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Enhancing active citizenship: Developing assessment tools for digital literacy and critical thinking in Indonesian Civics Education

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ABSTRACT

This study aims to develop instruments to measure digital literacy and critical thinking skills within the Civics Education course, addressing the challenge of assessing these essential competencies in the context of modern education. As digital literacy and critical thinking become increasingly crucial for active citizenship, there is a lack of comprehensive and reliable tools to evaluate these skills effectively. The research employs a development method using the 4D model, consisting of four phases: Define, Design, Develop, and Disseminate. In the Define phase, the competencies to be assessed were clearly identified. In the Design phase, the instruments were crafted based on specific indicators of digital literacy and critical thinking. The Develop phase involved testing the reliability and validity of the instruments, while the Disseminate phase prepared the instruments for broader use. The critical thinking instrument was found to have excellent internal consistency, with a Cronbach's Alpha of 0.908. However, certain items exhibited low item-total correlations, indicating that revisions were necessary. This study contributes to filling the gap in Civics Education by providing a reliable and valid tool for evaluating digital literacy and critical thinking, ultimately supporting the enhancement of students' competencies in these crucial areas for active and informed citizenship.

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INTRODUCTION

In today's digital era, digital literacy and critical thinking skills have become fundamental competencies in higher education. Digital literacy extends beyond the ability to use digital tools; it also involves a deeper understanding of the social, cultural, political, and educational aspects of digital practices (Mills, 2016). Meanwhile, critical thinking plays a crucial role in enabling students to analyze information, make data-driven decisions, and develop problem-solving skills (Zobish & Swanson, 2015).

Digital literacy is defined as the ability to access, evaluate, and effectively use digital information (Haliq et al., 2023). Digital literacy requires interpretative and creative skills across various digital texts (Dort & Gough, 2023), and the importance of data security, information protection, and ethical considerations in digital spaces (Nazarova & Nazarov, 2021). In the context of Civics Education, digital literacy plays a crucial role in shaping digitally aware citizens. The integration of digital technology in learning environments influences how students access information while also impacting social behaviors, self-efficacy, and motivation (Hue et al., 2019).

According to Reyes and Cruz (2021), strong digital literacy enhances communication, collaboration, and engagement in digital communities. Several models have been developed to measure students' digital literacy, including the DIGCOMP Project, Krumsvik's model, TPACK framework, ISTE standards, and the P21 model (Pérez-Escoda et al., 2019). These models emphasize key dimensions such as information literacy, communication, digital content creation, cybersecurity, and problem-solving (Sanchez-Londono et al., 2022). Within higher education, quantitative and qualitative assessment strategies are essential for providing a comprehensive evaluation of digital literacy competencies (Gómez-Galán et al., 2021).

Critical thinking is a key factor in enhancing learning quality in higher education. According to Elder, it involves rational evaluation of information, challenging assumptions, and making decisions based on credible evidence (Elder, 2022). Critical thinking is not merely related to intelligence but is essential for overcoming cognitive biases and shaping rational thought processes (Halpern & Dunn, 2021).

The development of an assessment instrument for digital literacy and critical thinking in Civics Education is grounded in theoretical perspectives that emphasize cognitive, pedagogical, and technological competencies. Digital literacy is no longer confined to the ability to use digital tools; it also encompasses interpretative, ethical, and critical aspects (Mills, 2016). Meanwhile, critical thinking is fundamental in evaluating arguments, solving problems, and fostering civic engagement (Halpern & Dunn, 2021). The theoretical foundation for this study is built upon well-established models and frameworks, including the Digital Competence Framework (DIGCOMP), the Technological Pedagogical Content Knowledge (TPACK) model, the Watson-Glaser Critical Thinking Model, Dewey's "Creative Democracy" Concept, and Constructivist and Experiential Learning Theories. These models provide the basis for designing a comprehensive instrument that measures students' competencies in both digital literacy and critical thinking skills within the context of Civics Education.

