

HUMAN-CENTRED DIGITAL COMMUNICATION LITERACY AMONG VOCATIONAL HIGH SCHOOL STUDENTS: A CROSS- SECTIONAL ANALYSIS OF KNOWLEDGE, ATTITUDES, AND SCENARIO-BASED JUDGMENT

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Abstract

Digital literacy extends beyond technical proficiency to encompass ethical awareness, empathy, contextual communication, privacy, and responsible decision-making in digital environments. This study examined human-centred digital communication literacy among vocational high school students through three dimensions: knowledge, self-reported attitudes, and scenario-based judgment. A cross-sectional survey was administered to 154 students using an instrument comprising 10 knowledge questions, 15 four-point Likert-scale attitude statements, and five digital communication scenarios. The data were analysed using descriptive statistics, internal-consistency analysis, item-level examination, and Spearman's rank correlation. The results indicated high knowledge scores ($M = 9.77$ out of 10) and scenario-based judgment scores ($M = 4.93$ out of 5), while attitudes toward human-centred digital communication showed greater variation ($M = 3.34$ out of 4). Knowledge, attitudes, and scenario-based judgment were positively but weakly associated, with Spearman's coefficients ranging from 0.186 to 0.271. However, 86.4% of the participants achieved the maximum knowledge score, and 94.8% achieved the maximum scenario-based judgment score, indicating substantial ceiling effects. These findings suggest that students demonstrated strong awareness of appropriate digital communication principles, including clarity, empathy, digital ethics, privacy, and responsible artificial intelligence use. Nevertheless, the limited score variation indicates that conventional correct–incorrect questions and relatively straightforward scenarios may be insufficiently sensitive to distinguish different levels of digital communication competence. Digital literacy education should therefore incorporate more complex, context-sensitive, and authentic assessments that evaluate not only what students know and report, but also how they reason through ambiguous digital communication situations.

Keywords: Digital Literacy; Digital Communication; Vocational Students; Digital Ethics; Scenario-Based Judgment

1. Introduction

The use of digital technology in education has transformed the ways students access information, communicate, and interact with teachers and peers. This transformation requires students not only to possess technical skills, but also to communicate clearly, respectfully, empathetically, safely, and responsibly in digital spaces. Such competence has become an important part of digital literacy, as student's activities increasingly take place through messaging applications, social media, learning platforms, and various artificial intelligence-based services. In practice, however, digital communication competence cannot always be assessed solely through student's knowledge of rules or ethical principles related to technology use. Students may know which response is considered appropriate, but this does not necessarily mean that they demonstrate consistent attitudes or are able to choose suitable actions when facing contextual digital communication situations. Therefore, the assessment of digital communication literacy should include several aspects: what students know, the attitudes they report, and the decisions they make when responding to digital scenarios.

Previous studies on digital citizenship and digital literacy have largely relied on self-report instruments to measure student's perceptions and attitudes. While this approach is valuable, it is not sufficient to fully capture student's ability to apply digital communication principles in specific situations. The use of case studies or scenarios can complement such measurement by providing insight into student's ability to select the response they consider most appropriate. However, the sensitivity of the instrument also needs to be examined, as items that are too easy may produce scores concentrated at

the maximum level and may be less able to distinguish differences in student's competence. Based on these concerns, this study analyses human-centred digital communication literacy among vocational high school students through three dimensions: knowledge, attitudes, and scenario-based judgment. The aspects examined include communication clarity, empathy, politeness, language adjustment, privacy protection, carefulness in sharing information, and responsible use of artificial intelligence. This study aims to describe student's levels across these three dimensions, evaluate the characteristics of the instrument used, and analyse the relationships among knowledge, attitudes, and scenario-based judgment in human-centred digital communication.

Specifically, this study aims to: (1) describe the levels of knowledge, attitudes, and scenario-based judgment related to human-centred digital communication among vocational high school students; (2) evaluate the characteristics of the instrument used to measure these three dimensions; and (3) analyse the relationships among knowledge, attitudes, and scenario-based judgment. The findings are expected to provide empirical evidence on student's digital communication literacy profiles and to serve as a basis for developing more complex, contextual, and authentic digital literacy assessments.

