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# Assessing the Level of AI Literacy among Muslim University Students: A Rasch Model Analysis

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**Abstract**
The modern world is experiencing a high rate of development and widespread adoption of Artificial Intelligence (AI) in daily activities. However, the emergence of generative Artificial Intelligence applications such as ChatGPT has brought much public and pedagogical debate. Consequently, the rapid implementation of generative AI requires more careful and important analyses of its real potential and its consequences in relation to educational practice. Therefore, AI literacy is an important skill that must be possessed, especially by Muslim students in Indonesia, because there is increasing support for the use of digital and AI-based technologies in Indonesia universities. Moreover, one aspect of AI literacy, which is ethics in line with the teachings of Islam, namely itqan (excellence and responsibility) and amanah (trustworthiness). AI literacy is broader than the ability to use AI technically; it also requires a critical and comprehensive understanding of the ramifications surrounding the use of AI. Thus, given the importance of AI literacy and in line with the concepts taught by Islam, using the Rasch model analysis, this research aims to investigate the level of AI literacy among Muslim Indonesian University students. Employing non-experimental quantitative research with convenience sampling, a total of 286 Muslim students participated in this study. The data was collected through an online questionnaire and analyzed using Winsteps 3.75 version, a Rasch model analysis software, to assess students' AI literacy level. The findings indicated that students, in general, exhibited moderately high scores on the majority of AI literacy dimensions, and the profile of the students was generally adaptive to AI technology. Furthermore, because this study provides evidence of students' AI literacy, this study could be a useful source to help universities design more adaptive and ethically-oriented curricula, and policymakers come up with measures that facilitate value-based and inclusive AI learning.

**Keywords:** AI Literacy, Muslim University Students, Rasch Analysis

## A. INTRODUCTION

One feature of the modern world is the rapid pace of development and the widespread adoption of Artificial Intelligence (AI) in daily life. Machine learning algorithms, smart systems, and data-related decisions are new realities rather than far-fetched capabilities as part of the Fourth Industrial Revolution (4IR) (Schwab, 2016). Although AI has revolutionized industries like healthcare, finance, and logistics, education has been one of the sectors that has been significantly transformed. The introduction of AI into education is likely to initiate a proportional shift that will offer more customized education, smart tutoring, automating learning processes, and promoting research analytics (Alashwal, 2024; Imran et al., 2024; Yang, 2025).

Scholars believe that such advancements should not be perceived merely as a step in increased technology; rather, it should be seen as a transformational redesign of educational delivery and of the educational experience itself. Despite its advancement, the emergence of generative Artificial Intelligence applications such as ChatGPT has brought much public and pedagogical debate. Selwyn (2024) asserts that such systems can give out plausible textual outputs by means of statistical modelling, but they have no true understanding, nor epistemic understanding of what they write. Consequently, the rapid implementation of generative AI requires more careful and important analyses of its real potential and its consequences in relation to educational practice.

The aforementioned global transformation can also be traced in the Indonesian higher education environment. Parallel to the national goals of digital transformation and the Golden Indonesia 2045 (*Indonesia Emas 2045*) plan, universities across Indonesia have increasingly supported the use of digital and AI-based technologies (Alfiani & Saptomo, 2024; Lukita et al., 2025). Consequently, AI-based tools are now central to the academic work performed by students, as they help them conduct literature reviews, analyze data, code, and compose academic papers (Nguyen et al., 2024). While this growing interrelationship highlights the necessity of fostering AI literacy. AI literacy is broader than the ability to use AI technically; it also requires a critical and comprehensive understanding of the ramifications surrounding the use of AI. Long & Magerko (2020) explain AI literacy as the ability to "critically evaluate AI technologies; communicate and collaborate effectively with AI; and use AI as a tool online, at home, and in the workplace". In this regard, AI literacy arms learners with knowledge not only of the functioning of AI systems (machine learning, neural networks, and large language models) but also the awareness to evaluate the limitations, ethics, and biases of the systems (Carolus et al., 2023a; Zhai et al., 2024). Scholars have developed and validated instruments to assess AI literacy levels. The Meta AI Literacy Scale (MAILS) is one of the most well-known and quantifies those seven competencies into quantifiable elements that include "Use and apply AI", "Understand AI", "Detect AI", "AI Ethics", "AI self-competency", and "AI Self-efficacy" (Carolus et al., 2023a). This framework also becomes the theoretical foundation of this study, which emphasizes the need to have comprehensive AI literacy. Because if such competence is absent, students may turn into passive AI users vulnerable to misinformation, invasion of their privacy, and blind acceptance of AI results (Đerić et al., 2025; Zhai et al., 2024). Therefore, the development of AI literacy is a fundamental building block of education in fostering the ability of learners to think, act, and collaborate in an AI-driven academic world (Pinski & Benlian, 2024).