Digital literacy is defined as the ability to access, evaluate, and effectively use digital information (Haliq et al., 2023). Mills expands this definition by integrating multimodal, social, and cognitive competencies within digital environments (Mills, 2016). Digital literacy also requires interpretative and creative skills across various digital texts (Dort & Gough, 2023), while Nazarova and Nazarov emphasize the importance of ethical considerations and data security (Nazarova & Nazarov, 2021). Several theoretical models underpin digital literacy research. The DIGCOMP Framework (Pérez-Escoda et al., 2019), developed by the European Commission, outlines five key dimensions: information and data literacy, communication and collaboration, digital content creation, safety and security, and problem-solving. Similarly, the TPACK model (Gayyur, 2021) integrates technology, pedagogy, and subject content knowledge to ensure effective digital learning experiences. In the context of Civics Education, this model highlights the ethical use of digital tools in fostering civic engagement and critical inquiry. Another relevant framework is the Digital Literacy and Social Learning Theory (Zulmaulida et al., 2018), which posits that digital literacy is a social practice where students construct knowledge through digital interaction. Reyes and Cruz (2021) further argue that digital literacy requires collaborative learning strategies, particularly in higher education settings. Additionally, Krumsvik's Digital Competence Model (Pérez-Escoda et al., 2019) highlights pedagogical digital literacy, emphasizing technological proficiency, ethical awareness, and educational integration.

Critical thinking is an essential cognitive skill that enables individuals to objectively analyze, interpret, and evaluate information. Halpern and Dunn (2021) highlight that critical thinking extends beyond intelligence, as it helps individuals overcome cognitive biases and develop rational thought processes. Several theoretical approaches guide critical thinking assessment. The Watson-Glaser critical thinking model (Zulmaulida et al., 2018; Suarniati et al., 2019) defines five components of critical thinking: inference, recognizing assumptions, deduction, interpretation, and evaluation of arguments. Meanwhile, Dewey's "Creative Democracy" Theory (Burman, 2008; Dewey, n.d.) emphasizes that critical thinking is fundamental for democratic participation,

fostering active engagement, problem-solving, and reflective learning. Thorkelsdóttir (2018) conceptualizes critical thinking as an evaluative and procedural process that enables students to challenge assumptions and improve decision-making. Additionally, constructivist and experiential learning theories (Almulla, 2020; Sukhanova, 2022) suggest that learning is actively constructed through social interactions and real-world problem-solving. These theories encourage self-regulation, metacognition, and ethical reasoning. Backwards design and pedagogical strategies should be systematically integrated into curriculum design to strengthen students' critical thinking abilities (Sanchez-Londono et al., 2022). Their approach involves defining learning goals, designing authentic assessments, and developing instructional strategies.

Despite extensive research on digital literacy and critical thinking as separate constructs, there remains a significant gap in integrating these competencies into a unified measurement tool for Civics Education. Current assessment frameworks tend to focus exclusively on digital literacy's technical aspects or critical thinking's cognitive dimensions without addressing their synergistic relationship (Sanchez-Londono et al., 2022). A well-rounded Civics Education curriculum requires both digital literacy and critical thinking skills to ensure students can navigate complex digital ecosystems, critically assess online information, and participate meaningfully in digital democracy. Sillat et al. (2021) highlight the necessity of multidimensional digital literacy models that incorporate analytical reasoning, ethical considerations, and collaborative learning. A reflective decision-making model, based on Dewey's principles, strengthens problem-solving and critical engagement in democratic processes (Muraro, 2016). By integrating digital literacy assessment models such as DIGCOMP, TPACK, and Krumsvik's framework with critical thinking measurement frameworks such as the Watson-Glaser Assessment and the Delphi Report, this research seeks to develop a comprehensive, validated instrument that can accurately measure both competencies simultaneously. This integration will provide a holistic evaluation framework for educators to design curricula that enhance students' digital citizenship and analytical reasoning skills.

This study is firmly grounded in digital literacy and critical thinking theories, incorporating models such as DIGCOMP, TPACK, Watson-Glaser, and Dewey's democracy theory. By addressing the critical gap in integrating these two competencies into a single, validated instrument tailored for Civics Education, the research contributes to curriculum development in higher education, pedagogical strategies for fostering critical engagement, and standardized assessment tools for digital literacy and critical thinking. Leveraging established theoretical models, the study aims to provide an evidence-based, comprehensive measurement instrument that will support students, educators, and policymakers in enhancing civic participation and digital competency in academic settings.

In the context of Civics Education, critical thinking is indispensable for assessing social, political, and legal issues (Suhendi et al., 2021). Students with strong critical thinking skills can analyze public policies, understand their civic responsibilities, and engage in academic discourse constructively (Thorkelsdóttir, 2018). Dewey's "creative democracy" philosophy highlights the role of critical thinking in developing a more reflective and participatory society (Wattimena, 2018).

