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THE INFLUENCE OF DIGITAL LITERACY AND INFORMATION LITERACY ON CRITICAL THINKING SKILLS AMONG TEACHER EDUCATION STUDENTS

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ABSTRACT
This study determined the influence of digital literacy and information literacy on critical thinking skills among teacher education students. Quantitative research design utilizing descriptive-correlational approach was used in this study. The data were gathered from 147 third-year teacher education students of Kapalong College of Agriculture, Sciences and Technology (KCAST) through stratified random sampling. Findings revealed that the levels of digital literacy and information literacy were both high; and the level of critical thinking skills was high. Results also revealed that there were high, positive, and significant relationships among the variables: digital literacy and critical thinking skills; and information literacy and critical thinking skills. Moreover, results showed that domains of digital literacy such as critical thinking, citizenship, and curation can significantly influence critical thinking skills. Finally, it was revealed that domains of information literacy such as information knowledge, information skills, and information morality can significantly predict critical thinking skills. Results imply that the variables are significant in improving the critical thinking skills of teacher education students.

KEYWORDS: *Digital Literacy, Critical Thinking Skills, Information Literacy, Teacher Education Students, Philippines*

INTRODUCTION
In the era of rapid technological advancements, critical thinking skills have become indispensable. The ever-expanding digital landscape carries an enormous volume of information, emphasizing the need for individuals to assess and scrutinize it to make informed decisions. Unfortunately, research consistently reveals a deficiency in critical thinking skills among student populations, particularly teacher education students, who play a pivotal role in shaping future generations (Aysu, 2023). This worrisome trend highlights the impending responsibility of these students.

The lack of critical thinking skills was a global issue that affected students in different countries and cultures. In Turkey, pre-service teachers demonstrated inadequate critical thinking abilities, limiting their capacity to analyze and evaluate information (Çarkıt & Kurnaz, 2022). Similarly, in the United States, only 24% of high school seniors were proficient in critical thinking skills, according to the National Assessment of Educational Progress (NAEP) (Fadhlullah, 2017). This universal issue demands collaborative solutions.

In the Philippines, traditional teaching methods contribute to students' lack of critical thinking skills. Efforts to shift teachers' mindsets have proven challenging, highlighting the need to prepare future educators to teach these skills effectively (Muhlisin et al., 2016). The emphasis on rote memorization through recitations and tests has long hindered critical thinking development among Filipino students. Additionally, Benedicto and Andrade (2022) noted that the widespread use of smartphones and technology has made it easier for students to find solutions online, reducing their ability to solve problems independently.

The rapid advancement of technology, prevalence of misinformation, and growing complexity of global issues highlight the need for individuals with strong critical thinking skills. This is particularly concerning among teacher education students, who play a key role in shaping future generations. These students must discern credible information, evaluate perspectives, and make well-reasoned judgments to foster intellectual curiosity, responsible citizenship, and informed decision-making. Addressing this issue is critical, as it impacts society's ability to tackle challenges and create a sustainable future.

Previous research had shed light on the relationship between digital literacy, information literacy, and critical thinking skills, a distinct research gap existed regarding the impact of these skills on teacher education students. While most studies focused on general student populations or specific disciplines, limited attention was given to how these factors shaped critical thinking in future educators. This research addressed the gap by exploring the influence of digital and information literacy on teacher

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education students' critical thinking skills, aiming to inform pedagogical strategies to develop these competencies. Copies of the study were shared with research conferences and relevant agencies to encourage scholarly exchange and practical application.

Research Objectives

This study aimed to determine the influence of digital and information literacy on the critical thinking skills of teacher education students at Kapalong College of Agriculture, Sciences and Technology, focusing on the following objectives:

1. To determine the level of digital literacy among teacher education students in terms of:
   - 1.1 communication;
   - 1.2 copyright;
   - 1.3 critical thinking;
   - 1.4 character;
   - 1.5 citizenship;
   - 1.6 curation;
   - 1.7 connectedness;
   - 1.8 creativity; and
   - 1.9 collaboration.
2. To determine the level of information literacy in terms of:
   - 2.1 information knowledge;
   - 2.2 information awareness;
   - 2.3 information skills; and
   - 2.4 information morality.
3. To determine the level of critical thinking skills in terms of:
   - 3.1 analyzing;
   - 3.2 evaluating;
   - 3.3 creating;
   - 3.4 remembering;
   - 3.5 understanding; and
   - 3.6 applying.
4. To determine the significant relationship between:
   - 4.1 digital literacy and critical thinking skills; and
   - 4.2 information literacy and critical thinking skills.
5. Did the singular and combined influence of digital literacy and information literacy on critical thinking skills significant?