Further, the field of ethics forms the basis of a complete AI literacy (Ng et al., 2021; Zhang et al., 2023). Most Western-dominated scholarly and business contexts of the literature on AI ethics in general tend to center on the principles of fairness, accountability, transparency, and privacy (Elmahjub, 2023; Jobin et al., 2019; Taddeo & Floridi, 2018). The report published by the UNESCO (2022) about AI ethics has focused on the issue of the prevalence of secular images of the paradigm, which most of the time lack cultural and spiritual variability. Although these universal principles are also relevant, they are continuously mediated by certain cultural and situational factors (Elmahjub, 2023). This is critical in the Indonesian context, the country with the largest Muslim population in the world, as indicated by Yuniarti et al. (2022)'s policy brief, and equally relevant to Indonesian university students, since their moral compass and ethical structure are highly shaped by the tenets of Islam (Rukiyati et al., 2025). The ethics of Muslims, known as Islamic ethics (*akhlaq*), is assessed through an Islamic prism based on such concepts as justice (*adl*), truthfulness (*sidq*), being a steward (*khalifah*), and the overall aims of the Shariah (*maqasid al-shariah*) (Elmahjub, 2023; Karimullah, 2023; Nasir Bin Omar & Nasir Omar, 2010). This intersection thus forms a distinct set of techno-religious ethical issues that students have to navigate. All these issues are echoed in recent debates on AI ethics in Islamic education, where researchers highlight the importance of such values as *amanah* (trust), *ʿadl* (justice), and *ṭalab al-ʿilm* (pursuit of knowledge) as the guide to responsible AI interactions (Hemmet, 2023).

Moreover, these principles are also becoming necessary as guidelines for ethical standards of an AI system, particularly in non-Western societies (Elmahjub, 2023). Researchers also talk about the need to introduce AI ethics education into official curricula to empower students to tackle in the fact that there is an essential scarcity of empirical data regarding the present stage of AI literacy in Indonesian students, and those who are Muslim students in particular, which are the majority of such. The current level of knowledge on the baseline competencies of this substantial population is unclear, and also their level of awareness of these same ethical aspects. It is therefore important to first establish an empirical ground on what these students know before attempting to answer the complex question of how these students integrate their frameworks.

Moreover, this study is aimed at filling in the mentioned gap by providing an empirical evaluation of the artificial intelligence (AI) literacy among Indonesian Muslim university students. This study also attempts to go beyond the anecdotal observations, providing solid data on competencies among the students in a quantitative manner. In this regard, the investigation is focused on the East Java area. The East Java region is a good research location especially due to the following reasons: It is a significant center of higher education in Indonesia and houses a large and diverse collection of institutions, as quoted from Detik.com portal news (Az-Zahra, 2025). In addition, in order to attain a certain level of measurement accuracy and validity, this study utilizes a psychometric methodology based on the Rasch Model. Unlike in classical test theory, where raw scores are used, the Rasch Model provides an objective and interval-scale measure by modelling both the ability and difficulty of items in parallel (T. Bond, 2015; Boone & Staver, 2020). The model helps to create a mapping of AI literacy and define the particular competencies that students perceive as easy and challenging, as well as allows for measuring the distribution of AI literacy levels in the student population accurately (Boone et al., 2014b; Planinic et al., 2019). Thus, this research aims to investigate the level of AI literacy among Muslim Indonesian University students. Finally, this research is expected to serve as a basis for universities to design curricula that are more adaptive to the development of AI, as well as assist educational policymakers in developing strategies to improve AI literacy in the technological era. Additionally, this research will contribute to identifying AI literacy gaps among students, thereby encouraging more inclusive educational initiatives.

