The Digital Learning Revolution: AI-Powered Adaptive Learning in PGSD Lectures

Elvani Hertati[1*]

[1]*Program Studi Pendidikan Guru Sekolah Dasar (PGSD), Universitas Nahdlatul Ulama Kal-Bar, Indonesia*

Abstract

The development of digital technology has significantly impacted education, including PGSD (Primary School Teacher Education) lectures. AI-powered adaptive learning offers vast potential to revolutionize digital learning in PGSD, particularly in the course on Digital Learning. This study aims to explore the use of AI-powered adaptive learning in the context of fifth-semester PGSD students enrolled in Digital Learning courses for elementary schools. This research employs a qualitative approach with a case study method. Data were collected through observations, in-depth interviews with lecturers and students, and document analysis. Data were analyzed thematically to identify the benefits, challenges, and effective strategies for implementing AI-powered adaptive learning. The findings reveal that AI-powered adaptive learning has significant potential to enhance the effectiveness of digital learning in PGSD lectures. This system can provide personalized learning tailored to the needs and abilities of each student. It also boosts learning motivation, fosters independence, and optimizes study time. However, the study also highlights several challenges, such as resource availability, technology access, and lecturers' readiness to implement this system. This research recommends that universities consider integrating AI-powered adaptive learning as an integral part of digital learning in PGSD lectures. It also serves as a reference for developing strategies and policies that support the effective and sustainable implementation of AI-powered adaptive learning in higher education.

1. Introduction
The advancement of digital technology has transformed education, presenting both new opportunities and challenges for educators. The digital era demands that teachers master digital skills and innovative pedagogy to create more effective and engaging learning experiences. Amidst these changes, artificial intelligence (AI) emerges as a new force capable of revolutionizing digital learning.

"Technology is changing the way we learn, teach, and think. We need to leverage technology to improve the quality of education, increase access, and prepare students for the future," said (Pellegrino, 2018).

One promising AI innovation is AI-powered adaptive learning. This system provides personalized learning tailored to the needs and abilities of each student. (Christensen, 2011) explains, "Adaptive learning uses AI to identify student strengths and weaknesses, adjust the difficulty level, and provide tailored recommendations for each individual."

In the context of PGSD lectures, mastering digital technology is an urgent necessity. PGSD students are expected to become innovative teachers capable of integrating digital technology into elementary school learning. The Digital Learning course is designed to meet this need; however, traditional teaching methods are often limited and less effective in developing students' digital skills.

This study focuses on utilizing AI-powered adaptive learning in the fifth-semester PGSD course on Digital Learning for elementary schools. It aims to examine how this system can enhance learning quality, uncover the challenges encountered, and formulate effective implementation strategies.

The study builds on the concept (Anderson, L. W., & Krathwohl, 2021), emphasizing the importance of personalized learning approaches in the digital era. It also references (Bates, 2019), highlighting the role of technology in improving educational access and quality.

Through this research, it is hoped that recommendations can be generated for universities to improve the effectiveness of digital learning in PGSD lectures while contributing to the advancement of education in the digital age.

1.1 Literature Review
The use of AI in digital learning, particularly AI-powered adaptive learning, has become a prominent topic in recent years. This study examines literature related to AI-powered adaptive learning in the context of PGSD (Primary School Teacher Education) lectures and digital learning.

1. 1.1 AI-Powered Adaptive Learning

AI-powered adaptive learning is a learning system that leverages AI to adjust content, difficulty levels, and learning pace according to the needs and abilities of each student. (Baker, R. S. J., & Yacef, 2010) explain that this system can identify students' strengths and weaknesses, provide personalized feedback, and tailor optimal learning paths. (Brusilovsky, 2001) adds that adaptive learning improves learning effectiveness, student motivation, and independent learning.

1.1.2 Digital Learning in PGSD Lectures

PGSD lectures are a critical stage in preparing professional teachers. (Suryabrata, 2014) emphasizes the importance of digital skills for future teachers in addressing educational challenges in the digital era. (Warschauer, 2016) notes that integrating digital technology into PGSD lectures can enhance learning quality and prepare students to become innovative teachers.