2. Literature Review

The development of digital technology has transformed the ways students access information, communicate, collaborate, and build social relationships. In educational settings, technology use is no longer limited to information retrieval or device operation. It also involves the ability to interact safely, ethically, critically, and responsibly. This condition requires digital literacy to be understood as a multidimensional competence that includes knowledge, skills, attitudes, ethical awareness, and participation in digital environments. Integrative reviews have shown that digital citizenship has been examined across various disciplines, particularly in education, yet its conceptualization and measurement methods remain diverse (Chen et al., 2021).

Digital literacy, therefore, should not be understood merely as the technical ability to operate devices or applications. Students also need to understand the social consequences of digital activities, respect other users, evaluate information critically, protect privacy, and determine appropriate actions when facing problems in online communication. Choi et al. (2017) conceptualize digital citizenship as a construct that includes individual's abilities, perceptions, critical perspectives, and participation in internet-based communities. The development of the Digital Citizenship Scale in their study demonstrates that digital competence has a complex structure and cannot be represented by a single technical indicator (Choi et al., 2017). The social and communicative dimensions of digital literacy have become increasingly important, as many student's interactions now take place through instant messaging, social media, learning platforms, and various forms of computer-mediated communication. In digital communication, the absence or limitation of nonverbal cues may increase the risk of misunderstanding, decontextualized messages, impolite comments, privacy violations, and responses that do not sufficiently consider the emotional state of the recipient. Therefore, human-centred digital communication requires message clarity, politeness, empathy, respect, the ability to take others's perspectives, and awareness of the potential impact of the messages being conveyed.

García-Pérez et al. (2016) identified virtual empathy as an important digital competency in technology-based educational interactions. Empathy in digital spaces allows one to understand another person's perspective and emotional state even when communication is not taking place face-to-face. (García-pérez & Buzón-garcía, 2016). This concept is further supported by Collins et al. (2024), who developed the Digital Communication Empathy Scale to measure empathy experienced in digital communication. The development of this scale shows that digital empathy is a multidimensional construct that may include perspective taking, empathic concern, and emotional responses to other user's experiences (Collins et al., 2024). In addition to empathy, responsible digital communication also requires netiquette, or the ethics of interacting on the internet. Netiquette includes norms related to language use, politeness, respect for communication partners, protection of personal information, and carefulness in sharing information. The systematic review by Soler-Costa et al. (2021) shows that netiquette is closely related to educational contexts, as the integration of technology into learning processes also creates new patterns of social interaction. Therefore, digital education should teach not only how to use media, but also how to behave and communicate appropriately through those media (Soler-costa et al., 2021). These competencies are particularly relevant for vocational high school students. In addition to communicating with teachers and peers, vocational students are being prepared for workplaces that require professional communication through email, instant messaging, social media, collaboration platforms, and digital services. Human-centred digital communication competence may support students in conveying information clearly, responding to criticism, resolving misunderstandings, protecting privacy, and using technology responsibly. In the Indonesian context, Ananto and Kusuma

(2023) found relatively high perceptions and levels of digital citizenship among teachers and students, including respondents from vocational schools. However, high reported competence does not always imply equally strong engagement across all forms of digital activity (Ananto & Kusuma, 2023). One important issue in assessing digital literacy is the possible mismatch between what individuals know, what they report, and what they choose when facing digital situations. Knowledge of the correct action does not necessarily represent consistent attitudes or the ability to apply principles in contextual situations. Hui and Campbell (2018) show that learning digital citizenship does not always align with practising it. Harrison and Polizzi (2022) also demonstrate that adolescent's moral decisions in online incivility and cyberbullying situations are shaped by how they consider rules, consequences, and moral character. These findings highlight the need for digital education that develops reasoning in ambiguous or dilemma-based situations.

Scenario-based assessment may complement knowledge and attitude measures. Through scenarios, students are asked to choose responses in situations such as contacting a teacher, communicating in a class group, commenting on a friend's work, responding to an angry customer, or using artificial intelligence for school assignments. This approach does not measure actual behaviour rather, it provides information about scenario-based judgment, or the ability to identify the most appropriate response in a hypothetical situation. However, an instrument that combines several forms of assessment is not automatically sensitive enough to differentiate levels of competence. Items or scenarios that are too straightforward may produce ceiling effects and reduce the ability of the assessment to distinguish students at medium and high levels of competence.