## B. METHODS

### Research Design and Instrument

A non-experimental quantitative method with a cross-sectional research design utilizing questionnaire surveys was implemented in this study. Using the Meta AI Literacy Scale (MAILS) by Carolus et al., (2023), this study tries to measure AI literacy of Muslim university students through seven dimensions (Apply AI, Understand AI, Detect AI, AI Ethics, Create AI, AI Self-efficacy, and AI Self-competency). This instrument is chosen among the other instruments because it is based on the existing literature on AI literacy, covering various aspects that can be used in conjunction with each other so that they can be flexibly applied in various professional lives, depending on the purpose. In detail, the questionnaire consisted of five demographic questions and a total of 34 items, with six items in apply AI, understanding AI, AI problem solving, and AI self-competency, three items in the dimension of detect AI and AI ethics, and the last four items in the create AI dimension. Moreover, a fourth Likert-scale from “strongly disagree” to “strongly agree” was offered as the option’s response for all the items.

### Participants of the Research

Using a convenience sampling technique, a total of 286 Muslim university students from universities located in East Java participated in this research by joining the online survey conducted through Google Forms. From the total number of respondents, data cleaning and validation were carried out using Winsteps 3.75 version software for Rasch Model analysis to detect any odd responses. This cleaning process was carried out in two stages: removing data that indicated maximum and minimum measures, and the next stage was to remove data that indicated misfit responses (Widhiarso & Sumintono, 2016). This cleaning process was carried

out separately for each dimension of AI literacy. This separation is essential because the Rasch. Model assumes and tests unidimensionality (Soeharto & Csapó, 2022). Thus, by separating each dimension, it is ensured that each dimension accurately measures the intended single construct. From the cleaning process, the final number for each dimension of the AI literacy instrument by Carolus et al. (2023) is as follows: in the dimension of applying AI, there are 226 students; in the dimension of understanding AI, there are 236 students; followed by the detect AI dimension with 223 students, the AI ethics dimension with 224 students, the create AI dimension with 218 students, then the AI self-efficacy dimension with 241 students, and then the last dimension, AI self-competency, with 230 students. The detailed distribution of students in each dimension is shown in Table 1 the detailed demographic profile of students based on each dimension. In addition, to maintain the respondents' confidentiality, the researcher secured the data and coded it to guarantee anonymity. Furthermore, consent for the respondent to be included in the research was also given in the first section of the instrument to maintain the research's ethics.

**Table 1.** The Detailed Demographic Profile of Students Based on Each Dimension

| | **Applying AI (N = 256)** | **Understand AI (N =236)** | **Detect AI (N = 223)** | **AI Ethics (N=244)** | **Create AI (N= 218)** | **AI Self-Efficacy (N=241)** | **AI Self-Competency (N=244)** |
|---|---|---|---|---|---|---|---|
| **Gender** | | | | | | | |
| Male | 127 | 135 | 122 | 126 | 124 | 136 | 128 |
| Female | 99 | 101 | 101 | 98 | 94 | 105 | 102 |
| **Field of Study** | | | | | | | |
| Science | 130 | 135 | 127 | 129 | 129 | 137 | 135 |
| Social | 96 | 101 | 96 | 95 | 89 | 104 | 95 |
| **Semester** | | | | | | | |
| Semester 1-3 | 103 | 102 | 97 | 95 | 97 | 105 | 104 |
| Semester 4-6 | 81 | 90 | 86 | 82 | 81 | 88 | 82 |
| Semester 7 > | 42 | 44 | 40 | 47 | 40 | 48 | 44 |
| **Type of University** | | | | | | | |
| Public | 153 | 154 | 148 | 146 | 145 | 161 | 153 |
| Private | 73 | 82 | 75 | 78 | 73 | 80 | 77 |
| **The Intensity of Using AI** | | | | | | | |
| Seldom | 11 | 13 | 11 | 11 | 7 | 12 | 11 |
| Sometimes | 74 | 65 | 66 | 68 | 67 | 72 | 67 |
| Often | 120 | 134 | 125 | 124 | 125 | 131 | 130 |
| Always | 21 | 24 | 21 | 21 | 19 | 26 | 22 |

