



## Rasch Model Analysis of Artificial Intelligence Technology Implementation Among Physical Education Student

Yudha Munajat Saputra<sup>1\*</sup>, Enjang Yusup Ali<sup>1</sup>, Ari Gana Yulianto<sup>1</sup>, Mohd Salleh Aman<sup>2</sup>

<sup>1</sup>Department of Sport Education, Universitas Pendidikan Indonesia, Indonesia

<sup>2</sup>Department of Sport Education, University of Malaya, Malaysia

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#### Correspondence

\*Yudha Munajat Saputra

**Address:** Jalan Setiabudhi No. 229, Kota Bandung, Jawa Barat 40154, Indonesia

**E-mail:**

[yudhamsaputra@upi.edu](mailto:yudhamsaputra@upi.edu)

### Abstract

The purpose of this study was to analyze of the implementation of Artificial Intelligence Technology (AIT) in higher education through Rasch Model. Research method was used mixed- method through a convergent mixed-method design. The subjects in this study were 138 understudies (29 male and 109 female) at one of higher education in Sumedang, West Java, Indonesia. The instrument utilized is a survey comprising of 14 inquiries dispersed through Google Form. Quantitative investigation incorporates rates, while qualitative examination utilizes the Rasch model, and furthermore from survey examination. The outcomes are depicted in light of the five principal dissects of artificial intelligence execution as per the responses of understudies. By and large, artificial intelligence innovation has been utilized successfully for understudy academic and non-academic activity. There are a few hindrances, one of the greatest is the web connection or network. There are a few reasons and understudy assumptions about the AIT utilized. It is possible to draw the conclusion that AIT has been utilized by students enrolled in higher education for both academic and non-academic purposes. Later on, understudies trust that current AIT can be additionally improved.

**Keywords:** artificial intelligence technology, higher education, rasch model





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<sup>1</sup>Afiliasi 1: Department of Sport Education, Universitas Pendidikan Indonesia, Indonesia

<sup>2</sup>Afiliasi 1: Department of Sport Education, Universitas, Negara

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*Correspondence:*

Yudha Munajat Saputra

E-mail:

[yudhamsaputra@upi.edu](mailto:yudhamsaputra@upi.edu)

### Abstract

*The purpose of this study was to analyze of the implementation of Artificial Intelligence Technology (AIT) in higher education through Rasch Model. Research method was used mixed- method through a convergent mixed-method design. The subjects in this study were 138 understudies (29 male and 109 female) at one of higher education in Sumedang, West Java, Indonesia. The instrument utilized is a survey comprising of 14 inquiries dispersed through Google Form. Quantitative investigation incorporates rates, while qualitative examination utilizes the Rasch model, and furthermore from survey examination. The outcomes are depicted in light of the five principal dissects of artificial intelligence execution as per the responses of understudies. By and large, artificial intelligence innovation has been utilized successfully for understudy academic and non-academic activity. There are a few hindrances, one of the greatest is the web connection or network. There are a few reasons and understudy assumptions about the AIT utilized. It is possible to draw the conclusion that AIT has been utilized by students enrolled in higher education for both academic and non-academic purposes. Later on, understudies trust that current AIT can be additionally improved.*

## Introduction

The era of the Industrial Revolution 4.0 demands greater technological competence in both industry and education (Schwab, 2018). Educational institutions are therefore required to adopt innovative approaches that support meaningful transformation in teaching and learning. One important strategy involves strengthening digital literacy. Digital literacy refers to the ability to access, understand, evaluate, and use information from various digital sources through technological devices (Jalil et al., 2021; Spante et al., 2018; Tang & Chaw, 2015). The concept began gaining prominence in the 1980s with the widespread use of microcomputers in business and society (Rahm & Fejes, 2017). In the 1990s, the rapid expansion of networked information systems further accelerated access to and distribution of information, leading to broader recognition of information literacy (Priyono et al., 2020). Today, digital literacy is closely associated with technical skills in accessing, organizing, interpreting, and sharing information effectively.

