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The Role of Digital Literacy in the Critical Attitudes of Chemistry Students Toward Fake News

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ABSTRACT

This study aims to understand the relationship between digital literacy and the critical attitudes of chemistry students in responding to the spread of fake news. Using a descriptive qualitative approach, the study involved three first-year students who were purposively selected as participants. Data were collected through structured interviews and observations conducted during learning activities and informal discussions within the campus environment. Thematic analysis was employed to identify patterns of attitudes and digital literacy practices. The results indicate that students with higher levels of digital literacy tend to be more critical, selective, and responsible in dealing with digital information, whereas those with developing literacy demonstrate potential improvement through reflective interaction. These findings highlight the importance of strengthening digital literacy in higher education as part of building resilient academic and social character in the era of information disruption.

1. INTRODUCTION

The development of digital technology has significantly transformed the way people access, produce, and disseminate information. Social media, as one of the most dominant digital products, enables the rapid and widespread circulation of information. However, this convenience also brings negative impacts, such as the rampant spread of false information or fake news, which can degrade the quality of public communication and affect the social and intellectual stability of society. This phenomenon indicates that the digital era not only offers opportunities for the advancement of knowledge but also presents major challenges in maintaining the accuracy and reliability of information.

One of the main factors contributing to the spread of fake news is the low level of digital literacy among the public, including university students. Digital literacy is not only related to technical skills in using digital devices but also encompasses cognitive abilities to evaluate, process, and respond to information critically. In the context of higher education, this becomes important because students are expected to be able to distinguish the truthfulness of information amid the flood of unverified digital content.

Chemistry students, for instance, are accustomed to thinking logically, systematically, and data-based in academic activities. However, such critical thinking skills are not always applied in non-scientific contexts, such as when they encounter false news or social issues on digital media. This condition reflects a gap between scientific thinking skills and critical attitudes toward general information. Ideally, students as agents of change should possess strong digital literacy so that they can play an active role in preventing the spread of hoaxes and building a healthy information ecosystem.

Digital literacy plays an important role in helping individuals recognize and respond to hoax content on social media (Amaly et al., 2021). However, their research also shows that digital literacy awareness among students remains general and has not been widely integrated into formal learning processes. This indicates the need for more systematic efforts to strengthen digital literacy in higher education, particularly in fostering critical thinking skills toward non-scientific information, which is often misleading.

Based on this background, this study aims to analyze the relationship between digital literacy and the critical attitudes of chemistry students in dealing with fake news. The results are expected to serve as a basis for strengthening digital literacy in universities so that students can adopt more critical and responsible attitudes in their use of information.

2. METHODS

This study employed a descriptive qualitative approach aimed at illustrating the role of digital literacy in shaping the critical attitudes of Chemistry students toward fake news. This approach was chosen because it allows the researcher to gain an in-depth understanding of students' experiences and behaviors in real-life contexts without manipulating variables.

The research participants consisted of three first-semester Chemistry students who were selected based on their willingness to be interviewed and observed. The selection was carried out purposively to ensure that the participants were actively engaged in seeking digital information and willing to express their views openly throughout the research process.

The research procedure involved two primary methods: unstructured interviews and simple non-participatory observation. The interviews were conducted in a relaxed setting for approximately ten minutes in the campus area and nearby cafés to make the participants feel comfortable sharing their experiences and opinions. The researcher prepared only an outline of topics related to how students search for information, verify news, and view the importance of digital literacy. Subsequently, simple observations were carried out during classroom activities and informal student discussions to directly observe their behavior in searching for, filtering, and responding to digital information.

The research instruments included an open interview guide and a simple observation sheet. The interview guide contained several key questions, such as “Where do you usually obtain information?” and “How do you check the accuracy of news before sharing it?” Meanwhile, the observation sheet was used to record students’ behaviors when interacting with online information, including the sources used, the ways they verified news, and their responses to viral information.

Data collection was conducted by taking notes from interviews and creating brief field notes from observations. The collected data were then analyzed using thematic analysis techniques, which included data reduction, data presentation, and conclusion drawing based on emerging patterns and themes. Source triangulation was applied by comparing the results of interviews and observations to ensure the validity of the data.