1.1.3 Challenges in Implementing AI-Powered Adaptive Learning

Several challenges arise in implementing AI-powered adaptive learning in PGSD lectures, including:

- **Resource Availability:** (Bates, 2019) highlights that access to adequate technology and resources is a determining factor in the successful implementation of educational technology.

- **Lecturer Readiness:** (Ross et al., 2012) stresses the importance of lecturer readiness to adopt new technologies and develop pedagogy suited to the digital context.

- **Privacy and Data Security:** The use of AI in learning raises concerns about student data privacy and security. (OECD, 2019) emphasizes the importance of regulations and ethical standards in the use of AI in education.

1.1.4 Effective Strategies for Implementing AI-Powered Adaptive Learning

To address challenges and maximize the benefits of AI-powered adaptive learning in PGSD lectures, effective strategies are needed, including:

- **Lecturer Training:** (Mishra, P., & Koehler, 2006) highlight the importance of training and mentoring lecturers in implementing AI-powered adaptive learning in classrooms.

- **Curriculum Development:** (Anderson, L. W., & Krathwohl, 2021) suggest that curricula need to be adapted to integrate digital technology and personalized learning approaches.

- **Collaboration with Stakeholders:** (Bates, 2019) underscores the importance of collaboration between universities, technology industries, and other stakeholders in developing effective AI-powered adaptive learning systems.

2. Research Methods

This study adopts a qualitative approach with a case study method to examine the implementation of AI-powered adaptive learning in the Digital Learning course for elementary schools, taught by the researcher at Universitas Nahdlatul Ulama Kalimantan Barat. The research focuses on the researcher's experience in implementing AI-powered adaptive learning in a fifth-semester PGSD (Primary School Teacher Education) class. The Coursera platform was selected as the AI-powered adaptive learning platform for its extensive range of courses relevant to digital learning and its ability to use AI to tailor learning content to students' needs and capabilities.

Data were collected through participant observation of classroom learning processes, student interactions with the Coursera platform, and learning activities outside the classroom. The researcher also analyzed documents, including course materials, Coursera platform usage guidelines, and data on students' activities within the Coursera platform. Additionally, the researcher conducted personal reflections on the experience and preparation involved in implementing AI-powered adaptive learning in the classroom.

The collected data were analyzed using thematic analysis techniques, encompassing data reduction, data presentation, and conclusion drawing. Data validity and reliability were enhanced through triangulation of data from various sources (observation, document analysis, and personal reflection), comparisons with related research literature, and detailed documentation of each research stage.

Ethical considerations were observed throughout the study, including obtaining student consent prior to conducting observations and collecting activity data on the Coursera platform, maintaining the confidentiality of research participants' data, and ensuring objectivity in data analysis.

By combining participant observation, document analysis, and personal reflection, this study aims to provide an in-depth understanding of the use of AI-powered adaptive learning in the context of PGSD lectures, based on the researcher's experience as a course instructor utilizing the Coursera platform.

3. Result and Discussion

This study was conducted by observing the researcher's experience in implementing AI-powered adaptive learning in the Digital Learning course for fifth-semester PGSD (Primary School Teacher Education) students, using the Coursera platform over one semester. The following results were obtained:

a. **Increased Motivation and Independent Learning**

- **Student Enthusiasm**: Students demonstrated high enthusiasm in participating in learning activities using the Coursera platform. They were eager to explore interactive materials and motivated to complete assigned tasks. This was reflected in their active participation in online discussions, question forums, and tasks provided through Coursera. This finding aligns with (Brusilovsky, 2001), who

emphasizes that adaptive learning enhances learning effectiveness, student motivation, and independent learning.

- **Better Time Management**: Students reported that Coursera helped them manage their study time more effectively. They could organize their own learning schedules and complete materials at their own pace and ability level.