Within education, challenges often arise from the use of learning strategies that are inefficient or outdated (Kimmons & Veletsianos, 2018). Misunderstandings between lecturers and students regarding learning materials can hinder the achievement of educational goals. To address these issues, innovation is necessary to improve both competence and mindset. The integration of supportive systems, such as Artificial Intelligence (AI), has the potential to enhance educational quality and effectiveness (Kuleto et al., 2021; Ouyang et al., 2022).

Artificial Intelligence is generally described as technology capable of simulating aspects of human cognition (Chen et al., 2020; Dwivedi et al., 2021). In educational contexts, AI represents the outcome of interdisciplinary research involving system developers, data scientists, designers, linguists, psychologists, and education specialists. The goal is to create intelligent systems that assist educators and support students in developing knowledge and adaptability for a rapidly changing world (Pokrivcakova, 2019). AI relies on advanced algorithms that enable machines to perform tasks requiring reasoning, learning, and adaptation to dynamic environments (Chowdhury et al., 2023). Similarly, Geetha and Reddy (2018) define AI as the ability of machines to replicate human thought processes and behaviors.

AI as a field focuses on designing systems that can think, learn, and act in ways that resemble human intelligence. According to the AskAboutAI report from Getting Smart, the central idea behind AI is that machines can demonstrate intelligent behavior. The concept dates back to 1956, when

algorithms were first used to analyze data and perform tasks autonomously (Purnomo et al., 2020). AI systems are typically designed to learn from experience and solve problems independently (Sharma et al., 2020). In essence, AI consists of computational processes capable of learning, reasoning, and improving performance over time. As data expands and systems become more advanced, AI continues to evolve, offering broader possibilities for improving efficiency and contributing to society.

Overall, AI encompasses the development of intelligent machines capable of performing cognitive tasks such as learning, decision-making, problem-solving, and adapting to new conditions. The defining characteristic of AI lies in its capacity to execute complex functions that traditionally require human intelligence.

Recent studies have explored the integration of AI into mobile technologies, enhancing applications such as facial recognition, speech processing, language translation, and virtual reality (Bhar et al., 2019; Chen et al., 2020; Sarker, 2021). Some projections suggest that AI may automate certain cognitive tasks, potentially transforming aspects of human labor while increasing productivity and efficiency (Polak, 2021). Despite its advantages, AI systems require substantial computational power to process and analyze large amounts of data. In educational contexts, AI-supported mobile technologies contribute to more personalized and interactive learning experiences. For example, virtual reality can extend learning beyond physical classrooms, while AI-based chatbots can provide individualized feedback and assess students' levels of understanding.

In Indonesia, however, the adoption of AI in education remains limited, highlighting the need for continued development within the educational system (Priyahita, 2020). At one higher education institution in Sumedang, the implementation of AI in student academic and non-academic activities is still not optimal. AI can potentially support various functions, including adaptive learning, intelligent tutoring systems, chatbots, learning analytics, assessment tools, plagiarism detection, admissions systems, and campus management platforms. Examples of AI-based tools used in higher education include Smart Sparrow, Blackboard Learn, Cognii, Turnitin, IBM Watson Analytics, Carnegie Learning, and Coursera.

Research by Alexandra and Budiyantara (2022) examined the role of AI in curriculum development within higher education. They observed that many curricula are designed primarily around subject content without fully aligning with labor market demands. AI offers opportunities to develop more adaptive and

dynamic curricula that better reflect industry needs. Through AI-supported curriculum innovation, graduates are expected to acquire competencies that are more relevant to professional requirements, thereby improving educational quality.

Similarly, Cucus et al. (2019) developed an NLP-based chatbot for academic consultation in higher education. Natural Language Processing (NLP) is a branch of computer science and artificial intelligence that enables computers to understand and respond to human language. The chatbot application was designed to assist students in academic advising processes more efficiently and effectively.