3. RESULTS AND DISCUSSION

3.1 Results

Category	Student (A)	Student (B)	Student C
Experience in finding information	Often searches for news through social media. Lecture materials are obtained from Google, sometimes from Google Scholar, and ChatGPT.	More often uses scientific sites (Google Scholar) for study materials and valid news from online media or reliable sources.	More often uses scientific sites (Google Scholar) for study materials and valid news from online media or reliable sources.
Attitude toward fake news (hoaxes)	Once shared fake news without verifying its truth.	Always checks the source of news and compares information from several sites.	Not easily convinced and always verifies the source first.
Awareness of Digital Literacy	Aware that not all online information can be trusted, but has not yet been consistent in checking sources.	Quite high, accustomed to thinking critically before trusting information.	Quite high, accustomed to thinking critically before trusting information.
Key quotation	“I just realized that there are actually a lot of hoax news; I used to share anything that looked interesting.”	“When I see news, I first check the source. If the origin is unclear, I just ignore it.”	“I won’t believe it immediately; for every viral news, I first check the original source.”
Interpretiton	There is initial awareness, but it is	Shows a good level of digital literacy and	Demonstrates high digital literacy and a

	not yet consistent in its application (source verification).	critical attitude, in line with the habit of using scholarly sources.	critical attitude, consistent with the habit of using scholarly sources and being cautious in accepting information.

3.2 Interview Results

1. Student A

Based on the interview conducted, Student A described himself as an active internet user who is accustomed to utilizing various digital platforms to fulfill his daily information needs. He mentioned that to keep up with the latest news, he mostly relies on social media platforms such as Instagram and X (formerly known as Twitter). Meanwhile, for academic purposes such as searching for lecture materials, he tends to use Google as his main tool. However, he admitted that he only occasionally accesses Google Scholar to find scientific references and sometimes uses ChatGPT as an additional tool—both to understand difficult concepts and to help summarize assignments.

During the conversation, Student A also shared a memorable experience. He once unintentionally spread information that turned out to be false or a hoax simply because he found the content interesting and worth sharing. He stated:

"I only found out later that there's actually a lot of hoax news—I used to just share anything that looked interesting."

This statement reflects that, in the early stages of his digital media use, he tended to share information impulsively without first verifying its accuracy. However, that experience became an important turning point. Since then, he has begun to realize that not all information circulating on the internet can be trusted, and it is important to be more cautious before sharing something with others.

Furthermore, Student A admitted that although he is now aware of the need to be more selective in sharing information, he is still not fully accustomed to systematically checking sources. In practice, he often assesses the credibility of information based on how many "likes" or "shares" a post receives. This means that his judgment of truth is still heavily influenced by the popularity of content rather than the validity of its source.

Upon closer examination, this interview shows that Student A is currently in the early stage of developing digital literacy. He has a basic awareness that information received should be verified first, but his technical skills for thorough verification have not yet been fully developed. His awareness remains conceptual—he understands the importance of being critical toward information—but it has not yet become a reflective habit consistently applied in his daily digital activities.

2. Student B

The profile of Student B shows a rather different approach compared to his peers. From the beginning of his college years, he has demonstrated a tendency to rely on academic sources when searching for references for his coursework. He mentioned that he feels more comfortable using platforms such as Google Scholar and journals published by higher education institutions. Instead of depending on general or popular information, he prefers references that have a scientific foundation and have undergone a peer-review process.

To stay updated with current news or issues, Student B is also selective in choosing sources. He tends to read from reputable online media sites known for their credibility. He understands that in today's digital era, information can come from anywhere, and not all of it can be trusted. Therefore, before believing a piece of news, he habitually compares several sources first to ensure the consistency and validity of the information received.

During the interview session, he expressed his view firmly:

"When I see news, I check the source first. If it's unclear where it comes from, I just ignore it."