While existing studies have explored digital literacy and critical thinking in higher education, a major gap remains in developing a holistic, validated measurement instrument that integrates both competencies within Civics Education courses. Most current assessment tools either focus solely on technical aspects of digital literacy or cognitive elements of critical thinking, without considering the synergistic relationship between these skills in shaping students' competencies (Deo & Hölttä-Otto, 2024; Sanchez-Londono et al., 2022; Tang et al., 2024). While many studies have examined digital literacy and critical thinking separately in higher education, few have developed integrated tools for assessing both within Civics Education. Most existing instruments isolate either technical digital skills or cognitive reasoning, neglecting their combined impact on student competencies.

Therefore, this study aims to develop and validate a comprehensive instrument for measuring digital literacy and critical thinking skills among university students in Civics Education courses. By employing expert validation and field testing, this study seeks to produce a reliable evaluation tool that can contribute to curriculum improvement and enhance digital citizenship competencies.

The significance of this study lies in its integration of digital literacy and critical thinking within the framework of Civics Education, providing a novel approach to assessing and improving students' skills in the digital era. Existing assessment models often treat these competencies as separate constructs, failing to recognize their synergistic impact on students' academic and civic engagement (Nazarova & Nazarov, 2021). This research bridges that gap by developing a dual-measurement instrument that evaluates both technological competencies and analytical reasoning, which are essential for digital citizens in democratic societies (Mortari & Ubbiali, 2021).

Furthermore, this study contributes to advancing digital education frameworks by incorporating a multidimensional evaluation approach. While previous models like DIGCOMP and TPACK (Pérez-Escoda et al., 2019), focus primarily on technical and pedagogical integration, this research extends these frameworks to include ethical, collaborative, and problem-solving aspects of digital literacy (Gómez-Galán et al., 2021). The validated instrument developed in this study can serve as a benchmark for assessing students' readiness for digital participation in educational, social, and professional environments (Dort & Gough, 2023). Lastly, this research has practical implications for policy development in higher education. As universities transition towards blended and online learning, there is an increasing demand for standardized evaluation tools that assess students' digital competencies beyond technological proficiency (Reyes & Cruz, 2021). The findings from this study can inform curriculum designers and educators on how to structure digital literacy and critical thinking training, ensuring that students acquire the skills necessary for critical engagement in digital democracy (Thorkelsdóttir, 2018). By developing a robust measurement tool, this study provides a foundation for future research on the intersection of digital literacy, critical thinking, and civic engagement in higher education, reinforcing the need for updated pedagogical and curriculum strategies.

METHOD

The research methodology employed in this study follows a quantitative research approach with a developmental research design, utilizing the 4D Model (Define, Design, Develop, and Disseminate) to construct and validate an instrument for assessing critical thinking and digital literacy skills in Civics Education courses. The research process consists of two key validation phases: expert validation to ensure content validity and reliability testing using SPSS to measure internal consistency based on student responses. This systematic approach ensures that the developed instrument meets the required psychometric standards for validity and reliability.

As presented in Figure 1, the research begins with the Define Phase, where a literature review and needs analysis were conducted to identify gaps in existing assessment tools for digital literacy and critical thinking. This phase involved reviewing prior research and analyzing key theoretical models, including DIGCOMP (Digital Competence Framework), TPACK (Technological Pedagogical Content Knowledge), Watson-Glaser Critical Thinking Model, and Dewey's Civic Engagement Theory. The findings from this phase informed the construction of research variables and operational indicators necessary for designing the instrument.

Following the Define Phase, the Design Phase was carried out to develop the initial version of the instrument. The instrument was structured based on key constructs derived from established theoretical frameworks, ensuring alignment with the skills and competencies required for Civics Education. The instrument was designed using a Likert-scale format to capture students' proficiency in digital literacy and critical thinking.

After the design phase, the Develop Phase was initiated, which consisted of two main stages: expert validation and reliability testing. In the expert validation stage, a panel of five experts specializing in educational measurement, digital literacy, and critical thinking reviewed the instrument for content validity, clarity, relevance, and linguistic accuracy. Experts assessed the quality of the items and provided feedback on their alignment with theoretical constructs. A three-stage review process was conducted, beginning with an initial assessment, followed by revisions based on expert feedback, and concluding with a final review to confirm the validity of the instrument.

Once the instrument passed the expert validation phase, it was tested on 140 undergraduate students enrolled in Civics Education courses. The collected responses were analyzed using SPSS software to assess the instrument's internal reliability. Cronbach's Alpha was calculated to determine internal consistency, with a threshold of ≥0.7 set as the minimum benchmark for reliability. Additionally, corrected item-total correlations were examined to identify items with low discrimination values (<0.30), which were either revised or removed to enhance the instrument's psychometric properties (Kumar, 2024).