Chen et al. (2021) found that digital citizenship instruments that are used consistently and supported by strong measurement foundations remain limited. Knowledge items or scenarios that are too simple may produce scores concentrated at the maximum level, making the instrument less sensitive in distinguishing students with moderate and high levels of competence. Therefore, in addition to describing respondent's scores, studies on digital literacy need to examine item difficulty, score variation, internal consistency, and the relationships among the measured dimensions.

Based on this review, two research gaps can be identified. First, studies on student's digital citizenship still largely rely on measurements of self-reported perceptions and attitudes, while the integration of knowledge, attitudes, and scenario-based judgment remains limited. Second, research should not only determine whether students obtain high or low scores, but also examine whether the instruments used are sufficiently sensitive to distinguish different levels of competence. These gaps are important because high scores may indicate strong competence, but they may also be influenced by item difficulty, the clarity of the expected correct answers, and respondent's tendency to provide socially desirable responses. This study seeks to address these gaps by analysing human-centred digital communication literacy among vocational high school students through three dimensions: knowledge, self-reported attitudes, and scenario-based judgment. In this study, human-centred digital communication literacy includes communication clarity, empathy, politeness, language adjustment based on context, privacy protection, carefulness in sharing information, and responsible use of artificial intelligence. This study also evaluates the measurement characteristics of the instrument through item analysis, internal consistency, score distribution, and the relationships among the measured dimensions.

3. Research Methods

3.1. Object, time and Place

This study employed a quantitative cross-sectional design with a descriptive-correlational approach. Data were collected once through an online questionnaire from 154 vocational high school students. The study aimed to describe student's knowledge, attitudes, and scenario-based judgment in human-centred digital communication and to analyse the relationships among these three variables.

3.2. Data Collection Techniques

Knowledge, attitudes, and scenario-based judgment were measured using questionnaire data. The instrument consisted of 10 knowledge questions on human-centred digital communication, 15 four-point Likert-scale statements measuring digital communication attitudes and habits, and five scenario-based questions. The scoring process was based on three main variables: digital communication knowledge, attitudes toward human-centred digital communication, and scenario-based judgment. Knowledge items were scored 1 for correct answers and 0 for incorrect answers. The attitude items were scored on a scale of 1 to 4, and reverse scoring was applied to negatively worded items. The scenario-based items were scored 1 for the most appropriate response and 0 for other responses.

Table 1. Questionnaire items

Component	Number of items	Scoring	Main aspects / examples
Knowledge	10 multiple-choice items	Correct = 1; incorrect = 0; total score 0-10	Human-centred technology, effective digital communication, empathy, digital ethics, responsible AI use, and “THINK before you post”.
Attitudes and digital communication habits	15 Likert-scale statements	1 = strongly disagree to 4 = strongly agree; three negatively worded items were reverse-scored	Clarity, completeness of messages, empathy, politeness toward teachers and peers, privacy, careful sharing, and responsible AI-assisted learning.
Scenario-based judgment	5 digital communication scenarios	Most appropriate response = 1; other responses = 0; total score 0-5	Chatting with a teacher, classroom WhatsApp group, social media comment, angry internet customer, and use of AI for school assignments.

3.3. Data Analysis Techniques

The data were analysed through data cleaning, scoring, descriptive analysis, instrument quality evaluation, and examination of relationships among variables. Data cleaning was conducted to ensure the completeness of responses, the consistency of answer formats, and the presence of unusual response patterns. Straightlining was identified when a respondent selected the same answer category for all attitude items. These responses were not automatically removed but were flagged for sensitivity analysis. Descriptive statistics were used to describe respondent’s characteristics and the distribution of knowledge, attitude, and scenario-based judgment scores. The reported statistics included frequency, percentage, mean, standard deviation, median, interquartile range, minimum, and maximum values. The quality of the knowledge and scenario items was examined using the difficulty index, calculated as the proportion of respondents who answered correctly. Corrected item-total correlations were used to examine the consistency of each item with its overall construct.

Internal consistency was analysed using Cronbach’s alpha. The score distribution was also examined to identify ceiling effects, defined as the percentage of respondents who obtained the maximum score. A ceiling effect was considered noteworthy when more than 15% of respondents achieved the maximum score. Relationships among knowledge, attitudes, and scenario-based judgment were analysed using Spearman rank correlation. This nonparametric technique was selected because the knowledge and scenario scores were not normally distributed, were concentrated at the maximum values, and contained many tied scores. Statistical significance was set at $p < 0.05$. Because the study used a cross-sectional design, statistically significant correlations were interpreted as associations rather than causal relationships. Sensitivity analysis was conducted by recalculating descriptive statistics, reliability, and correlations after excluding responses flagged for straightlining.