**Data Analysis and Measurement Model**

The data analysis of this study is Rasch model analysis (Bond & Fox, 2015) using Winsteps version 3.75 software. This measurement is used to analyse both the quality of the instrument and the person's response. The Rach model analysis is very suitable for measuring latent properties in assessing human attitudes, perceptions, and opinions (Bond & Fox, 2015). This analysis model can convert ordinal data into odd probabilities by calculating it as a frequency. Furthermore, the resulting probabilities are converted into interval data with the same scale through logarithms (Boone, 2016). Finally, the measurement model is calibrated through a conjunctive measurement process that is useful for determining the relationship between item difficulty and individual ability using the same unit scale called logit (Rusland et al., 2020).

From the Rasch analysis, the level of difficulty of items with accurate and precise measurements and the AI literacy levels of respondents, as well as the quality of items, can be explained in the results of this study (Linacre, 2013). This accuracy and precision will be more useful in obtaining consistency of responses to the questionnaire (respondent suitability statistics) (Rusland et al., 2020). Thus, this Rasch model differs from classical theory (CTT), which does not provide precise and accurate measurements for latent trait measurement since the measurement process is only based on scores (Andrich & Marais, 2019). In detail, the results of the Winstep software analysis were used to analyse students' AI literacy, which was assessed based on the mean and standard deviation, item calibration or item logit value, and person calibration or person logit value. Therefore, if a student has a positive logit value, it means that the individual's AI literacy is higher than the average value and vice versa. This means that a higher logit score indicates a higher level of AI literacy among students. This division is based on a descriptive division used to map the distribution of respondents' abilities.

**Validity and reliability of the instruments**

The validity and reliability of the AI literacy instrument were assessed using Winsteps version 3.75 with the Rasch Model analysis approach. Based on the results of the Rasch analysis in Table 2, the Instrument Validity and Reliability, the results identified that most of the dimensions of the AI Literacy instrument showed good psychometric attributes. In terms of reliability, the instrument was indicated to have varying internal consistency, as indicated by Cronbach's Alpha values ranging from 0.55 to 0.92 and item reliability that was consistently indicated to be very high (0.91-0.99) (Bond & Fox, 2015). Furthermore, the item separation index values ranging from 3.24 to 8.35 also indicate that the questionnaire has a very good item distribution to define various levels of instrument difficulty (Fisher, 2007). Moreover, in terms of person, the results indicated significant variation in psychometric quality across dimensions, as evidenced by Person Reliability ranging from 0.00 to 0.77 and Person Separation from 0.00 to 1.85. While dimensions such "Applying AI," "AI Self-Efficacy," and "AI Self-Competency" demonstrated good separation (1.62-1.85), indicating the ability to reliably distinguish students into two or more ability strata, the dimensions "Detect AI," "AI Ethics," and "Create AI" indicated Person Separation of 0.00 and Person Reliability of 0.00. This extreme lack of separation is a methodological limitation, which is likely due to the very small number of items in these dimensions, only 3 to 4 items. Consequently, the ability to reliably differentiate respondents' abilities in these specific areas is compromised.

Additionally, in terms of validity, the construct validity of the instrument was confirmed through Rasch Model analysis by evaluating the assumption of unidimensionality. This is supported by the high Raw Variance Explained percentage, which ranges from 53.1% to 86.8%, and the low Unexplained Variance 1st contrast, which ranges from 5.0% to 19.3% (Sumintono & Widhiarso, 2015). This indicates that each dimension effectively measures the intended latent construct. Then, in terms of content validation using the Rasch method, content validation is determined from the data fit to the model, where the data is considered consistent with the Rasch model, where each item is indicated to effectively measure a single targeted attribute.

This is supported by the model fit evaluation of the Outfit Mean Square (MNSQ) value, where the average value of items and persons is indicated in the range of 0.15 to 0.98, which is close to the ideal value of 1.0 (Boone et al., 2014). Overall, these findings confirm that the majority of the existing AI literacy instrument dimensions are valid and reliable for use in measurement. However, structural limitations in the number of items in the "Detect AI," "AI Ethics," and "Create AI" dimensions resulted in low reliability values for persons and need to be addressed in further research.