The final phase, the Disseminate Phase, involved refining the validated instrument based on the reliability analysis results and content validity tools. The final version of the instrument was structured to provide a standardized assessment tool for measuring digital literacy and critical thinking skills in higher education.

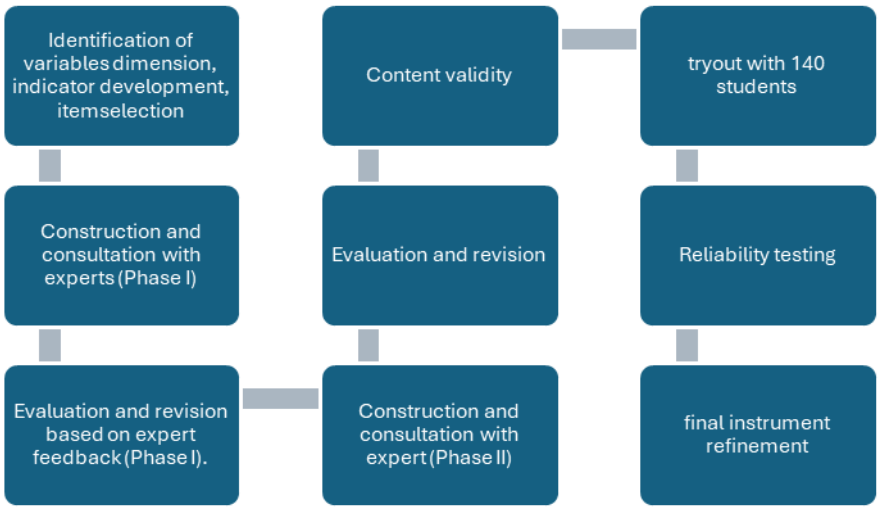

Figure 1. Instrument Development Process

FINDINGS AND DISCUSSION

The process began by defining the conceptual framework and determining measurable constructs. Relevant theoretical models such as DIGCOMP, TPACK, and the Watson-Glaser Critical Thinking model guided the selection of dimensions and indicators. From this foundation, preliminary items were generated based on each indicator.

In the second step, draft instruments were developed using a Likert-scale format and then reviewed by educational experts specializing in digital literacy and critical thinking. This early consultation ensured alignment with theoretical models and curricular goals. In the third step, expert feedback informed several modifications to item clarity, relevance, and alignment. Some items were reworded or replaced to better reflect the intended cognitive processes or digital competencies. In the fourth step, a structured content validity process was carried out with five experts using a three-stage review: initial assessment, revision, and final confirmation. This ensured that each item adequately represented the intended construct. Here are the results of the sixth step to the ninth step.

Critical Thinking Instrument

The validation and testing process of the Critical Thinking Skills Instrument followed a rigorous methodological approach to ensure its reliability and validity. The instrument initially consisted of 50 items, which were refined through expert validation, resulting in a final 30-item version. The revised instrument was subsequently administered to 140 undergraduate students enrolled in Civics Education courses to evaluate its psychometric properties, particularly its internal consistency as measured by Cronbach's Alpha.

Table 1. Reliability Test Result for the Critical Thinking Instrument

Cronbach's Alpha	Number of Items	Criteria
0.908	**30**	**0.25**

Item		Scale Mean if Item Deleted	Scale Variance if Item Deleted	Item Discrimination	Cronbach's Alpha if Item Deleted
No	Difficulty			(Corrected Item-Total Correlation)	
1	3.84	119.49	144.49	0.30	**0.910**
2	3.90	119.43	140.34	0.46	**0.907**
3	4.31	119.01	143.64	0.44	**0.907**
4	4.26	119.07	141.81	0.47	**0.907**
5	4.43	118.90	145.71	0.28	**0.909**
6	3.83	119.50	142.69	0.43	**0.907**
7	4.07	119.26	143.21	0.41	**0.908**
8	4.17	119.16	138.63	0.59	**0.905**
9	4.33	119.00	141.57	0.60	**0.905**
10	4.30	119.03	141.62	0.52	**0.906**
11	4.26	119.07	139.84	0.65	**0.904**
12	4.03	119.30	137.84	0.55	**0.905**
13	3.73	119.60	137.08	0.57	**0.905**
14	3.97	119.36	137.60	0.68	**0.903**
15	4.26	119.07	139.49	0.57	**0.905**
16	4.21	119.11	140.19	0.58	**0.905**
17	4.17	119.16	140.02	0.65	**0.904**
18	4.36	118.97	143.42	0.36	**0.909**
19	4.46	118.87	140.78	0.63	**0.905**
20	4.11	119.21	142.69	0.43	**0.907**
21	3.83	119.50	140.80	0.50	**0.906**
22	3.97	119.36	140.06	0.44	**0.908**
23	3.97	119.36	144.29	0.25	**0.911**
24	3.84	119.49	140.28	0.46	**0.907**
25	3.96	119.37	140.06	0.53	**0.906**
26	4.06	119.86	144.15	0.62	**0.909**
27	4.29	119.66	145.70	0.64	**0.909**
28	4.44	119.51	147.57	0.42	**0.912**
29	4.10	119.83	148.02	0.39	**0.912**
30	3.87	120.15	144.29	0.34	**0.916**