4. Results and Discussion

4.1. Level of Knowledge, Attitudes, and Scenario-based Judgment

The first objective of this study was to describe student’s knowledge, attitudes, and scenario-based judgment in human-centred digital communication. The descriptive statistics for the three variables are presented in Table 2.

Table 2. Descriptive statistics of the research variables

Variable	Mean	SD	Median	Q1-Q3	Minimum-Maximum
Knowledge	9,77	0,72	10,00	10,00-10,00	5-10
Attitudes	3,34	0,61	3,47	3,00-3,80	1,13-4,00
Scenario-based judgment	4,93	0,35	5,00	5,00–5,00	2–5

The results show that students obtained very high knowledge scores, with a mean of 9.77 out of 10. A total of 133 students, or 86.4%, achieved the maximum knowledge score. The proportion of correct answers for each knowledge item ranged from 92.2% to 99.4%. This finding indicates that most students were able to recognise basic principles of human-centred digital communication, including clear

communication, politeness, empathy, digital ethics, privacy protection, and responsible use of artificial intelligence.

Scenario-based judgment scores were also very high, with a mean of 4.93 out of 5. A total of 146 students, or 94.8%, answered all scenario items correctly. The proportion of correct responses for each scenario ranged from 97.4% to 99.4%. This finding suggests that students were generally able to identify responses considered appropriate in situations involving communication with teachers, classmates, social media users, customers, and the use of AI for learning tasks.

Although knowledge and scenario-based judgment scores were very high, the attitude scores showed greater variation. The mean attitude score was 3.34 out of 4, indicating that student's responses generally fell between "agree" and "strongly agree" toward human-centred digital communication principles. Attitude scores ranged from 1.13 to 4.00, showing more visible differences in students's reported dispositions than in their knowledge and scenario scores.

The highest average attitude item was related to using greetings and expressions of thanks when contacting teachers or older persons. This suggests that politeness and respect were the most strongly endorsed aspects of digital communication. In contrast, lower scores were found in negatively worded items related to sending messages without considering whether the recipient understands them, considering rude comments online as not serious, and assuming that communication with teachers and friends does not need to differ. These results indicate that students may easily recognise appropriate principles, yet their reported attitudes still vary, especially when items involve less desirable communication habits. From an educational perspective, the high level of knowledge and scenario-based judgment is encouraging. However, the variation in attitudes suggests that digital literacy education should not focus only on rules and correct answers. Students need opportunities to analyse the consequences of digital messages, reflect on the recipient's perspective, and adjust communication to different social and professional contexts.

4.2. Characteristica of Human-Centered Digital Communication Literacy Instrument

The second objective was to evaluate the characteristics of the instrument used to measure knowledge, attitudes, and scenario-based judgment. The evaluation included internal consistency, item difficulty, score distribution, and the presence of ceiling effects.

Table 3. Internal Consistency of the Instrument

Component	Number of Items	Cornbach's Alpha
Knowledge	10	0,639
Attitudes	15	0,935
Scenario-based judgment	5	0,508

The knowledge component had a reliability coefficient of 0.639, indicating moderate internal consistency. This result should be interpreted together with the high level of item ease. Almost all knowledge items were answered correctly by more than 90% of respondents. When most respondents provide the same response, item variance becomes small and the instrument's ability to distinguish different levels of knowledge is reduced.

The attitude component obtained a Cronbach's alpha of 0.935, indicating very high internal consistency. This suggests that the 15 attitude items generally measured a coherent orientation toward clear, empathetic, polite, contextual, and responsible digital communication. However, a coefficient above 0.90 should be interpreted carefully because it may indicate content overlap or similarity among items. Because the scale relied on self-report, student's answers may also have been influenced by social desirability.

The scenario-based judgment component obtained a reliability coefficient of 0.508. This value is relatively low if the five scenarios are treated as a reflective scale. The low reliability may be due to the limited number of items, the different contexts represented by each scenario, and the very small variation in responses. Therefore, the five scenarios may be better understood as formative indicators representing several contexts of digital communication rather than as items that measure a single identical attribute.