This statement reflects a critical and reflective attitude toward the flow of digital information. He not only understands the importance of digital literacy but has also formed a habit of applying it consistently in daily life. This verification-oriented attitude indicates that Student B is aware that every piece of information circulating on the internet has the potential to contain bias, and thus must be approached with caution and thorough analysis.

Furthermore, Student B explained that he uses AI-based technology such as ChatGPT not as a primary source of information, but as an initial supporting tool. He utilizes it to design frameworks, organize preliminary ideas, or simply find inspiration before proceeding to collect data from more valid scientific sources. This approach shows that he can wisely integrate modern technology with academic principles. He does not fall into the trap of instant convenience but continues to uphold scholarly standards in his learning process.

From the overall interview, it can be concluded that Student B has reached a mature stage of digital literacy. He is not only able to search for and access information but also possesses the skills to evaluate and use it appropriately. This habit has become part of his academic routine, reflecting a strong orientation toward accuracy, validity, and integrity in information use. In other words, for Student B, digital literacy is not merely knowledge but has become a practice deeply rooted in his way of thinking and acting in everyday life.

3. Student C

Student C demonstrates a rather mature approach in responding to the flow of digital information. Since the beginning of her college years, she has been accustomed to searching for references from academically credible sources. Google Scholar has become her primary choice when working on assignments or deepening her understanding of a topic. She feels more confident and assured when the information she uses comes from scientific journals or articles that have undergone peer review.

Unlike some other students who may be more flexible in using various sources, Student C tends to be selective. She only uses ChatGPT or similar platforms when truly necessary—for example, when facing tight deadlines or struggling to organize an initial framework of ideas. However, she never treats the output of AI as a main reference. After gaining an initial overview, she always returns to scientific sources to ensure that the data and arguments she uses have a solid foundation.

When it comes to following current news or trending issues on social media, Student C exhibits a very cautious attitude. She does not easily believe information, especially when its origin is unclear. She is accustomed to verifying information first before deciding whether it is trustworthy or not. She expressed her view firmly:

"I won't believe it right away—every viral news, I check the original source first."

This statement reflects a high level of critical thinking and responsibility in interacting with digital content. She understands that in the age of social media, information can spread very quickly, but not all of it is true. Therefore, she considers verification a necessary step before sharing anything with others.

Student C's habits of checking sources, thinking critically, and prioritizing academic references indicate that she possesses strong digital literacy. She not only knows that information should be verified but has made this attitude a part of her routine. She is not influenced by the popularity of content but places greater importance on the validity and integrity of information.

Interpretation of this interview shows that Student C has reached an advanced stage of digital literacy. She is able to access, evaluate, and use information responsibly and with an academic orientation. The critical and cautious attitude she demonstrates aligns with her habit of using academic sources as her main references. In her daily life, digital literacy is not just a theory but has become an integral part of her reflective way of thinking and acting.

3.2 Discussion

In the midst of the rapid flow of digital information, digital literacy has become a fundamental competence that is not only technical in nature but also encompasses cognitive, affective, and social dimensions. The ability to filter, understand, and evaluate information is increasingly important, especially amid the widespread circulation of hoaxes on social media. This study arises from concern over this phenomenon and seeks to understand how first-year Chemistry students respond to hoaxes through their digital literacy practices.

The research findings show that all three participants have acquired basic digital literacy skills from formal education. However, their actual application is strongly influenced by attitude and social environment. Students B and C demonstrate mature digital literacy, with habits of verifying information and encouraging fact-checking during discussions. Student A is still at an early stage, tending to rely on the first search results and being inconsistent in verifying sources, although showing openness to feedback. These differences indicate that digital literacy is not a static competence, but dynamic and contextual.

Digital literacy as a multidimensional competence was formulated by Tsaniyah and Juliana (2019), encompassing eight elements: cultural, cognitive, constructive, communicative, confident, creative, critical, and citizenship. Students B and C exhibit competence in the critical, cognitive, and citizenship elements, while Student A is still in the developmental process. These findings are consistent with the study by Cynthia and Riries (2023), which emphasizes the importance of digital literacy in improving learners' critical thinking and problem-solving skills.