Research Hypothesis

This study was tested at a 0.05 alpha significance level and found no significant relationship between digital literacy and critical thinking skills, nor between information literacy and critical thinking skills. Additionally, the findings indicated that neither digital literacy nor information literacy, whether considered individually or in combination, significantly influenced the critical thinking skills of the respondents.

RESEARCH METHODOLOGY

Research Design

This study utilized a quantitative, descriptive-correlational design to examine how digital literacy and information literacy influence the critical thinking skills of teacher education students at KCAST. According to Creswell (2008), quantitative research involves analyzing numerical data to identify relationships between variables. The descriptive aspect outlined the levels of digital literacy, information literacy, and critical thinking skills, while the correlational aspect assessed their relationships.

Population and Sample

The respondents were third-year teacher education students at Kapalong College of Agriculture, Sciences and Technology (KCAST) during the first semester of the 2023-2024 academic year. Stratified random sampling ensured proportional representation from the four programs: BEEd, BSEd-English, BSEd-Filipino, and BSEd-Mathematics. Population data from the College Registrar were used by a statistician to calculate the sample size and allocation. The final sample included 40 BEEd students, 43 BSEd-English students, 37 BSEd-Filipino students, and 27 BSEd-Mathematics students, totaling 147 respondents, or 62% of the population.

Research Instrument

The researcher used an adapted questionnaire from Amin et al. (2021), "Development and Validation of Digital Literacy Scale (DLS)," which had a Cronbach's alpha of 0.89, indicating high reliability. The second set of questions on information literacy was adapted from Guo-Xiang et al. (2023), with a Cronbach's alpha of 0.92, showing excellent consistency.

For critical thinking, an adapted version of the Critical Thinking Questionnaire (CThQ) by Kobylarek et al. (2020) was used, reporting a Cronbach's alpha of 0.87, indicating good reliability. A five-point Likert Scale was used to interpret respondents' digital literacy and critical thinking, ranging from 1 (strongly disagree) to 5 (strongly agree).

Data Collection

The researcher completed the following processes to be able to gather the needed data.

Searching for Questionnaires. The researcher searched related questionnaire of the study from the internet and modified them as used in conducting survey having the teacher education students as respondents.

Submitting and Revising Questionnaires for Validation. After the modification of the searched questionnaires, researcher submitted it to the panelists and revised the questionnaires after receiving it with corrections.

Seeking the Permission to Conduct the Study. The researcher obtained permission from the Vice President for Academic Affairs of KCAST through a letter to allow the researcher to distribute the questionnaires in the classroom.

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Distribution and Retrieval of the Questionnaire. With approval from the School Principal, the researcher personally distributed and retrieved the questionnaires from respondents.

Collection and Tabulation of the Data. After conducting the survey, the researcher collected and analyzed the data, recording and tabulating the results. Statistical analysis was conducted, conclusions drawn, and recommendations presented.

Statistical Treatment of data

Mean. This was used to assess digital literacy, information literacy and critical thinking skills among the respondents.

Pearson-r. This was used to determine the significant relationship between digital literacy and critical thinking skills as well as the relationship between information literacy and critical thinking skills among the respondents.

Regression. This was used to determine the significant influence of digital literacy and information literacy on critical thinking skills of the respondents.