The reliability analysis using Cronbach's Alpha (Table 1) revealed a coefficient of 0.908, which exceeds the commonly accepted threshold of 0.70 for internal consistency (Vos et al., 2016). This high reliability score indicates that the instrument demonstrates strong internal consistency and is suitable for measuring critical thinking skills within an educational context. Furthermore, the corrected item-total correlation values ranged from 0.25 to 0.68, demonstrating that most items contributed positively to the overall instrument reliability. However, Item 5 (0.28) and Item 23 (0.25) had relatively lower item discrimination values, suggesting the need for further refinement or potential removal in future studies. The results are presented in a chart shown in Figure 2, Figure 3, and Figure 4.

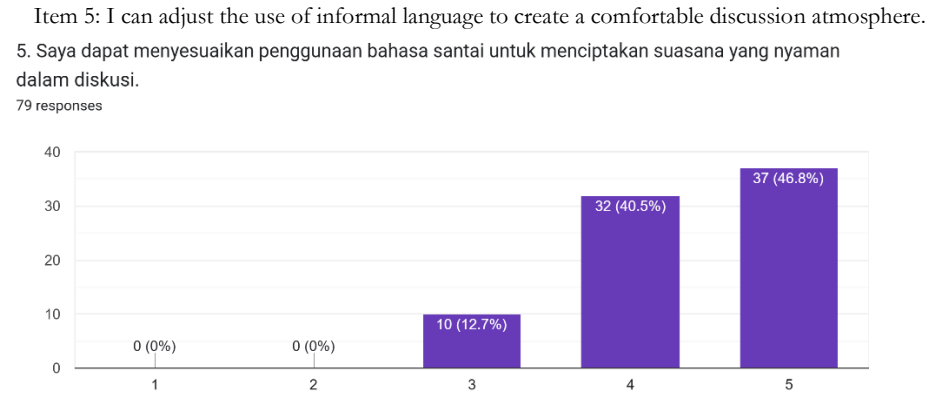

Figure 2. Item Number 5 for Further Refinement

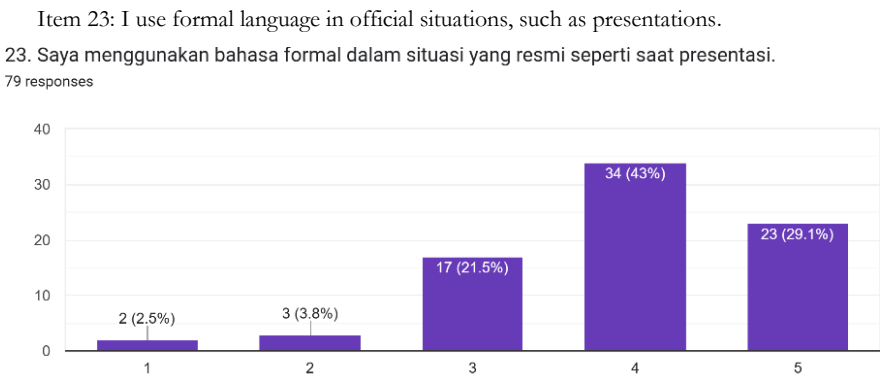

Figure 3. Item Number 23 for Further Refinement

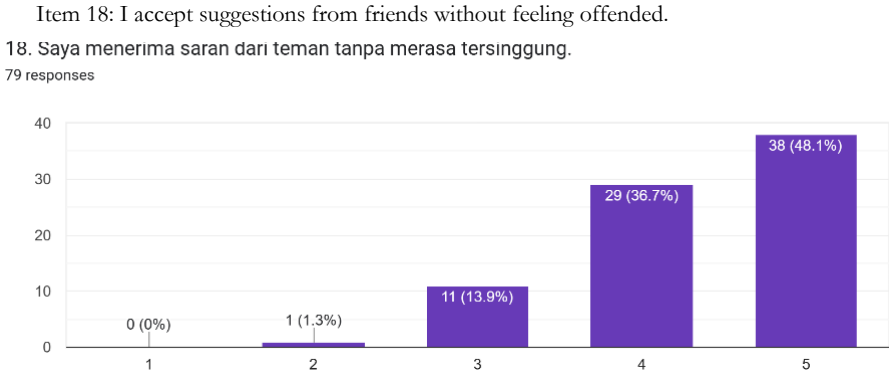

Figure 4. Item Number 18 for Further Refinement

Item 5: Adjusting Language Use for Comfortable Discussion

"Saya dapat menyesuaikan penggunaan bahasa santai untuk menciptakan suasana yang nyaman dalam diskusi." (I can adjust the use of informal language to create a comfortable discussion atmosphere.)

The response distribution indicates that the majority of students strongly agreed (46.8%) or agreed (40.5%), with only 12.7% responding neutrally. Notably, no participants selected "Strongly Disagree" or "Disagree". This lack of variance in responses suggests that this item does not effectively differentiate between students with higher and lower critical thinking skills. In an instrument designed to measure critical thinking, this item may not be relevant, as it focuses more on linguistic adaptability rather than analytical reasoning, evaluation, or argumentation skills (Halpern & Dunn, 2021). Consequently, its inclusion may not provide meaningful insights into students' higher-order thinking abilities, justifying its removal.

Item 18: Receiving Feedback without Feeling Offended

"Saya menerima saran dari teman tanpa merasa tersinggung." (I accept suggestions from friends without feeling offended.)

The response distribution shows that the vast majority of students strongly agreed (48.1%) or agreed (36.7%), with only a small percentage responding neutrally (13.9%) and a negligible number selecting disagreement (1.3% for "Disagree"; 0% for "Strongly Disagree"). The low variation in responses implies that this item does not adequately distinguish between different levels of critical thinking skills.