Digital literacy also serves as a safeguard against hoaxes. Research by Amaly and Armiah (2021) shows that low digital literacy competence contributes to the high spread of false information. In this context, the behaviors of Students B and C provide concrete examples of how good digital literacy can prevent the spread of hoaxes and help build a healthy information ecosystem. This is supported by findings from *Al-Balagh Journal* (2023), which state that digital literacy is an effective strategy for countering hoaxes in the era of disruption.

The importance of digital literacy in shaping critical character is also emphasized by Palupi (2020), who proposed using hoaxes as educational material. By making hoaxes case studies, learners can be trained to analyze, evaluate, and develop reflective attitudes toward information. This approach aligns with constructivist theory, which states that knowledge is built through experience and critical reflection. In this study, Students B and C naturally exhibited such behavior, while Student A can be guided through case-based learning strategies.

Digital literacy is relevant not only in higher education but also from early education. Research by Wulandari (2023) and Pratiwi (2023) shows that digital literacy can enhance students' critical thinking skills from an early age. This supports the importance of integrating digital literacy into the curriculum across all levels of education. In the Society 5.0 era, digital literacy becomes an essential instrument for developing adaptive, critical, and responsible students (Sari, 2023; *Philosophiamundi*, 2023).

The social dimension of digital literacy also cannot be overlooked. Digital literacy develops through social interaction, reflective discussion, and collective experience. Students who actively engage in discussions, accept feedback, and change behavior demonstrate that digital literacy includes interpersonal and affective aspects. Research by Oktavian and Sulistyowati (2024) emphasizes that adolescents' digital literacy can be enhanced through contextual and participatory learning involving the community and social environment.

Optimizing digital literacy is also a strategy for building a critical society. Research by PABKI (2023) indicates that digital literacy can promote active community participation, strengthen analytical skills, and increase awareness of the social impact of digital information. In this context, Students B and C not only demonstrate individual competence but also contribute to creating a healthy and responsible digital community.

The implications of this study cover both educational and social aspects. In education, digital literacy needs to be systematically integrated into the curriculum across subjects, using case-based and reflective discussion approaches. Students should be trained to verify information sources, understand the structure of scientific journals, recognize media bias, and develop information-sharing ethics and awareness of the

impact of hoaxes. Socially, strong digital literacy can prevent the spread of hoaxes in academic environments and foster a healthy information ecosystem.

This study shows that first-year students' digital literacy plays an important role in responding to hoaxes and shaping responsible digital character. Students B and C exhibit high digital literacy competence, while Student A shows potential for growth through social interaction and reflection. These findings reinforce the theory of digital literacy as a multidimensional competence and encourage theoretical modification by adding interpersonal and reflective dimensions. Digital literacy is not only a defense mechanism against hoaxes but also an instrument for shaping intelligent, critical, and ethical digital citizens.

4. CONCLUSION

Based on the results of this study, it can be understood that digital literacy plays an important role in shaping the critical attitudes of chemistry students when facing the flow of information that is not always trustworthy, particularly fake news. Students with strong digital literacy are proven to be more capable of assessing the credibility of sources, filtering information before sharing it, and even encouraging those around them to use digital media more wisely. This attitude is clearly reflected in Students B and C, who not only rely on scientific sources but also demonstrate social responsibility in their daily practices. Meanwhile, Student A shows that digital literacy is a process that can develop; he began to realize the importance of verification after receiving feedback from peers. These findings reinforce the idea that digital literacy is not merely about technical skills but also about reflective awareness and information ethics. Thus, the research objective to analyze the relationship between digital literacy and the critical attitudes of chemistry students in dealing with fake news has been achieved, and the results show that the two are closely related. In the future, strengthening digital literacy in higher education should be directed toward a more contextual and interdisciplinary approach, including using hoaxes as material for critical learning. Further research can develop adaptive learning models suited to the characteristics of specific fields of study, so that students are not only academically competent but also digitally resilient in facing informational challenges in the era of disruption.

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6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article.

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