**Table 2.** The Instrument Validity and Reliability

| **Psychometrics attribute** | **Applying AI (N=226)** | **Understand AI (N=236)** | **Detect AI (N=233)** | **AI Ethics (N=224)** | **Create AI (N = 218)** | **AI Self-Efficacy (N=241)** | **AI Self-Competency (N=230)** |
|---|---|---|---|---|---|---|---|
| Number of items | 6 | 6 | 3 | 3 | 4 | 6 | 6 |
| Outfit Mean Square (Person) | | | | | | | |
| Mean | 0.83 | 0.79 | 0.51 | 0.15 | 0.42 | 0.78 | 0.98 |
| SD (Standard Deviation) | 1.12 | 1.13 | 0.87 | 0.40 | 1.13 | 1.17 | 0.86 |
| Outfit Mean Square (Item) | | | | | | | |
| Mean | 0.83 | 0.81 | 0.51 | 0.15 | 0.42 | 0.80 | 0.98 |
| SD (Standard Deviation) | 0.25 | 0.25 | 0.05 | 0.10 | 0.09 | 0.24 | 0.30 |
| Person Reliability | 0.77 | 0.65 | 0.00 | 0.00 | 0.00 | 0.73 | 0.72 |
| Item Reliability | 0.95 | 0.93 | 0.96 | 0.98 | 0.97 | 0.91 | 0.99 |
| Person Separation | 1.85 | 1.36 | 0.00 | 0.00 | 0.00 | 1.66 | 1.62 |
| Item Separation | 4.23 | 3.66 | 4.69 | 6.39 | 6.11 | 3.24 | 8.35 |
| Cronbach's alpha | 0.85 | 0.80 | 0.55 | 0.57 | 0.92 | 0,84 | 0.74 |
| Unidimensionality | | | | | | | |
| Raw Variance | 60.6% | 53.1% | 62.5% | 85.7% | 86.8% | 57.4% | 53.8% |
| Unexplained Variance | 10.9% | 12.1% | 19.3% | 9.5% | 5.0% | 12.1% | 17.5% |

## C. RESULT & DISCUSSION

The result of this study offers a picture of the prevailing position of AI literacy among muslim university students in East Java. In addition, the Rasch model analysis indicated an intricate but subtle outcome where, by majority, most students are at a medium to high stage in nearly all aspects of AI literacy. In Figure 1, the results of each dimension of students' AI Literacy indicated that students in the "Applying AI" dimension also demonstrated a moderate level, with only 42.04% indicating that they are still developing their practical skills in working and using AI applications in their daily lives. In the "Understanding AI" dimension, the majority of students (34.32%) were also equipped with a moderate level of understanding, which may indicate that they already have a simple conceptual understanding of AI, but not an in-depth understanding.

Interestingly, in the "Detect AI" dimension, almost half of the students (49.33%) were at a high level in recognising or distinguishing AI-generated material, and no one in the middle level had a moderate level of awareness, polarising between those who can detect AI-generated material and those who do not.

Furthermore, in "AI Ethics", most of them (54.02%) expressed a moderate level of ethical awareness, which means that more efforts should be made to increase the students' level of responsibility, fairness, and moral reasoning in their use of AI. In the "Create AI" dimension, the majority of the students (33.49%), however, were in the moderate stage, which demonstrates that their creativity and technical abilities in AI application development remain underdeveloped. Additionally, "AI Self-Efficacy" and "AI Self-Competency" dimensions also had comparatively large proportions (44% and 45 %), meaning that a significant part of the students believe that they are capable of working with AI-related processes and that they can cope with its impact in their everyday lives. Based on the data, it could be inferred that a student profile tends to be generally adaptive to AI but still needs to work on the areas of ethical consciousness, conceptual comprehension, and practical creation skills.