Although many existing studies focus on reviewing the literature regarding AI implementation in education (Chen et al., 2020; Kabudi et al., 2021; Tahiru, 2021), relatively few have examined its direct application in student academic and non-academic activities. Prior research highlights benefit such as improved learning outcomes, increased study efficiency, personalized instruction, adaptive learning systems, AI tutors, chatbots, and learning analytics, while also discussing associated challenges.

Given this context, the present study aims to investigate the implementation of AI technology in supporting student activities in higher education, both academic and non-academic. The analysis was conducted using the Rasch Model to provide a systematic evaluation of the data.

## Methods

### Research Design

This study employed a mixed-methods research approach using a convergent mixed-method

design. In this design, quantitative and qualitative data are collected and analyzed concurrently within a single phase of the study. The findings from both datasets are subsequently compared and integrated to determine whether they converge, complement, or contradict one another (Hatta et al., 2020). Quantitative data were obtained through structured questionnaire responses, whereas qualitative data were derived from open-ended survey questions and supported by Wright Map analysis.

### Participants

The participants were undergraduate students enrolled at a higher education institution in Sumedang, West Java, Indonesia. A purposive sampling technique was employed to select respondents who met the study criteria. Specifically, participants were chosen because they belonged to the digital native generation and were presumed to be familiar with technology and digital applications. A total of 138 students participated in the study, consisting of 29 males (21.0%) and 109 females (79.0%).

### Instrument

The research instrument was adapted from the study conducted by AlDhaen (2022), entitled *The Use of Artificial Intelligence in Higher Education: A Systematic Review*. The questionnaire consisted of 14 items designed to assess students' perceptions and experiences regarding the implementation of Artificial Intelligence Technology (AIT) in higher education.

The instrument included both closed-ended and open-ended questions. Closed-ended items employed three response options: "Yes," "No," and "Sometimes." The 14 items were developed to represent the five principal dimensions of AIT implementation presented in Table 1.

**Table 1**

*Explanation of Questions in the Questionnaire*

Key Analyses of AIT Employment	Questions' Number
Outline of existing artificial intelligence innovations for understudy academic and non-academic activities	Q1, Q2, Q8, Q9
The adequacy of existing man-made intelligence innovation for understudy academic and non-academic activities	Q3, Q4, Q10, Q11
Requirements experienced by understudies in involving artificial intelligence innovation for understudy academic and non-academic activities Purposes behind the significance of AI technology for understudy academic and non-academic activities	Q5, Q12
Trust for artificial intelligence innovation for understudy academic and non-academic activities from now on	Q6, Q13
Outline of existing artificial intelligence innovations for understudy academic and non-academic activities	Q7, Q14

### Procedure

Data were collected using an online questionnaire administered through Google Forms. The survey link was distributed to eligible students, and participation was voluntary. Prior to completing the questionnaire, respondents were informed about the purpose of the study and provided their consent to participate.

### Data Analysis

Quantitative data were analyzed using descriptive statistical techniques, including frequencies and percentages, to summarize participants' responses to each questionnaire item. Qualitative responses obtained from the open-ended questions were analyzed thematically to identify recurring patterns and perceptions related to AIT implementation. In addition, Wright Map analysis was employed to support the interpretation of response distributions and participant characteristics. The integration of quantitative and qualitative findings was conducted during the interpretation stage to provide a comprehensive understanding of students' perceptions of Artificial Intelligence Technology in higher education.

The study involved 138 university students from various study programs in West Java. As presented in Table 2, the majority of participants were female (79.0%), while male students accounted for 21.0%. Most respondents were aged 19–20 years (55.1%), followed by those aged 17–18 years (40.6%). Participants were primarily enrolled in Primary Teacher Education and Tourism Industry programs (34.8% each), followed by Physical Education (26.8%) and Nursing (3.6%).

The implementation and perceived effectiveness of Artificial Intelligence Technology (AIT) in academic and non-academic student activities are summarized in Table 3.

Students reported a relatively high utilization of AIT for academic activities, with 63.0% indicating regular use and 25.4% reporting occasional use. Commonly used technologies included Academic Information Systems (SIAK), Integrated Online Learning Systems (SPOT), Session Submission Administration Information Systems (SIAS), ChatGPT, digital libraries, and Turnitin.