RESULTS AND DISCUSSION

Table 2. Level of Digital Literacy in terms of Communication

Communication	Mean	Description
1. Reading things on a screen without any problems.	3.86	High
2. Printing out things I read online enhances my understanding.	3.73	High
3. Engaging in effective online communication feels natural and intuitive.	3.81	High
4. Talking to and seeing other people through the computer.		
5. Experiencing clear audio while using headphones or speakers online.	3.74	High
	3.91	High
OVERALL	**3.81**	**High**

Table 3. Level of Digital Literacy in terms of Copyright

Copyright	Mean	Description
1. Being familiar with my school's online plagiarism policy is essential.	4.39	Very High
2. Understanding the consequences for utilizing copyrighted material online without permission.	4.34	Very High
3. Acknowledging sources in my work, even when collaborating with peers.	4.05	High
4. Using Turnitin or other similar software to check and avoid unintentional plagiarism.	3.59	High
5. Complying with copyright rules online ensures ethical engagement with academic content.	4.12	High
OVERALL	**4.10**	**High**

Table 4. Level of Digital Literacy in terms of Critical Thinking

Critical Thinking	Mean	Description
1. Engaging in school-provided online activities related to real-life experiences.	4.18	High
2. Finding information online and using it to solve problems.	4.13	High
3. Maintaining an online journal where I write about things I learn and think about.	3.59	High
4. Participating in online school activities that address real-life challenges.	3.91	High
5. Feeling confident in using online resources to solve problems.	3.90	High
OVERALL	**3.94**	**High**

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Table 5. Level of Digital Literacy in terms of Character

Character	Mean	Description
1. Respecting others' privacy and not sharing personal info without consent.	4.61	Very High
2. Avoiding harmful online behavior like negative comments.	4.59	Very High
3. Participating fairly and empathetically in online discussions.		
4. Showing empathy by considering others' feelings and perspectives online.	4.44	Very High
5. Fostering a positive online environment through constructive engagement and mutual respect.	4.50	Very High
	4.47	Very High
OVERALL	**4.52**	**Very High**

Table 6. Level of Digital Literacy in terms of Citizenship

Citizenship	Mean	Description
1. Engaging in respectful communication to ensure positive interactions while using technology.	4.52	Very High
2. Understanding and following cyber laws, showing responsible digital citizenship.	4.44	Very High
3. Respecting guidelines by reading terms and privacy policies.	4.51	Very High
4. Adapting to cultural norms and using appropriate language online.	4.45	Very High
5. Prioritizing online safety by protecting personal info.		
	4.52	Very High
OVERALL	**4.49**	**Very High**

Table 7. Level of Digital Literacy in terms of Curation

Curation	Mean	Description
1. Searching for material from renowned websites.	4.10	High
2. Enhancing information with my ideas to make it more useful.	4.21	High
3. Enjoying updating and improving information when possible.	4.09	High
4. Searching trusted websites for school project information.		
5. Sharing helpful information or my ideas online.	4.37	Very High
	4.22	High
OVERALL	**4.20**	**High**

Table 8. Level of Digital Literacy in terms of Connectedness

Connectedness	Mean	Description
1. Joining online groups to connect with other users	3.59	High
2. Participating in nationwide online projects that involve diverse individuals.	3.35	High
3. Engaging in online campaigns to improve our community.	3.48	High
4. Taking part actively in polls and surveys that are done online.		
5. Supporting community members in sharing their problems on social media to get help and attention.	3.74	High
	3.73	High
Overall	**3.58**	**High**

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Table 9. Level of Digital Literacy in terms of Creativity

Creativity	Mean	Description
1. Writing online articles to share new ideas and perspectives.	3.31	Moderate
2. Sharing new facts and engaging content on social media.		
3. Making my own videos and sharing them online.	3.59	High
4. Having creative ideas and showcasing them on the internet.		
5. Wanting to research and contribute new knowledge to what we already know.	3.03 3.31	Moderate Moderate
	3.60	High
OVERALL	**3.37**	**Moderate**

Table 10. Level of Digital Literacy in terms of Collaboration

Collaboration	Mean	Description
1. Teaming up with other people to do tasks together when I use the internet.	3.82	High
2. Doing things with a group online helps me learn from other people.	3.80	High
3. Working with my friends to solve problems on the internet.	3.85	High
4. Working together with others online to get things done.		
5. Learning new things and getting smart ideas from friends while working in a group online.	3.76 3.92	High High
OVERALL	**3.83**	**High**

Table 11. Summary on Level of Digital Literacy

Indicators	Mean	Description
Communication	3.81	High
Copyright	4.10	High
Critical Thinking	3.94	High
Character	4.52	Very High
Citizenship	4.49	Very High
Curation	4.20	High
Connectedness	3.58	High
Creativity	3.37	Moderate
Collaboration	3.83	High
OVERALL	**3.98**	**High**

Level of Digital Literacy of Teacher Education Students. The respondents showed a high level of digital literacy across areas like character, citizenship, communication, curation, and critical thinking, reflecting their ability to use digital tools effectively, evaluate information critically, and engage responsibly online. These results align with Anisimova (2020) and Widana (2020), who highlighted that digital literacy promotes ethical behavior and collaboration.

