The Correlation between the Use of Grok AI as a Teaching Medium and Students' Digital Literacy

Fadilah Nur Fauzi[1]
Universitas Islam Asyafi'iyah
e-mail: fadilahnur.fnf@gmail.com[1]

Intan Karima Zahra[2]
Universitas Islam Asyafi'iyah
e-mail: intankarimaz@gmail.com[2]

Siti Aisyah[3]
Universitas Islam Asyafi'iyah
e-mail: sitiaisyahh51880@gmail.com[3]

Abdul Rozak Syahroni[4]
Universitas Islam Asyafi'iyah
e-mail: abdulsyahroni50@gmail.com[4]

Dhani Ringga Ramadhan[5]
Universitas Islam Asyafi'iyah
e-mail: dhaniringga953@gmail.com[5]

Khasanah[6]
Universitas Islam Asyafi'iyah
e-mail: khaaanahrcl.mtp@uia.ac.id[6]

ABSTRACT
This study aimed to explore the relationship between the utilization of Grok AI as a teaching tool and the digital literacy of students. To achieve this, a quantitative research approach was adopted, involving 30 university students from different universities in West Java and Jakarta. Data were gathered using a questionnaire designed with a five-point Likert scale and were analyzed using descriptive statistics along with the Pearson correlation test. The results indicated that students exhibited a very high level of digital literacy, while their engagement with Grok AI was found to be at a moderate to high level. Additionally, a statistically significant positive correlation was identified between the two variables, with $r = .364$ and $p = .048$. This suggests that increased usage of Grok AI in educational settings leads to higher levels of digital literacy among students. However, the varying proficiency levels imply that additional factors could influence students' digital literacy. Consequently, Grok AI can be viewed as an important educational resource, but it requires further integration strategies and support systems to enhance its effectiveness in developing students' skills.

INTRODUCTION

As technology infiltrates all facets of our lives, the ability to navigate and complete tasks effectively using technology increases. The Internet has emerged as the defining technology for literacy and learning for this generation, yet classrooms have not fully embraced the integration of the Internet into their teaching practices or initiated instruction in the new literacy skills demanded by the Internet. (Osterman, 2012). Digital literacy refers to the capacity to comprehend and utilize information in various formats from a diverse range of sources when it is delivered through computers, especially through the Internet. Gilster (1997), as cited in Lankshear & Knobel, (2015) Four essential competencies of digital literacy: gathering knowledge, assessing the quality of information, conducting online searches, and maneuvering through hypertext. Meanwhile, (Spires et al., 2018) have categorized the different cognitive processes related to digital literacy into three groups: (a) finding and using digital content, (b) producing digital content, and (c) sharing digital content. Digital literacy can facilitate or speed up the process of gaining knowledge and enhancing skills across various academic settings.

Digital literacy in academic has the objective to incorporate tasks; however, it's crucial to recognize that some students may possess minimal or no basic skills. Cultivating Digital Literacy in educational settings is influenced by international, national, and in certain instances, local or institutional frameworks that offer clear dimensions to comprehend the concept, arrange resources, encourage development, and assess individuals' proficiency in Digital Literacy. Marín & Castañeda, (2023). Digital literacy is essential for students' academic advancement in studies focusing on the importance of using technology to enhance student success. Similarly, Khan et al., (2022) discovered that enhanced access to ICT significantly benefits academic performance. According to University, (2017) This aspect of digital literacy in academia involves integrating the insights acquired in each course with evaluations and thoughts on a subject or problem, which results in the development of creative solutions and effective communication. Therefore, Artificial Intelligence (AI) is crucial in promoting digital literacy, serving as a comprehensive area of technology that is set to expand rapidly.

Artificial Intelligence (AI) involves the replication of human thinking and decision-making abilities by machines, particularly computers. According to Farahani & Ghasmi, (2024) Technologies under AI include machine learning, natural language processing, computer vision, and robotics, all of which allow machines to carry out tasks that usually require human intelligence, such as analyzing, learning, reasoning, and solving problems. AI is a fast-growing discipline that has already brought major changes to many industries, including education. As AI tools become more advanced, they are being increasingly adopted in schools and universities. These tools are used to enhance teaching methods, assessments, student assistance, and administrative operations.

What began as simple educational tools has now evolved into sophisticated systems capable of providing personalized learning experiences and generating data-

driven insights. The integration of AI in education has recently transformed traditional classroom methods, making learning more tailored, flexible, and effective. According to Nguyen, (2023) By offering customized learning paths, automating administrative tasks, and supporting teachers, AI holds the potential to significantly improve educational outcomes.