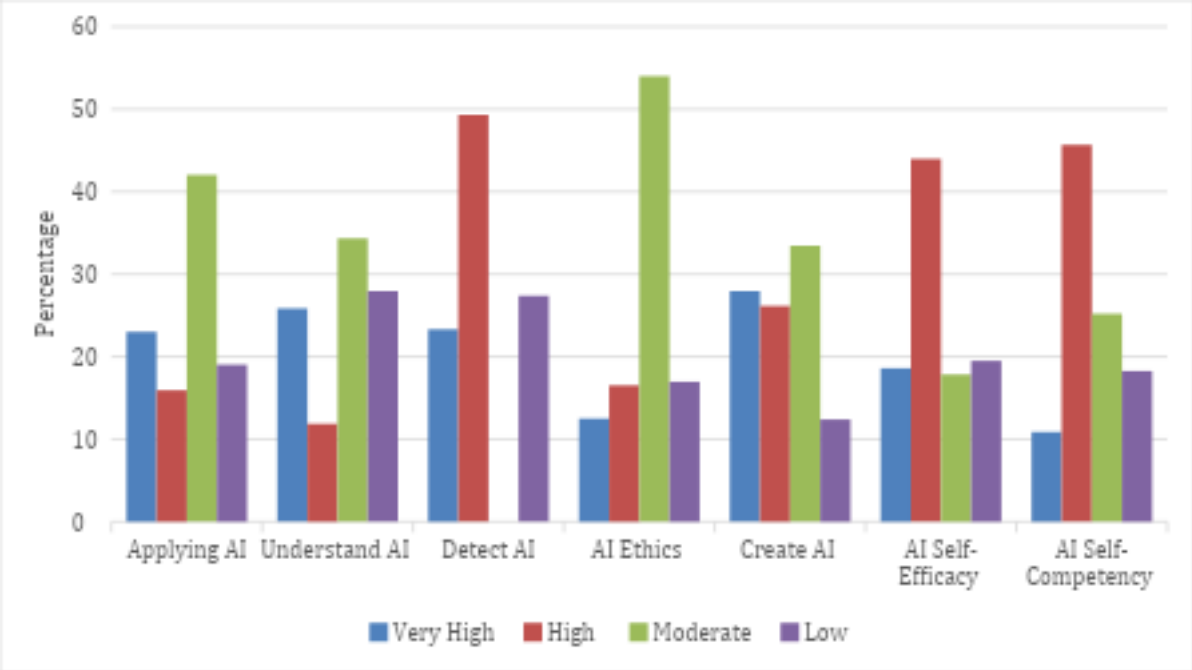


**Figure 1.** The Result of Each Dimension of Students' AI Literacy

Furthermore, the Rasch analysis found differences in the level of difficulty of the items in the seven dimensions of AI literacy: AI Ethics, AI Self-Competency, AI Self-Efficacy, Applying AI, Creating AI, Detecting AI, and Understanding AI. Findings indicate a heterogeneous distribution of the strengths and weaknesses of students using AI-related knowledge, attitudes, and practices. Table 3 item calibration for each dimension of AI literacy indicated that in the "Apply AI" dimension, students considered A6 "I can communicate gainfully with artificial intelligence in everyday life" to be very challenging, A3 "I can use artificial intelligence meaningfully to achieve my everyday goals." and A5 "In everyday life, I can work together gainfully with an artificial intelligence." to be challenging, and A1 "I can operate AI applications in everyday life.", A4 "In everyday life, I can interact with AI in a way that makes my tasks easier." and A2 " I can use AI applications to make my everyday life easier." to be easy to very easy, suggesting that students can easily identify with simple applications of AI, yet have problems with complex or collaborative AI applications. In understand AI, U1 that ask about students' understanding about the most important concepts of the topic AI was extremely challenging for students to agree, U2 "their knowledge about the definition of AI" and U5 "the capability of think the new us of AI"

were challenging to agree, U3 “their capability of assess the opportunity and the limitation of using AI” and U6 “the capability of imagining the possibility of the AI use in the future” were easy to agree by the students, and the last the capability of to measure the advantages and disadvantages of using AI (U4) is very easy to agree by them, this is indicating a greater knowledge of fundamental concepts than abstract concept. Furthermore, regarding the detecting AI D2 “capability to distinguish applications that are based on AI” is difficult for the students to agree on, D1 “the capability to tell that they are dealing with an application based on AI” is easy to agree by the students, and the last item D3 regarding to their capability to distinguish their interaction is AI based or real human is very easy to agree by them. Thus, it is clear that detecting AI-generated content is still a challenge. In the case of AI Ethics, the E3 was extremely challenging, and the E1 and E2 were not, which signifies that generalised ethical consciousness is healthier than internal moralization.