According to Sánchez-Cruzado et al. (2021), the high levels suggest students are well-equipped to analyze and create digital content, while Liza and Andriyanti (2020) emphasized the importance of curation skills. Tejedor et al. (2020) also stressed the role of communication skills in collaboration, demonstrated by the respondents in their use of digital tools for teamwork. However, Aydin and Erol (2021) pointed out that the moderate level of creativity suggests room for growth in fostering innovation and self-expression.

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Table 12. Level of Information Literacy in terms of Information Knowledge

Information Knowledge	Mean	Description
1. Gathering important information from my life in time.	4.13	High
2. Being able to differentiate between false and true information.	4.19	High
3. Keeping updated on the latest developments in my field of study.	4.05	High
4. Extracting significant insights from personal experiences.	4.16	High
5. Being proactive in staying informed about advancements in my discipline.	4.01	High
OVERALL	**4.11**	**High**

Table 13. Level of Information Literacy in terms of Information Awareness

Information Awareness	Mean	Description
1. Knowing where to find different kinds of information like books, articles, and online databases.	4.16	High
2. Understanding how to protect information from threats like viruses and scams.	4.15	High
3. Knowing the rules for using information responsibly, such as giving credit and respecting privacy.	4.29	Very High
4. Being skilled at gathering and combining information from different sources for research.	4.12	High
5. Being aware of how to credit individuals whose work I use in my papers.	4.28	Very High
OVERALL	**4.20**	**High**

Table 14. Level of Information Literacy in terms of Information Skills

Information Skills	Mean	Description
1. Using software efficiently for processing text, audio, video, and images.	4.03	High
2. Using basic communication tools to share information effectively.	4.12	High
3. Selecting and using relevant search terms to find information in various ways.	4.19	High
4. Evaluating the quality and credibility of information based on its source and authorship.	4.20	High
5. Applying gathered information to real-world situations, such as reporting or solving practical problems.	4.14	High
OVERALL	**4.14**	**High**

Table 15. Level of Information Literacy in terms of Information Morality

Information Morality	Mean	Description
1. Respecting others' academic achievements and correctly citing them, like writing reference statements.	4.35	Very High
2. Exposing and stopping harmful or false information from spreading.	4.26	Very High
3. Taking steps to keep my information or others safe.	4.37	Very High
4. Properly crediting others' work by citing their contributions.	4.39	Very High
5. Correcting false or harmful information shared with other.	4.21	High
OVERALL	**4.32**	**Very High**

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Table 16. Summary on Level of Information Literacy

Indicators	Mean	Description
Information Knowledge	4.11	High
Information Awareness	4.20	High
Information Skills	4.14	High
Information Morality	4.32	Very High
OVERALL	**4.19**	**High**

Level of Information Literacy among Teacher Education Students. The respondents demonstrated a high level of information literacy, with strong skills in accessing, evaluating, and using information effectively, in line with Nisha and Varghese (2021), who stressed the importance of critical thinking, identifying credible sources, and adapting to digital environments for informed decision-making.

The study also revealed high levels of information morality, reflecting ethical behavior in respecting intellectual property, as noted by Banik and Kumar (2019). In line with Zimmerman and Ni (2021), students exhibited strong information awareness by assessing the relevance and accuracy of information.

Additionally, students excelled in information skills and knowledge, showcasing their ability to locate, analyze, and apply information for problem-solving and decision-making. Avcı and Ergün (2022) emphasized the importance of these competencies for academic and professional success.