According to AI in Education by Tahiru, (2021), AI is being used in various innovative ways to support teaching, learning, and administration. One prominent application is in personalized learning platforms, such as adaptive learning systems and learning management systems (LMS), which tailor instructional content to match individual students' needs, preferences, and learning styles. These platforms analyze student progress and provide customized resources to enhance learning effectiveness. Another important innovation is the use of Intelligent Tutoring Systems (ITS), which simulate the experience of one-on-one tutoring by utilizing machine learning and natural language processing to deliver immediate, personalized guidance as students engage with their coursework.

AI-powered chatbots and virtual assistants are transforming student support by serving as digital tutors. These tools offer instant answers, explain concepts, and assist with assignments through interactive, conversational interfaces. Automated assessment and grading systems are also gaining traction, as they streamline the evaluation process by analyzing student responses on quizzes, assignments, and exams. This not only provides prompt feedback to learners but also helps reduce teachers' grading workload, allowing more time to focus on instruction and student engagement.

The rise of AI-based learning tools, such as Grok AI, exemplifies how advanced technologies are now directly accessible to students and educators alike. These tools not only function as intelligent assistants but also foster more interactive and engaging learning environments. By providing real-time feedback, personalized content, and on-demand support, AI enhances student participation and encourages active learning. Furthermore, AI does not solely benefit educators by automating tasks; it also strengthens the overall learning experience by promoting student autonomy, motivation, and deeper understanding through interactive and adaptive learning features. With the emergence of accessible AI tools like Grok AI, it is increasingly essential to explore how these innovations can shape and enhance the future of education.

According to Edson et al., (2025) Grok AI, in particular, offers a unique example of how AI can be integrated into digital platforms to deliver real-time, contextualized information. Developed by xAI, a company founded by Elon Musk, Grok stands out due to its native integration with the X platform (formerly Twitter). This feature enables the model to generate responses based on ongoing conversations, making it especially useful for analyzing social interactions and current trends. Although its architectural details remain largely undisclosed, Grok is built on the transformer model commonly used in modern large language models and prioritizes freedom of expression in its outputs. However, while its strength lies in social media analytics, Grok's dependency on data from X may result in biased outputs and limit its effectiveness in more general or academic

learning environments. Thus, its application in education must be carefully considered to balance its strengths with its contextual limitations.

While numerous studies have explored the general use of artificial intelligence (AI) in education, particularly focusing on language models like ChatGPT and DeepSeek, most of this research has emphasized AI's potential in lesson planning, personalized learning, automation, and language instruction Edson et al., (2025). These studies largely concentrate on AI's technical performance, architectural strengths, and application in broad educational or industrial contexts. However, there remains limited investigation into the specific role of Grok AI, a model developed by xAI and integrated into the X platform, in supporting students' digital literacy, especially in educational environments.

Although comparative reviews highlight Grok AI's real-time contextual capabilities and focus on user engagement through its freedom of expression (Adinath & Smiju, 2025) They do not address its effectiveness as a teaching tool or its impact on core digital literacy competencies such as ethical information use, critical thinking, and safe digital practices. Furthermore, existing research using the Technology Acceptance Model (TAM) has examined user perception and acceptance of Grok AI on social platforms (Winarno et al., 2024), but has not extended this inquiry to formal learning settings, particularly in terms of measurable literacy outcomes.

This gap is significant because digital literacy is no longer optional in the current technology-driven era; it is an essential competency. Therefore, this study aims to fill the research gap by specifically examining whether the use of Grok AI as a learning tool is significantly associated with the development of students' digital literacy skills, grounded in educational theory and supported by empirical data. In doing so, it contributes new insight into how conversational AI tools, beyond their social media integration, can support student learning in meaningful and ethical ways. This article focuses on the research question: "Does AI, such as Grok AI, help improve students' digital literacy?", with the specific aim of identifying whether there is a significant relationship between the use of Grok AI as a teaching tool and students' levels of digital literacy. In this research, we utilize the definition of digital literacy provided by Hague & Payton (2011) as referenced in Ramadhan (2021), which describes it as the capability to employ digital skills to access, assess, and share information while being conscious of digital safety and socio-cultural shifts. This framework emphasizes the significance of digital literacy in education, particularly in promoting students' curiosity, creativity, and critical thinking. This article will explore the challenges and potential of integrating AI in education, particularly examining how tools like Grok AI can support the development of essential digital competencies. To guide this discussion, several key concepts and theories will be considered. Grok AI serves as an AI-based learning medium that assists students in understanding content, interacting with information, and learning independently by providing explanations and real-time support.