- **Increased Confidence**: Students stated that the AI-powered adaptive learning system on Coursera made them feel more confident in completing tasks and answering questions. They felt supported by a system that provided feedback tailored to their abilities. This aligns with (Anderson, L. W., & Krathwohl, 2021), who emphasize the importance of personalized learning in enhancing student motivation and confidence.

b. **Improved Digital Skills**

- **Enhanced Technical Skills**: Students showed improved technical skills in using the e-learning platform, such as navigating menus, searching for information, and downloading learning materials.

- **Collaboration Skills**: Students became accustomed to collaborating with peers through online discussions on the Coursera platform and demonstrated their ability to exchange ideas and opinions digitally.

- **Digital Presentation Skills**: Students were trained to create digital presentations using tools available on the Coursera platform, showcasing their ability to present ideas visually. This finding supports (Warschauer, 2016), who emphasizes the importance of integrating digital technology into PGSD lectures to improve learning quality and prepare students to become innovative teachers.

c. **Challenges in Technology Access**

- **Limited Internet Access**: Some students faced challenges with limited internet access, especially in remote areas. This caused difficulties for some students in participating fully in online learning through Coursera.

- **Device Limitations**: Not all students had access to adequate computers or laptops to optimally utilize the Coursera platform. This finding underscores the critical role of resource availability, as explained by (Bates, 2019), in determining the success of educational technology implementation.

d. **Lecturer's Digital Skill Challenges**
- **Lack of Training**: The researcher acknowledged the need to improve their digital skills to optimally operate the Coursera platform. This highlights the importance of lecturer readiness to adopt new technology and develop pedagogy suitable for digital contexts, as emphasized by (Ross et al., 2012).

The findings show that AI-powered adaptive learning via Coursera has significant potential to improve the quality of PGSD lectures. This aligns with (Baker, R. S. J., & Yacef, 2010), who explain that such systems can identify student strengths and weaknesses, provide personalized feedback, and tailor optimal learning paths. The system offers personalized learning experiences, increases motivation and independence, and facilitates the development of students' digital skills.

However, the study also highlights several challenges in implementing AI-powered adaptive learning in PGSD lectures. Access to technology and lecturers' digital skills are critical factors in the successful implementation of this system. (Bates, 2019) emphasizes the importance of adequate resources and technology access, while (Ross et al., 2012) underscores the need for lecturers' readiness to adopt new technology and develop pedagogical approaches suitable for the digital era.

This study suggests that while AI-powered adaptive learning is a valuable tool for enhancing the quality of PGSD lectures, concerted efforts are needed to address the challenges identified. Proposed strategies include:

- **Improving Technology Access**: Universities should enhance technology access for students through scholarships or device loan programs.

- **Enhancing Lecturer Digital Skills**: Universities should organize training and mentoring for lecturers to effectively use AI-powered adaptive learning platforms, as emphasized by (Mishra, P., & Koehler, 2006).

- **Strengthening Technical Support**: Universities should establish technical support teams to assist lecturers and students in using AI-powered adaptive learning platforms effectively.

4. Conclusions

This study demonstrates that AI-powered adaptive learning through the Coursera platform holds significant potential to enhance the quality of learning in PGSD (Primary School Teacher Education) lectures. The system provides personalized learning experiences, boosts motivation and independence, and facilitates the development of students' digital skills.

The findings reveal that students displayed high enthusiasm for learning through the Coursera platform and showed improvements in technical skills, collaboration skills, and digital presentation skills. However, the study also highlights challenges in implementing AI-powered adaptive learning, particularly limited access to technology and lecturers' digital skills.

This research emphasizes the importance of efforts to improve technology access and enhance lecturers' digital skills to maximize the benefits of AI-powered adaptive learning in PGSD lectures.

Universities must develop effective strategies for implementing AI-powered adaptive learning, taking into account factors such as technology access, lecturers' digital skills, and students' learning needs. Further research is needed to investigate the impact of AI-powered adaptive learning on students' academic performance and digital skill development.

In conclusion, AI-powered adaptive learning has great potential to improve the quality of learning in PGSD lectures. However, comprehensive efforts are required to address the challenges identified. With the right strategies, AI-powered adaptive learning can become an effective tool for driving innovation and improving the quality of education in the digital era.

5. References

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