Table 17. Level of Critical Thinking Skills in terms of Analyzing

Analyzing	Mean	Description
1. Spending time understanding details is necessary or enjoyable.	4.14	High
2. Enjoying discovering how seemingly unrelated things are connected.	4.14	High
3. Finding the most important information from a text.	4.23	High
4. Considering the credibility and relevance of online information.	4.35	Very High
5. Recognizing potential biases and manipulative techniques in online content.	4.18	High
OVERALL	**4.21**	**High**

Table 18. Level of Critical Thinking Skills in terms of Evaluating

Evaluating	Mean	Description
1. Verifying if information is important, even if it seems true.	4.47	Very High
2. Articulating my stance while considering diverse perspectives in discussions.	4.12	High
3. Checking if information is true before accepting it.	4.38	Very High
4. Looking at different sources to assess information reliability.	4.27	Very High
5. Verifying the truth of something before believing or sharing it.	4.37	Very High
OVERALL	**4.32**	**Very High**

Table 19. Level of Critical Thinking Skills in terms of Creating

Creating	Mean	Description
1. Enjoying combining information from different sources.	3.99	High
2. Expressing the same content in various ways.	4.00	High
3. Formulating original ideas and solutions by combining existing knowledge.	4.06	High
4. Understanding how a text is structured, and sometimes altering it if needed.	4.12	High
5. Liking talking about new ideas and their meanings in books I've already read.	4.09	High
OVERALL	**4.05**	**High**

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Table 20. Level of Critical Thinking Skills in terms of Remembering

Remembering	Mean	Description
1. Remembering key parts of the story after reading.	4.29	Very High
2. Retaining and applying prior learning to analyze new information.	4.20	High
3. Recalling and discussing things I've read before when needed.	4.18	High
4. Retaining much of what I learn in school.	3.97	High
5. Recollecting and discussing important points after reading.	4.15	High
OVERALL	**4.16**	**High**

Table 21. Level of Critical Thinking Skills in terms of Understanding

Understanding	Mean	Description
1. Understanding what I read across various topics.	4.16	High
2. Enjoying comparing different opinions for similarities and differences.	4.07	High
3. Finding it easy to express things in my own words.	3.98	High
4. Paying attention to situations, feelings, and clues in conversations.	4.17	High
5. Noticing small or hidden details in what people say or read.	4.12	High
OVERALL	**4.10**	**High**

Table 22. Level of Critical Thinking Skills in terms of Applying

Applying	Mean	Description
1. Liking to share what I just learned with others.	4.20	High
2. Giving plenty of examples to explain things better when I talk.	4.06	High
3. Using real-life examples to explain my beliefs in discussions.	4.21	High
4. Trying to apply what I learn in my everyday life.		
5. Enjoying using what I learn in real situations and sharing it with others.	4.27 4.25	Very High Very High
OVERALL	**4.20**	**High**

Table 23. Summary on Level of Critical Thinking Skills

Indicators	Mean	Description
Analyzing	4.21	High
Evaluating	4.32	Very High
Creating	4.05	High
Remembering	4.16	High
Understanding	4.10	High
Applying	4.20	High
OVERALL	**4.17**	**High**

Level of Critical Thinking Skills among Teacher Education Students. Teacher education students demonstrated high critical thinking skills in analyzing, evaluating, creating, remembering, understanding, and applying, demonstrating their ability to process information, make decisions, and prepare for teaching roles.

Alsaleh (2020) highlighted the importance of critical thinking in evaluating and applying information, aligning with the students' skills. Bezanilla et al. (2019) emphasized evaluation as key for decision-making, which the students showcased.

The students demonstrated strong analytical skills, supporting El Soufi and See's (2019) findings, and applied knowledge effectively in practical contexts, as noted by Mahanal et al. (2019). Their remembering skills, foundational for advanced tasks, were highlighted by Saputra et al. (2019). Lastly, their creative skills in generating innovative solutions supported

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Warsah et al.'s (2021) argument on creativity's role in problem-solving.

Table 24. Significant Relationship between Digital Literacy and Critical Thinking Skills

Variable	Mean	R-Value	P-Value	Decision @=0.05
Digital Literacy	3.98	.750	<.001	**H_o Rejected**
Critical Thinking Skills	4.17			

Correlation between Digital Literacy and Critical Thinking Skills. The study revealed a significant relationship between digital literacy and critical thinking skills among teacher education students. Those with strong digital literacy, including the ability to analyze digital information, demonstrated enhanced skills in evaluating sources and applying knowledge effectively. Kim (2019) highlighted that digital literacy enables assessing source reliability and detecting misinformation. Similarly, Rizaldi et al. (2020) noted that digital literacy fosters deeper content engagement, supporting critical evaluation and problem-solving.