Critical thinking, as defined in the Watson-Glaser model, involves evaluative judgment, logical reasoning, and problem-solving (Zulmaulida et al., 2018). While emotional intelligence and receptiveness to feedback are important for collaborative learning, they do not directly measure analytical, interpretive, or inferential reasoning skills, which are core components of critical thinking (Sánchez-Londono et al., 2022). The consistency in high agreement across respondents suggests that this item is not discriminative enough for inclusion in the final instrument.

Item 23: Use of Formal Language in Official Situations

"Saya menggunakan bahasa formal dalam situasi yang resmi seperti saat presentasi." (I use formal language in official situations, such as presentations.)

The response pattern reveals that 43% of students agreed, 29.1% strongly agreed, and 21.5% responded neutrally, with only a small fraction expressing disagreement (3.8% "Disagree"; 2.5% "Strongly Disagree"). Similar to Item 5, this item primarily measures linguistic competency and adherence to formal conventions rather than critical thinking skills. The low dispersion of responses and its focus on language rather than cognitive evaluation suggest that it does not align well with the construct of critical thinking.

According to research on critical thinking assessment, effective items should challenge students to analyze, synthesize, as well as critically evaluate information (Gómez-Galán et al., 2021). Since this item does not require students to engage in logical reasoning, argumentation, or critical evaluation, it may not contribute significantly to assessing students' critical thinking capacity.

The results of the Cronbach's Alpha if Item Deleted analysis indicate that the removal of any single item would have a minimal effect on the overall reliability, with values remaining above 0.90 in all cases. This suggests that the 30-item instrument is robust and well-structured, supporting its applicability in assessing students' critical thinking skills in Civics Education courses. Similar findings have been reported in studies utilizing the Watson-Glaser Critical Thinking Model, where well-constructed assessment instruments tend to exhibit high internal consistency and strong psychometric properties (Halpern & Dunn, 2021).