LITERATURE REVIEW

Digital literacy is a process built upon knowledge literacy, Internet literacy, web literacy, and digital skills. In this process, every step is crucial, and all of them should be utilized collectively for effective digitalization. Digital literacy is interconnected with eight fundamental components, which include: cognitive (broadening the intellect), proactive (fostering positive outcomes), communicative (capacity to engage and network), optimistic and accountable, inventive (pursuing innovation), critical (analytical in assessing content), and civil (promoting the development of civil society) Nurfazri et al., (2024). Meanwhile, digital literacy asserts its significance as a systematic requirement. The advancement of technology and widespread structures demand digital literacy. The evolution of digital literacy, which varies in nature, results from the integration of various literacies and Internet usage by nations through public policy, the impact of the global economy on information and communication sectors, and the increasing presence of the Internet in both professional and personal realms Ayhan, 2022). He also highlighted eight key characteristics of developmental literacy, outlined as follows:

1. The Internet is the defining technology for literacy and learning for this generation within our global society.
2. The Internet and its associated technologies necessitate new types of literacies to fully realize their capabilities.
3. New literacies are context-dependent.
4. New literacies are diverse, multimodal, and complex.
5. Critical thinking is fundamental to new literacies.
6. New literacies demand new forms of strategic understanding.
7. New social practices are integral to new literacies.
8. The significance of teachers increases, even as their roles evolve, in modern literacy classrooms.

In this research, we adopt the concept introduced by Hague & Payton (2011), quoted in Ramadhan (2021), which characterizes digital literacy as an individual's ability to apply practical skills on digital devices. This encompasses skills such as finding and assessing information, engaging in critical thinking, showcasing creativity, collaborating with others, communicating efficiently, and being mindful of digital safety, as well as the changing socio-cultural landscape. We utilize this framework to highlight the significance of digital literacy within educational environments, where it is crucial for nurturing students' curiosity, creativity, and critical thought. By leveraging this theoretical approach, the study investigates how digital literacy improves learning experiences and aids in achieving a more profound comprehension of subjects among students.

In terms of education, strong digital literacy contributes to expanding individuals' knowledge of specific subjects by fostering the curiosity and creativity that students possess. Here, creativity serves as a foundation for students to discover learning materials and use them as references to enhance their self-directed learning abilities. Self-Directed Learning is the capacity for an individual to identify and select personal goals, devise a plan of action, work towards problem-solving, manage oneself, and assess their thoughts

and performance. Hague & Payton in Febianti et al. (2023) research highlight that strong digital literacy can enhance an individual's understanding of particular learning resources by fostering curiosity and creativity among students. The range of publications is quite varied, and the information accessed online leads students to be less discerning when selecting their sources of information to utilize. Digital information resources encompass the (1) World Wide Web, (2) search engines, (3) online indexes, (4) video CDs, (5) VSAT-driven Internet connections, (6) online library catalogs, (7) digital databases, (8) portals, (9) electronic journals (E-journals), (10) electronic books (E-books), and even (11) Artificial Intelligence can serve as sources for digital literacy.

Artificial Intelligence (AI)

Artificial Intelligence (AI) has significantly transformed various sectors by enhancing automation, user engagement, and advanced problem-solving capabilities. In the field of education, AI is progressively reshaping both administrative operations and instructional practices. Researchers have explored how AI technologies contribute to educational advancement by streamlining institutional processes, improving student learning outcomes, and enriching teacher-student interactions.

One of the most impactful contributions of AI in education is the automation of administrative tasks. AI tools have been employed to handle repetitive duties such as grading, scheduling, and student admissions, thus enabling educators to dedicate more time to personalized instruction. For instance, multiple-choice assessments can be graded instantly using AI, and ongoing efforts are being made to improve the automated evaluation of essay-type responses. Institutions have also integrated AI for managing student records and streamlining admissions processes.

AI also plays a crucial role in assessment and feedback systems. Software like Turnitin facilitates instant plagiarism detection by comparing student submissions with vast online databases. Online grading rubrics and templates further simplify evaluation by automatically assigning grades based on predetermined criteria. In addition, AI enables personalized feedback delivery. According to Zouhaier Slimi, AI tools provide timely, private, and student-centered feedback, either in written or recorded formats, allowing learners to reflect on their work and improve performance independently. According to Alexandra Harry, the benefits of AI in education include:

1. Personalized Learning – AI allows instructional content to be adapted to each learner's pace, needs, and learning style, thus improving engagement and outcomes.
2. Enhanced Efficiency – Routine academic and administrative tasks can be automated, giving both teachers and students more time to focus on critical learning activities.
3. Improved Student Engagement – Through the use of chatbots, virtual assistants, and adaptive systems, AI can create more interactive and responsive learning environments.
4. Advanced Data Analytics – AI systems can process and analyze educational data to help teachers understand student progress and tailor instruction accordingly.