For non-academic activities, 41.3% of respondents reported regular use of AIT, while 36.2% reported occasional use. Examples included student organization elections, digital content creation, photography, and website development.

## Results

**Table 2**  
*Demographic Characteristics of Participants (N = 138)*

Characteristic	Category	n	%
<b>Gender</b>	Male	29	21.0
	Female	109	79.0
<b>Age Group</b>	17–18 years	56	40.6
	19–20 years	76	55.1
	21–22 years	4	2.9
	23–24 years	2	1.4
<b>Field of Study</b>	Primary Teacher Education	48	34.8
	Physical Education	37	26.8
	Nursing	5	3.6
	Tourism Industry	48	34.8

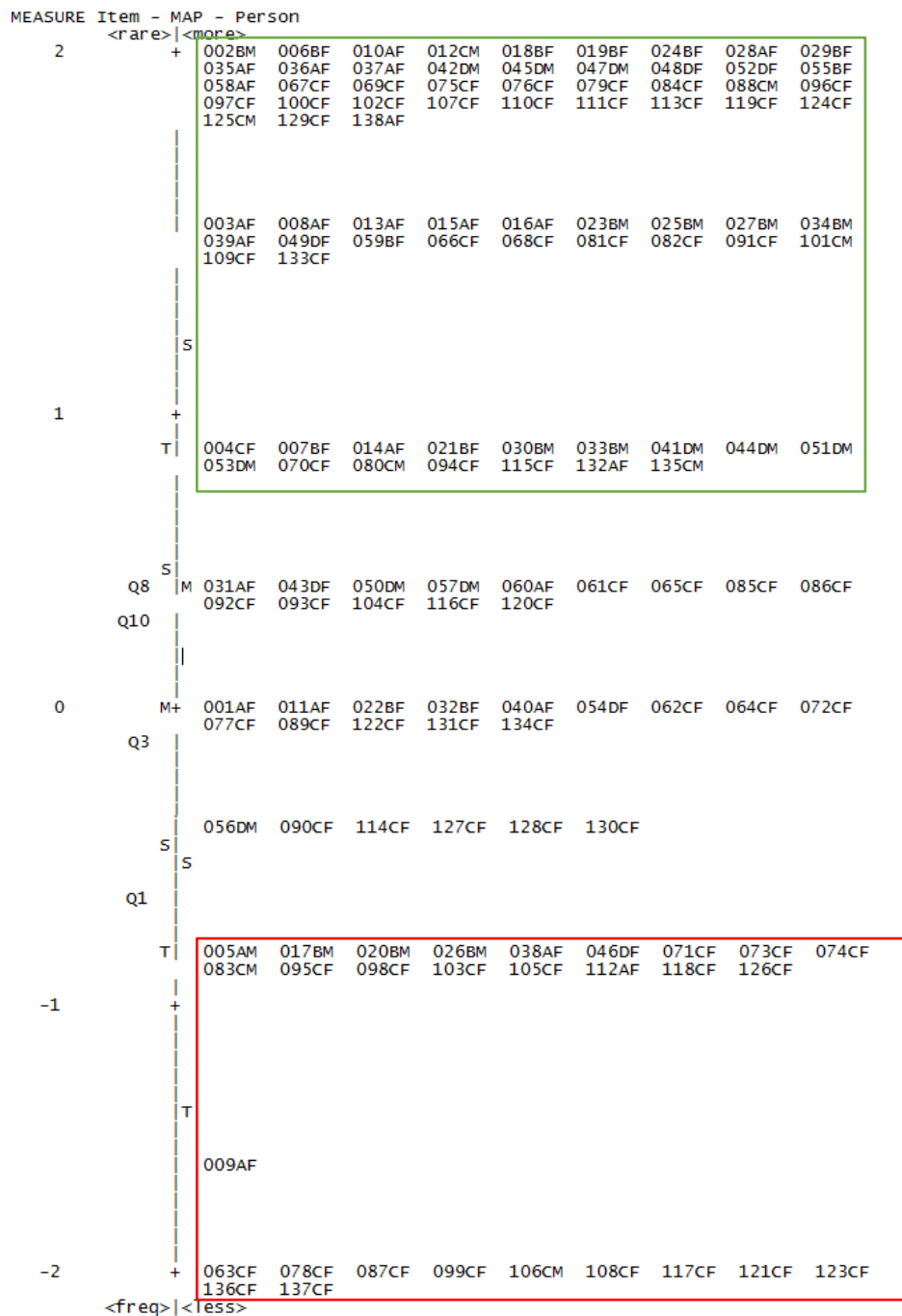
**Table 3**  
*Implementation and Perceived Effectiveness of AIT*

