. All participants had taken courses using an artificial intelligence-based learning system for at least one semester. The characteristics of the participants varied in terms of academic achievement, secondary education background, and preferences in learning styles. This was considered to obtain diverse data and represent various perspectives. Most students stated that the AI system made it easier for them to access materials and understand the learning content independently. Features such as additional assignment recommendations, adjustments to the difficulty level of questions based on performance, and automatic feedback were considered helpful in the learning process.

> *"I feel that AI can detect if I often make mistakes on certain types of questions, so after that I am given similar questions, but slightly easier for me to try again,"* (Participant A)

However, some students felt that this system was still lacking in understanding the context of the difficulties they faced. AI was seen as "rigid" and unable to adapt to the emotional or social states they experienced while learning.

> *"Sometimes AI keeps giving me additional assignments, even though I'm tired or not focused. It can't understand my condition like a lecturer can,"* (Participant E)

This experience shows that AI can support personalization in the cognitive aspect but is not yet responsive enough to students' affective or psychosocial dimensions.

Factors Influencing the Effectiveness of AI-Based Personalized Learning

Based on the results of thematic analysis, there are several main factors that influence the effectiveness of AI-based personalized learning: 1) Students' digital literacy skills: Students who are accustomed to using digital platforms are more easily adaptable to AI systems; 2) The role of lecturers as a liaison: Although AI systems are a dominant part of the learning process, the presence of lecturers is still considered vital in addressing the gap between technology and understanding of the material; 3) Algorithm suitability to actual needs: AI systems are considered helpful if they can adjust their material appropriately, but when recommendations are not appropriate, students feel confused. These factors show that personalization depends not only on AI skills, but also on the learning ecosystem that supports it.

Students' Views on the Role of AI in Learning.

Most participants had positive views on the role of AI in learning, especially in terms of efficiency and flexibility. They felt increased independence in learning because they could choose materials that suited their needs. However, there were also concerns about dependence on the system and the loss of meaningful human interaction.

> *"If everything is automated, sometimes we no longer discuss. In fact, discussing helps me to understand better,"* (Participant G)

This view emphasizes the importance of incorporating a humanistic approach in the design of AI systems in order to maintain pedagogical values that emphasize human relationships.

Barriers and Challenges in the Implementation of Personalized Learning

Some of the challenges expressed by students include: 1) The system's limitations in adapting to non-academic conditions, such as fatigue or psychological stress; 2) Concerns regarding data privacy, especially when the AI system requests access to personal information; 3) Lack of infrastructure, such as unstable internet connections when accessing the AI system online; 4) Lack of initial training on how to utilize the available AI features.

> *"At first, I felt confused using the system. There should have been a special session to introduce AI first,"* (Participant C)

The results of this study indicate that the success of customized learning is not only determined by technology, but also by institutional preparation and sufficient system support.

Results and Discussion

This study shows that AI-based personalized learning has great potential in improving the learning experience of third-semester students. This study reveals that AI-assisted personalized learning has significant ability to improve the learning experience of students in the third semester. AI enables more adaptive and cognitively responsive learning, but still has limitations in responding to emotional and social aspects. AI technology provides opportunities for more flexible and cognitively responsive learning, but still faces limitations in responding to emotional and social factors. This finding is in line with previous literature that shows the potential of AI in improving learning effectiveness (Holmes et al., 2019; Chen et al., 2020), but expands it by providing the perspective of students as end users. The results of this study are in line with previous studies that have identified the ability of AI to improve learning effectiveness (Holmes et al., 2019; Chen et al., 2020), but also expands understanding by adding the perspective of students as the main users. The main contribution of this study lies in the pedagogical and psychosocial dimensions that have previously received less attention in similar studies. The most significant contribution of this research lies in the pedagogical and psychosocial aspects that have not been widely discussed in similar studies. The practical implications of this research include: 1) The need for AI literacy training for students and lecturers; 2) AI integration must continue to consider the role of lecturers as learning companions; 3) Future AI system designs need to consider elements of empathy and emotional adaptation. The practical implications that can be drawn from this research include: 1) The importance of AI literacy training for students and lecturers; 2) The application of AI must continue to consider the function of lecturers as mentors in the learning process; 3) Future AI system designs need to include aspects of empathy and emotional adaptation.

CONCLUSION

Based on the results of a qualitative study of third-semester students involved in learning using artificial intelligence (AI), there are several important points that can be taken as follows: 1) Students gave a positive assessment of the personalized learning experience through AI, especially in terms of efficiency, flexibility, and materials that are tailored to their individual needs. They feel that this system helps in understanding the material at a speed and level of difficulty that can be adjusted by themselves. 2) Several factors that determine the effectiveness of learning are students' digital literacy skills, the role of the teacher as a facilitator, and the ability of the AI system to adjust the material according to the student's learning circumstances. The success of this system is highly dependent on the collaboration between technology, teaching methods, and social interactions. 3) In general, students have a positive view of AI, but they still emphasize the importance of human interaction in the learning process. Although AI is considered helpful, it cannot completely replace the role of lecturers in providing contextual understanding and emotional support. 4) Students face several obstacles, including the inability of the AI system to recognize their emotional state, concerns regarding data privacy, limitations of technological infrastructure, and lack of initial training to maximize the use of AI technology. 5) This study adds insight into the personalized learning experience with the help of AI, especially from the perspective of students in Indonesia. The findings suggest that a human-oriented approach is essential in the application of educational technology and provides new contributions to the development of adaptive learning theory and technology-based higher learning practices.

SUGGESTIONS

Based on the findings and conclusions above, the researcher provides the following suggestions:

For higher education institutions; 1) It is necessary to develop an AI technology integration policy that takes into account pedagogical and ethical dimensions. 2) Provide regular AI literacy training for students and lecturers to increase the effectiveness of its use.

For developers of AI-based learning systems; 1) Design a system that is not only cognitively adaptive, but also able to respond to students' affective aspects through emotion detection or integration with counseling support. 2) Increase data transparency and security to reduce students' concerns about the privacy of personal information.

For further researchers; 1) It is recommended to further examine the relationship between AI-based personalized learning and increased long-term learning autonomy. 2) Comparative research across institutions and across semesters is also recommended to strengthen the generalizability of these findings in the context of Indonesian higher education.

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