The score distribution revealed substantial ceiling effects. A total of 86.4% of respondents achieved the maximum knowledge score, and 94.8% achieved the maximum scenario-based judgment score. This condition indicates that the knowledge and scenario instruments were not sufficiently sensitive to distinguish students at moderate and high competence levels. High scores may indicate good understanding, but they may also reflect answer options that were too easy to identify. Future assessment should therefore include more complex scenarios, plausible alternatives, graded scoring, and opportunities for students to explain the reasoning behind their responses.

4.3. Relationships among Knowledge, Attitude and Scenario-Based Judgement

The third objective was to analyse the relationships among knowledge, attitudes, and scenario-based judgment. Because knowledge and scenario scores were not normally distributed and contained many tied values, Spearman rank correlation was used.

Table 3. Correlations among research variables

Variabel relationship	Spearman's ρ	P-value	Interpretasi
Knowledge-attitudes	0,250	0,002	Positif, weak
Knowledge-scenario based judgment	0,271	<0,001	Positif, weak
Attitudes-scenario based judgement	0,186	0,021	Positif, very weak

The results show a significant positive relationship between knowledge and attitudes, with a coefficient of 0.250. This means that students with higher digital communication knowledge tended to report more positive attitudes. However, the strength of the relationship was weak, indicating that knowledge explained only a small part of the variation in attitudes.

Knowledge was also positively related to scenario-based judgment, with a coefficient of 0.271. This was the strongest relationship among the three pairs of variables, but it was still weak. The finding suggests that students who understood digital communication principles tended to identify more appropriate responses in the scenarios, although the association was limited.

The relationship between attitudes and scenario-based judgment had a coefficient of 0.186. Although statistically significant, it was very weak. Thus, students who reported positive attitudes toward human-centred digital communication did not necessarily show much variation in their scenario responses. This indicates that knowing, valuing, and judging are related but distinct dimensions of digital literacy.

The weak relationships may be explained by several factors. First, self-reported attitudes may be influenced by social desirability. Second, the scenario items measured hypothetical judgment rather than actual behaviour. Third, ceiling effects in knowledge and scenario scores limited score variation, making it difficult for correlation analysis to capture stronger individual differences. These findings align with the view that digital citizenship learning does not automatically translate into consistent practice and that adolescent's online moral decisions involve complex considerations of rules, consequences, and character.

Based on these findings, digital communication literacy learning should integrate three complementary approaches. Students need to understand the principles of digital communication, reflect on the values of empathy and responsibility behind those principles, and practise making decisions in complex and ambiguous scenarios. Case-based learning, dilemma discussions, communication simulations, and consequence analysis may help bridge the gap between knowing principles and applying them.

5. Conclusion

The three objectives of the study produced complementary findings. First, students showed very high levels of knowledge and scenario-based judgment, while attitudes demonstrated greater variation. Second, the attitude scale had very high internal consistency, but the knowledge and scenario components had limited sensitivity due to the low level of difficulty and strong ceiling effects. Third, knowledge, attitudes, and scenario-based judgment were positively associated, but the strengths of the relationships were weak.

Substantively, the results suggest that students have a strong basic awareness of human-centred digital communication. Methodologically, however, the findings are not sufficient to conclude that students possess comprehensive digital communication competence. Actual competence requires more authentic assessment and observation of behaviour in real communication situations. The main contribution of this study lies in its use of three measurement dimensions and its evaluation of instrument sensitivity. The study shows that very high scores should be interpreted together with item difficulty and score distribution so that digital literacy assessment does not present an overly optimistic picture of student competence.

This study has several limitations. Its cross-sectional design describes student's condition at one point in time and does not allow causal interpretation. The sample came from a specific school context and was dominated by male students, so generalisation should be made cautiously. The knowledge and scenario components experienced ceiling effects, and the scenario component consisted of only five items. The attitude scale relied on self-report and may have been influenced by social desirability. In

addition, scenario-based responses represent intended responses rather than student's actual communication behaviour. Future studies should involve more diverse samples, develop more complex scenarios, use graded scoring, and add authentic tasks or behavioural observations. Longitudinal measurement is also needed to examine changes in digital communication literacy after learning interventions.

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