Creating AI also had difficult challenges in T1 “capability of designing new AI applications” and T2 “capability to program new applications in the AI field”, and easy in T3 “capability of developing” and T4 “selecting the useful tools for AI program”, thus it is indicated that AI tasks involving creativity or programming are nonetheless challenging for the students. In the meantime, S2, S4, S5, and S6 were challenging in AI Self-Efficacy, with S1 and S3 being less challenging, which indicates moderate self-efficacy in using artificial intelligence, particularly with familiar tasks. Lastly, C3 in AI Self-Competency was very challenging, C4-C6 were challenging, and C1-C2 easily exhibited greater confidence in the basic skills rather than the advanced skills or analytical ability. It may be implied that very challenging items were hyperconcentrated in the Ethics, Create, and Apply AI dimensions, whereas very easy items were low-lying concentrated in the Understanding and Self-Competency ones, implying that students feel more comfortable with conceptual and routine applications of AI than with those requiring ethics, creativity, and higher implementation.

**Table 3.** The Item Calibration for Each Dimension of AI Literacy

| **Dimension** | **Very Difficult (LVI > 5.64)** | **Difficult (5.64> LVI > 0.00)** | **Easy (0>LVI> -5.64)** | **Very Easy (LVI<-5.64)** |
|---|---|---|---|---|
| AI Ethics (N=3) | E3 | - | E2, E1 | - |
| AI Self Competency (N=6) | Very Difficult (LVI > 1.25)<br>C3 | Difficult (1.25>LVI> 0.00)<br>C4, C5, C6 | Easy (0.00>LVI>-1.25)<br>- | Very Easy (LVI <-1.25)<br>C2, C1 |
| AI Self Efficacy (N=6) | Very Difficult (LVI > 0.62)<br>- | Difficult (0.62> LVI>0.00)<br>S2, S5, S4, S6 | Easy (0.00>LVI> -0.62)<br>S1 | Very Easy (LVI <-0.62)<br>S3 |
| Applying AI (N=6) | Very Difficult (LVI>0.83)<br>A6 | Difficult (0.83 >LVI>0.00)<br>A3, A5 | Easy (0.00>LVI>-0.83)<br>A1, A4 | Very Easy (LVI<-0.83)<br>A2 |
| Create AI (N=4) | Very Difficult (LPI >1.91)<br>T1 | Difficult (1.91>LVI>0.00)<br>T2 | Easy (0.00>LPI>-1.91)<br>T3 | Very Easy (LVI<-1.91)<br>T4 |
| Detect AI (N=3) | Very Difficult (LVI>1.07)<br>D2 | Difficult (1.07>LVI>0.00)<br>D1 | Easy (0.00>LVI>-1.07)<br>- | Very Easy (LVI<-1.07)<br>D3 |
| Understanding AI (N=6) | Very Difficult (LVI>0.73)<br>U1 | Difficult (0.73>LVI>0.00)<br>U5, U2 | Easy (0.00>LVI>-0.73)<br>U6, U3 | Very Easy (LVI<-0.73)<br>U4 |

skill constitutes a potential ethical issue, because confidence without sufficient mastery may lead to irresponsible or careless use of AI, which contradicts the principle of of *itqan* (adhering to ethical norms and pursuing excellence), which is also one of the central principles of Islamic working ethic (Ahmed et al., 2025).

In addition, the status of humanity as a *khalifah* (steward) on the planet would suggest the duty not only to passively use technology but also to master it and guide it to the good (Jalil et al., 2025). In the context of Islam, *khalifah* has the moral responsibility to apply human intellect (*aql*) and creativity in a manner that supports the idea of *Al-Amanah* (Trustworthiness) And *Al-Mas'uliyyah* (Responsibility) of human character ethically as an Islamic worldview (Mamat, 2019). Therefore, mere use as a consumer of technology can be considered contrary to the spirit of this stewardship. This is in line with what Jalil et al. (2025) articulate, that humans are granted the role of *khalifah* not only to enjoy the benefits of technological advancements, but to manage and guide it ethically. In this regard, mastery of technology is representative of the Islamic ethic of *itqan*: pursuing excellence and perfection in work, as a manifestation of the divine command of humans to develop the Earth towards *maslaha* (the greater good) (Abdelgalil, 2023). But given the existing evidence in this study, it is possible that at present, students might also use AI as an advanced consumer, as opposed to recreating widespread social value (*maslaha*) by creatively applying AI to its maximum extent, which implies that deeper moral and creative utilisation of AI is necessary.