Table 25. Significant Relationship between Information Literacy and Critical Thinking Skills

Variable	Mean	R-Value	P-Value	Decision @=0.05
Information Literacy	4.19	.823	<.001	**H_o Rejected**
Critical Thinking Skills	4.17			

Correlation between Information Literacy and Critical Thinking Skills. The study revealed a significant relationship between information literacy and critical thinking skills. Students with strong information literacy, such as accessing, evaluating, and applying information, excelled in analyzing data, evaluating sources, and solving problems. Silber-Varod et al. (2019) highlighted that critically evaluating information enhances higher-order thinking skills, while Anthonysamy et al. (2020) noted that information literacy fosters questioning and interpreting information critically, strengthening cognitive abilities.

Table 26. Significant Influence between Digital Literacy and Critical Thinking Skills

Independent Variables	Unstandardized Coefficients		Standardized Coefficients	P-Value	Decision @=0.05
	Beta	Std. Error	Beta		
(Constant)	4.172	0.039			
Communication	0.007	0.052	0.008	.900	**H_o Accepted**
Copyright	0.092	0.049	0.126	.063	**H_o Accepted**
Critical Thinking	0.175	0.052	0.231	<.001	**H_o Rejected**
Character	0.048	0.057	0.059	.399	**H_o Accepted**
Citizenship	0.281	0.063	0.310	<.001	**H_o Rejected**
Curation	0.216	0.066	0.238	<.001	**H_o Rejected**
Connectedness	0.028	0.043	0.046	.519	**H_o Accepted**
Creativity	0.032	0.041	0.057	.435	**H_o Accepted**
Collaboration	0.015	0.045	0.023	.742	**H_o Accepted**
Dependent Variable Critical Thinking Skills					

Significant Influence of Digital Literacy on Critical Thinking Skills. The regression analysis revealed that the domains of critical thinking, citizenship, and curation significantly predict teacher education students' critical thinking skills. This leads to the rejection of the null hypothesis, confirming a strong relationship between these domains and critical thinking.

Critical thinking significantly impacts critical thinking skills, aligning with Fikriyati et al. (2022), who highlighted the role of

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analytical and reflective thought in developing critical thinking abilities.

Additionally, Hadi & Anggrasari (2021) supported that ethical technology use fosters reflective thinking, while Tinmaz et al. (2022) highlighted that digital curation improves critical thinking by enhancing the ability to evaluate web content credibility

Table 27. Significant Influence between Information Literacy and Critical Thinking Skills

Independent Variables	Unstandardized Coefficients		Standardized Coefficients	P-Value	Decision @=0.05
	Beta	Std. Error	Beta		
(Constant)	4.172	0.039			
Information Knowledge	0.187	0.055	0.241	<.001	**H_o Rejected**
Information Awareness	0.120	0.063	0.145	.060	**H_o Accepted**
Information Skills	0.230	0.061	0.293	<.001	**H_o Rejected**
Information Morality	0.223	0.058	0.269	<.001	**H_o Rejected**

Dependent Variable
Critical Thinking Skills

Significant Influence of Information Literacy on Critical Thinking Skills. The regression analysis showed that information knowledge and ethical behavior significantly predict teacher education students' critical thinking skills, confirming a strong relationship. Arafa et al. (2021) highlighted that understanding subject matter enhances evaluative abilities. Sulastri et al. (2023) found that ethical information handling fosters a reflective mindset, further supporting this connection.

CONCLUDING REMARKS

In conclusion, the study highlights the significant role of digital literacy and information literacy in predicting critical thinking skills among teacher education students. Critical thinking, citizenship, and curation emerged as significant predictors within digital literacy, while information knowledge, information skills, and information morality were key within information literacy. These findings emphasize the importance of fostering digital and information literacy to enhance students' analytical and evaluative capacities, highlighting the need for targeted educational strategies to further develop critical thinking skills in teacher education programs.

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