Item	Response Category	%
<b>AIT used in academic activities</b>	Yes	63.0
	Sometimes	25.4
	No	11.6
<b>AIT effective in academic activities</b>	Yes	67.4
	No	32.6
<b>AIT used in non-academic activities</b>	Yes	41.3
	Sometimes	36.2
	No	22.5
<b>AIT effective in non-academic activities</b>	Yes	60.9
	No	39.1

**Figure 1**

*The Consequence of Wright Map*

INPUT: 138 Person 4 Item REPORTED: 138 Person 4 Item 3 CATS WINSTEPS 4.4.5



Regarding effectiveness, most respondents perceived AIT as effective for both academic (67.4%) and non-academic activities (60.9%).

The overall implementation and perceived effectiveness of AIT were further examined using Wright Map analysis (Figure 1).

As shown in Figure 1, 75 respondents (54.35%) agreed with all measured items, indicating a generally positive perception regarding the implementation and effectiveness of AIT in both academic and non-academic contexts. Conversely, 29 respondents (21.01%) disagreed with all items,

while the remaining participants exhibited varying levels of agreement depending on item difficulty.

The major barriers encountered by students when using AIT are presented in Table 4.

For academic activities, internet connectivity emerged as the most frequently reported obstacle (71.01%), followed by other issues such as limited user knowledge and miscellaneous technical constraints. Similar findings were observed in non-academic activities, where internet connectivity remained the dominant barrier (63.77%).

**Table 4***Barriers to AIT Utilization in Academic and Non-Academic Activities*

<b>Obstacle</b>	<b>Academic (%)</b>	<b>Non-Academic (%)</b>
<b>Internet connection/network</b>	71.01	63.77
<b>Lack of user knowledge</b>	6.52	7.97
<b>Paid features</b>	0.72	2.90
<b>Unsupported device specifications</b>	0.72	—
<b>No response</b>	8.69	20.29
<b>Others</b>	12.34	5.07

Students identified several reasons why AIT is important for academic activities, including administrative support, facilitation of learning processes, improvement of learning efficiency, and optimization of academic resources. In non-academic contexts, AIT was perceived as beneficial for enhancing access to information, supporting student activities, and fostering creativity and innovation.

Regarding future development, respondents emphasized the need for continuous improvement of existing systems, broader dissemination and training, expansion of AI applications beyond academic purposes, and responsible implementation to maximize benefits for both academic and non-academic student activities.

## Discussion

The twenty-first century is characterized by the rapid expansion of digital and web-based technologies. This development has created both opportunities and challenges for higher education institutions, requiring them to continuously adapt and innovate in delivering teaching and learning activities. Universities are therefore expected to integrate technology into all aspects of their operations, including academic and non-academic activities. Such integration is essential to ensure that institutional processes run efficiently and effectively. In this context, the implementation of Artificial Intelligence Technology (AIT) in higher education represents a strategic effort to enhance student engagement and support the realization of 21st-century learning. The utilization of AIT is increasingly viewed as a meaningful approach to strengthening teaching and learning practices in modern educational environments.