Table 2. Reliability Test for Digital Literacy Instrument

Cronbach's Alpha	Number of Items	Criteria
0.908	48	0.25

Item		Scale Mean if Item Deleted	Scale Variance if Item Deleted	Item Discrimination (Corrected Item-Total Correlation)	Cronbach's Alpha if Item Deleted
No	Difficulty				
1	3.69	185.08	327.63	0.44	0.906
2	4.01	184.75	328.43	0.43	0.906
3	3.10	185.66	333.78	0.15	0.911
4	3.64	185.13	330.93	0.28	0.908
5	3.86	184.91	328.48	0.35	0.907
6	3.57	185.19	323.82	0.52	0.905
7	4.14	184.62	325.47	0.61	0.904
8	4.12	184.65	328.18	0.48	0.905
9	2.65	186.12	351.50	-0.23	0.916
10	4.21	184.56	327.28	0.47	0.906
11	4.61	184.16	329.29	0.59	0.905
12	4.26	184.51	321.83	0.56	0.904
13	4.12	184.65	328.26	0.40	0.906
14	4.14	184.62	325.50	0.58	0.904
15	2.83	185.94	328.04	0.30	0.908
16	3.86	184.91	323.16	0.43	0.906
17	3.97	184.79	331.80	0.38	0.906
18	4.17	184.60	330.77	0.48	0.906
19	4.13	184.64	328.79	0.50	0.905
20	4.14	184.62	327.47	0.52	0.905
21	4.18	184.58	324.33	0.60	0.904
22	4.34	184.43	330.96	0.37	0.906
23	4.12	184.65	329.73	0.53	0.905
24	4.25	184.52	334.70	0.29	0.907
25	4.43	184.34	329.23	0.53	0.905
26	4.57	184.58	322.56	0.22	0.903
27	4.38	184.79	316.22	0.48	0.901
28	3.86	185.31	312.33	0.45	0.900
29	3.74	185.47	312.59	0.41	0.901
30	4.19	184.99	315.62	0.42	0.901
31	4.32	184.79	314.93	0.52	0.900
32	4.03	185.11	315.48	0.41	0.901
33	4.53	184.63	318.10	0.50	0.901
34	4.18	185.00	313.94	0.50	0.900
35	4.21	184.96	318.27	0.43	0.901
36	3.74	185.43	320.02	0.21	0.904
37	3.74	185.47	312.99	0.38	0.901
38	3.39	185.78	317.53	0.27	0.903
39	4.05	185.10	315.22	0.35	0.902
40	3.00	186.15	313.46	0.33	0.902
41	3.25	185.93	310.18	0.38	0.902
42	3.32	185.86	309.08	0.48	0.900
43	3.44	185.79	312.05	0.35	0.902
44	3.73	185.49	310.51	0.48	0.900
45	4.27	184.89	317.71	0.45	0.901
46	3.95	185.25	315.63	0.39	0.901

Interpretation of Item Discrimination Values

Item discrimination values provide insight into how well each item differentiates between students with higher and lower critical thinking abilities. In this study, most items demonstrated moderate to high discrimination, with values ranging between 0.30 and 0.68. Items with higher discrimination values, such as Item 14 (0.68), Item 11 (0.65), and Item 17 (0.65), suggest that these questions are particularly effective in distinguishing between students with varying levels of critical thinking proficiency. These findings align with prior research emphasizing the importance of highly discriminative test items in accurately assessing cognitive abilities and higher-order thinking skills (Zulmaulida et al., 2018).

Implications for Civics Education

The findings of this study provide significant implications for Civics Education curriculum development. As highlighted in Dewey's creative democracy theory, critical thinking is essential for analyzing social, political, and legal issues (Dewey, 1916; Thorkelsdóttir, 2018). The validated critical thinking skills instrument developed in this study can serve as a standardized tool for evaluating students' analytical reasoning, inference skills, and logical decision-making in civic engagement contexts.

Moreover, the integration of experiential learning approaches, such as problem-based learning and digital literacy integration, can further enhance students' ability to critically evaluate information, challenge assumptions, and construct informed arguments (Gómez-Galán et al., 2021). The high reliability of the instrument suggests that it can be effectively used by educators to assess students' critical thinking growth over time, ultimately contributing to more reflective and active participation in democratic societies.

Digital Literacy Instrument

The validation and testing of the digital literacy instrument in Civics Education followed a structured methodological approach to ensure its validity and reliability. The instrument, initially composed of 46 items, was administered to 140 students, with its internal consistency assessed using Cronbach's alpha. The analysis yielded a high reliability coefficient (0.908), indicating strong internal consistency across the items. However, a detailed evaluation of item discrimination values and corrected item-total correlations highlights areas for refinement and potential revision.