Another unique finding from this study is that "AI ethics" was the weakest dimension of student AI literacy, and over a half (54.02%) of all students scored at a moderate level in this dimension, with difficult item to agree is E3 "I can analyse AI-based applications for their ethical implications". It means that, though students are becoming more sure about using AI tools and are now quite professional in their abilities, moral cognition and the level of ethical reflexiveness are not that developed. Although they are not completely ignorant of such matters, their roots might be shallow, perhaps even lacking the substantive frameworks required to handle the technologically complicated techno-religious conundrums they may describe in this study, say, academic honesty (amanah) or the artificial AI-generated content that could rub against Islamic beliefs (Ajizah et al., 2025; Mustapha & Malkan, 2025). Such an average ethical consciousness could also indicate the inadequacy of dominant Western-based ethical frameworks (Taddeo & Floridi, 2018). A powerful AI ethics framework within a Muslim context, according to Elmahjub (2023), must be based on such Islamic principles as maqasid al-shariah (goals of Shariah) and maslaha (common good). In line with it, our results can reflect that students are not prepared enough to undertake this deeper level of ethical analysis and reflect a more procedural approach to moral evaluation of fairness, justice (adl), and truthfulness (sidq) in engaging with AI systems.

This ethical distance is further amplified by the medium "Understanding AI" (34.32%), with the easiest item to agree is U4 "I can assess what advantages and disadvantages the use of an artificial intelligence entails". Without an adequately deep understanding of its conceptual foundation, it is hard to critically review the ethics of an algorithm (Gupta et al., 2024). In addition, the polarisation in the "Detect AI" dimension, with the students divided into high (49.33%) and low levels, with no intermediate group, and the most difficult item to agree with is D2 "I can distinguish devices that use AI from devices that do not." is an indicator of a digital literacy divide. It may suggest that some number of students are interacting with AI systems, e.g., recommendation engines or search algorithms, without clear awareness of them (Mansoor et al., 2024; Carolus et al., 2023). The lack of awareness corresponds to the basic competencies identified by both Long & Magerko (2020) and Carolus et al. (2023a), in which AI recognition and conceptual understanding can be taken as the building blocks of more mature and ethical interaction. As a result, such a level of ignorance greatly limits the capacity of students to critically or ethically evaluate AI systems.

## D. CONCLUSION

This study aimed to examine the state of AI literacy amongst Muslim Indonesian university undergraduate students through the Rasch model. The results showed that students, in general, exhibited moderately high scores on the majority of AI literacy dimensions, and the profile of the students was generally adaptive to AI technology. Nevertheless, similar to the research noted, some significant gaps were found in the "AI Ethics", "Understanding AI", and "Create AI" dimensions, implying that the level of trust and familiarity with AI tools does not yet align with the ethical sensitivity and substantial conceptual understanding. This imbalance in Islamic terms underscores the necessity to reinforce such Islamic typologies as itqan (excellence and responsibility) and amanah (trustworthiness) in terms of the user interaction with the technological environment. Such findings also effectively fulfil the research objectives in determining the current condition and spread of AI literacy in Muslim university students. Moreover, the results of this study could be a useful source to help universities design more adaptive and ethically-oriented curricula, and policymakers come up with measures that facilitate value-based and inclusive AI learning. This work, by identifying both the advantages and the drawbacks of the AI literacy of the students, adds to the current research of imparting skills to future Muslim specialists who should not just possess the relevant knowledge in the new technologies but who are also perceptually informed in the world of AI. However, This study is limited to descriptive separation using the logit Mean and Standard Deviation ranges, which are only used to obtain a practical mapping of the distribution of respondents' abilities, not as a valid stratification supported by the reliability of the existing dimensions. Therefore, for further research, we recommend substantially adding items to dimensions that have too few items and increasing the number of respondents to achieve a clear separation in future studies.

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