The findings of this study highlight five key aspects related to the implementation of AIT in student academic and non-academic activities. First, AIT has already been integrated into various academic services. These include Academic Information Systems (SIK), Integrated Online Learning Systems (SPOT), Session Submission Administration Information Systems (SIAS),

ChatGPT, digital libraries, and plagiarism detection tools such as Turnitin. SIK functions as the primary academic service platform for students, covering core academic administrative processes and utilizing a Single Sign-On authentication system. SPOT serves as an online learning platform that facilitates interaction between lecturers and students within the university environment, allowing learning activities to occur beyond physical and time limitations. This system is integrated with the broader university information infrastructure to ensure coordinated digital services. Meanwhile, SIAS supports thesis proposal submission processes by enabling students to obtain approval from supervisors and program administrators through an online system.

In addition, AI-based tools such as ChatGPT—an artificial intelligence system designed to generate text-based responses—are used to assist students in obtaining information and supporting academic tasks (George et al., 2023). Turnitin is also widely utilized as a plagiarism detection system, comparing submitted academic work with a vast range of digital sources, including journals, books, and online publications (Vani & Gupta, 2016).

Beyond academic functions, AIT has also been implemented in non-academic student activities. For example, digital systems are used in organizing Student Executive Body (BEM) elections, producing video content, photography projects, and developing websites. University-level elections often adopt mechanisms similar to those used by the General Election Commission (KPU), including campaign presentations of candidates' visions and missions (Yusri & Amrizal, 2020). Through technological integration, these processes can be conducted more efficiently and transparently. Students also utilize digital platforms and creative tools to develop their skills in media production and web development. Wright Map analysis further indicates that most respondents agree that AI technology has been effectively implemented and has positively supported both academic and non-academic student activities.

The third key finding relates to the challenges students encounter when using AIT. Difficulties reported in both academic and non-academic contexts are largely similar. These include unstable internet connectivity, limited understanding of system usage, restricted access to paid features, incompatible device specifications, and server instability. The most frequently reported issue concerns network and server limitations, particularly when systems are accessed simultaneously by large numbers of students. Server downtime during peak usage represents a significant obstacle. To address this issue, institutions may need to upgrade server capacity in proportion to user demand or implement scheduled access systems to minimize overload and reduce system downtime.

Furthermore, the study indicates that AIT plays a significant role in improving institutional efficiency. Technology assists in managing student administration, facilitating both academic and non-academic activities, enhancing teaching and learning processes, optimizing time and learning resources, improving access to information, and fostering student development, creativity, and innovation. The integration of AI into mainstream education is increasingly recognized as essential – not only for students in their current academic roles but also for their future professional development as educators or practitioners. AI contributes to lifelong learning advancement and supports the broader modernization of education systems. As suggested by Yang and Bai (2020), the convergence of traditional education and artificial intelligence holds vast potential and is likely to become a driving force in shaping the future of educational development.

Finally, students expressed several expectations regarding the continued implementation of AIT. They emphasized the need for system improvements to enhance efficiency and user-friendliness, particularly in non-academic applications. They also highlighted the importance of ensuring that technology is used appropriately and supported by adequate training and socialization. Continuous development and refinement of AI systems are necessary to maximize their effectiveness. Moreover, given the diverse technological competencies among students, structured guidance and orientation programs are essential to ensure equitable access and optimal utilization of institutional digital tools.

## Conclusions

Based on the five key findings, it can be concluded that Artificial Intelligence Technology (AIT) has been effectively implemented in both academic and non-academic student activities in higher

education. In academic settings, systems such as SIAK, SPOT, SIAS, visit GPT, digital libraries, and Turnitin support administrative processes and learning activities. In non-academic contexts, AIT is used for activities such as Student Executive Body (BEM) elections, digital content creation, photography, and website development. Although its implementation has been generally successful, students still face challenges, particularly related to internet connectivity and network stability. These issues highlight the need for improved technological infrastructure. Students recognize the importance of AIT in supporting their activities, indicating that existing systems should continue to be improved and accompanied by proper guidance. However, while AI offers significant benefits, it should remain a supportive tool in education. Universities must ensure its use is responsible, with strong attention to ethics, privacy, and data security.

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