However, these advancements come with several challenges:
1. Privacy and Security – AI systems require access to large amounts of student data, which raises concerns over data protection and misuse.
2. Trust and Acceptance – Students may prefer human-generated evaluations over AI, especially regarding grades and feedback, which could impact their comfort with the technology.
3. High Implementation Costs – The financial investment needed for AI infrastructure can be burdensome, particularly for under-resourced institutions.
4. Algorithmic Bias – If AI models are trained on biased data, they may replicate or amplify those biases, leading to unfair outcomes.

5. Ethical and Accessibility Issues – AI tools must be inclusive and transparent in their decision-making to ensure fairness and equal access for all learners.

Grok AI

Recent developments in conversational AI have introduced tools such as Grok AI, developed by xAI, which represents a unique and emerging application of AI in digital environments. According to Rania Nurbaity Winarno et al., Grok AI was launched on Platform X (formerly Twitter) as a context-aware assistant capable of interacting with real-time social media content. It aims to enhance digital engagement through humorous and adaptive communication, distinguishing itself from conventional chatbots.

As noted by D.R. Adinath and Smiju I.S., Grok's primary capabilities include sentiment analysis, trend prediction, and real-time engagement, made possible by its integration with social media data. Similarly, Murillo Edson de Carvalho Souza and Li Weigang highlight concerns about Grok's limited generalizability, given its specialization in social media discourse and its liberal content moderation standards.

Ahmed A. Q. Mohammed describes Grok AI as a distinctive alternative to traditional models like ChatGPT and Bard. It emphasizes real-time interaction, informal tone, and mathematical reasoning. However, Grok currently faces limitations, such as restricted accessibility (available only to X Premium users) and underperformance in general knowledge tasks. Despite these limitations, Grok has demonstrated rapid growth, from 33 billion to 314 billion parameters, indicating its strong potential for expansion into broader educational and analytical domains.

From an educational standpoint, Grok AI presents a groundbreaking method for learning assistance through real-time, context-sensitive interactions. In contrast to traditional AI chatbots that rely on static databases, Grok utilizes current data streams from Platform X, allowing it to react fluidly to ongoing trends and subjects. This capability is particularly advantageous in fields where continuous updates are crucial, such as media literacy, digital citizenship, or social sciences, enabling students to interact with relevant and timely content. By integrating conversational elements and humor, Grok creates a more engaging and less daunting atmosphere, helping students feel at ease when seeking knowledge and clarification.

One of Grok AI's most significant features is its function as a personalized

learning assistant. It can provide answers to students' academic inquiries with responsive, contextually relevant explanations. This makes it especially beneficial for self-directed learning situations, where students might not always have access to a teacher or tutor. Grok aids in grasping challenging concepts and also helps learners navigate multi-step problem-solving tasks, promoting the development of critical thinking, metacognition, and independent learning strategies. These attributes align with contemporary pedagogical models that emphasize student agency, personalization, and adaptability.

Additionally, Grok AI plays a crucial role in enhancing digital literacy. Through its conversational and intuitive interactions with learners, it exemplifies how to critically and ethically navigate and analyze digital information. This aligns with global educational objectives that highlight digital competencies as vital for learners in the 21st century. Its availability as a conversational agent encourages ongoing, informal learning outside the classroom, which is vital in blended or hybrid educational environments. Although Grok's access currently has limitations and its general knowledge base is still being developed, its swift progress and interactive capabilities position it as a promising educational resource for boosting learner engagement, autonomy, and digital fluency.

RESEARCH METHOD
Research Design
The research method used in this study is quantitative. The sample in this study consists of 30 students from different universities in West Java and Jakarta. The research variables consist of two variables, namely the independent variable, which is the use of Grok AI in the learning process (X), and the dependent variable, which is the students' digital literacy level as a result of using Grok (Y). Data collection techniques were conducted through the distribution of questionnaires using a five-point attitude scale, ranging from 'Strongly Disagree' to 'Strongly Agree.' This instrument was used to measure the level of Grok AI usage as an educational tool and students' digital literacy. Data analysis techniques were conducted using percentage analysis to identify trends in respondents' answers, as well as the Pearson correlation test to determine whether there is a significant relationship between the variable of Grok AI usage and students' digital literacy.