Instrument Reliability Analysis

The Cronbach's Alpha coefficient of 0.908 surpasses the commonly accepted threshold of 0.70, confirming that the instrument exhibits high internal reliability. The corrected item-total correlation values range from 0.21 to 0.61, with most items demonstrating acceptable values ($\geq$ 0.30). However, several items, particularly Items 3, 9, 15, 24, 26, 36, and 38, exhibit lower discrimination values ($<$0.30), indicating limited effectiveness in differentiating students with varying levels of digital literacy skills.

The Cronbach's Alpha if Item Deleted values indicate that removing poorly discriminating items could lead to marginal improvements in overall reliability. For instance, Item 9 has a negative discrimination value (-0.23), suggesting that it does not contribute effectively to the overall construct of digital literacy. Similarly, Items 3 (0.15), 26 (0.22), 36 (0.21), and 38 (0.27) present low item-total correlations, indicating weak alignment with the digital literacy construct.

Item Discrimination and Areas for Refinement

Item discrimination is crucial in ensuring that each item effectively differentiates students based on their digital literacy proficiency. As shown in Table 2, the results reveal that high-discrimination items, such as Item 7 (0.61), Item 11 (0.59), and Item 21 (0.60), contribute significantly to the instrument's ability to assess digital literacy competencies. These items align with

established digital literacy frameworks such as DIGCOMP and TPACK, which emphasize information evaluation, digital collaboration, and digital problem-solving. The novelty of this study lies in its methodical refinement of a dual-competency assessment instrument through detailed item discrimination analysis. By examining the ability of each item to differentiate between students with varying levels of digital literacy and critical thinking, the research moves beyond general reliability metrics. Items such as Item 9 (digital literacy) and Item 5 (critical thinking), which demonstrated low or even negative discrimination, were not only flagged statistically but also re-evaluated conceptually. This level of scrutiny ensures that every retained item meaningfully contributes to the construct being measured, an approach rarely employed in prior studies that often overlook individual item behavior within complex competencies. Moreover, the decision to revise or eliminate poorly discriminating items reflects an innovative commitment to psychometric precision and content relevance. Unlike traditional instruments that may conflate social-emotional traits with cognitive skills, this study carefully distinguishes between the two. For example, items related to linguistic politeness or emotional receptiveness, although important in collaborative learning, were found to lack direct alignment with critical thinking constructs. By refining these items, the research enhances the theoretical and empirical validity of the instrument, offering a novel, context-specific tool that supports more accurate assessment of students' readiness for digital citizenship and civic engagement.

Conversely, Items 3, 9, and 36, which demonstrate low or negative discrimination, require further scrutiny. Low discrimination values may arise due to ambiguous wording, difficulty misalignment, or a lack of variation in student responses. Items with low discrimination scores often fail to capture essential competencies and can introduce measurement errors. The presence of Item 9 with a negative discrimination value (-0.23) suggests that this item may confuse respondents or assess an unrelated concept, justifying its potential removal or revision.

Additionally, Item 26 (0.22), Item 15 (0.30), and Item 24 (0.29) present relatively weak discrimination values, indicating low contribution to the instrument's overall ability to assess digital literacy. These items may require rewording to enhance clarity, alignment with core digital literacy constructs, or removal if they do not contribute to differentiating student proficiency levels.

CONCLUSION

This study successfully answered the research question by developing and validating a dual-measurement instrument capable of assessing students' digital literacy and critical thinking skills in the context of Civics Education. The rigorous multi-phase development process, combining theoretical grounding, expert validation, and psychometric analysis, ensured that the instrument possesses both construct validity and strong internal consistency. As a recommendation, future studies are encouraged to expand the sample across diverse institutions and learning modalities to further test the instrument's generalizability. Moreover, qualitative approaches such as interviews or scenario-based tasks may complement the instrument's diagnostic depth. The implications of this research are significant for curriculum designers, educators, and policymakers, as it provides a robust tool to measure essential 21st-century competencies and to guide instructional practices that cultivate digital citizenship and critical civic engagement among university students.

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DISCLOSURE STATEMENT

The authors declare that although this research is funded by an educational institution, there is no conflict of interest that may interfere with the objectivity of the study.

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ETHICS APPROVAL

The informed consent for research participants was secured. All data analysis was conducted in accordance with data privacy guidelines and best practices for data security. Therefore, all data collected during the study were used only for the purpose of research, and it is guaranteed that the results of the study will not cause any harm to the research participants.

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