Validity and Reliability
In this research, the authors performed validity and reliability assessments through a preliminary study to confirm that the questionnaire instruments utilized were suitable and trustworthy. Construct validity testing was conducted by correlating each item with the total score of its corresponding variable. Construct validity was assessed by correlating each item with its variable's total score using the Pearson correlation coefficient. All items in the Grok AI usage variable showed significant correlations ($r = 0.694$–0.914; $p < 0.01$), indicating they are valid. Similarly, most items in the digital literacy variable exhibited significant correlations ($r = 0.382$–0.742; $p < 0.05$), demonstrating that both instruments are overall appropriate for use in the study.

Subsequently, the reliability of the instruments was evaluated using Cronbach's

Alpha formula. The findings indicated that for the digital literacy instrument, the Cronbach's Alpha value was 0.775, whereas for the Grok AI usage instrument, it was 0.952. Both values exceed the recommended minimum threshold of 0.70 as proposed by Parada & Arifin, (2023), leading to the conclusion that both instruments possess good reliability. Thus, all items from each questionnaire were considered reliable and utilized in this study.

Ethical Consideration

Before completing the questionnaire, participants received an overview of the study's objectives, instructions on how to fill it out, and details about the tools utilized. They were also provided with extra time to ask questions or seek further clarification if needed. The researchers highlighted that participation was voluntary, allowing participants to withdraw at any point without facing any repercussions. The findings of this study would have no impact on the academic evaluations or personal connections of participants with any individuals.

RESULT AND DISCUSSION

This section shows the findings, analysis of data, and discussion. It highlights the extent to which Grok AI is utilized as a teaching tool and assesses students' digital literacy based on the results of the questionnaire. Additionally, this section includes the findings from the correlation analysis examining the relationship between Grok AI usage and students' digital literacy. The interpretation of the data is supported by average value calculations and the Pearson correlation test, aiming to address the research question posed in this study.

The research findings regarding the levels indicate that the average score for students' digital literacy was 4.32 (refer to Table 1). According to the interpretation scale, this result is categorized as a very high level. In contrast, the average score for students' use of GrokAI was 3.60, which is classified as a moderate to high level. As per the Likert Scale interpretation, both scores of 4.32 and 3.60 fall within the high category, with digital literacy showing a significantly greater level than the utilization of GrokAI.

Table 1. Levels of Students' Digital Literacy and GrokAI Utilization

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
mean_literisi	30	3.30	5.00	4.32	.44928
Mean_Grok	30	1.40	5.00	3.60	.82337
Valid N (listwise)			30		

The Correlation between the Use of Grok AI as a Teaching Medium and Students' Digital Literacy

The Pearson correlation coefficient was used to answer the final research question, which aimed to determine whether there was a significant relationship between students' digital literacy and their use of Grok AI. As shown in Table 2, the analysis yielded a correlation coefficient of $r = 0.364$ with a significance value of $p = 0.048$, which is below the threshold of $\alpha = 0.05$, indicating that the relationship is statistically significant.

According to McLeod (2019), as quoted in (Tabita Deity Penna, 2023), a p-value that is less than or equal to .05 indicates that the correlation is statistically significant. Thus, it can be inferred that there is a noteworthy positive correlation between students' digital literacy and their engagement with GrokAI.

Table 2. The Correlation Between Students' Digital Literacy and Their Use of Grok AI
Correlations

		Literasi digital	Grok Ai
Literasi digital	Pearson Correlation	1	.364[*]
	Sig. (2-tailed)		.048
	N	30	30
Grok Ai	Pearson Correlation	.364[*]	1
	Sig. (2-tailed)	.048	
	N	30	30

*. Correlation is significant at the 0.05 level (2-tailed).

CONCLUSION

Based on the findings of this study, it can be concluded that university students demonstrate a very high level of digital literacy, while their use of Grok AI as a learning tool is within the moderate to high category. This suggests that although Grok AI may still be relatively new or not fully integrated into all learning activities, students are showing a growing familiarity and willingness to engage with the platform as part of their academic experience.

The Pearson correlation analysis revealed a significant positive relationship between Grok AI usage and students' digital literacy ($r = 0.364$; $p = 0.048$). This indicates that students who interact more frequently with Grok AI tend to exhibit stronger digital competencies, particularly in their ability to locate, assess, and use digital information effectively. The statistical significance of this relationship supports the idea that AI-based learning tools like Grok AI can contribute meaningfully to the development of essential digital skills in higher education settings.

In summary, Grok AI holds great potential as a supportive educational technology that enhances digital literacy among students. However, to fully optimize its impact, it should be implemented as part of a broader and more structured digital education strategy. This includes institutional support, access to digital infrastructure, regular training for both students and instructors, and the integration of AI tools into the curriculum. Such efforts will not only help maximize the benefits of platforms like Grok AI but also ensure that students are well-equipped to succeed in a digitally connected academic and professional environment.

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