

Development of the Digital Literacy Instrument of Heart Communication

Puji Lestari¹, Agnes Indar Etikawati², Theodorus Chrisna Bagas Adiyoso³, Sri Isworo Ediningsih⁴, Priyahita Garmadyuti Suryawijaya⁵

¹ORCID iD: [0000-0003-1019-5772](https://orcid.org/0000-0003-1019-5772), Universitas Pembangunan Nasional Veteran Yogyakarta, Jl. Padjajaran No. 104, Sleman Regency, Yogyakarta 55283, Indonesia

²ORCID iD: [0009-0008-0428-3331](https://orcid.org/0009-0008-0428-3331), Universitas Sanata Dharma, Jl. Paingan, Sleman Regency, Yogyakarta 55282, Indonesia

³ORCID iD: [0009-0008-3585-5478](https://orcid.org/0009-0008-3585-5478), Universitas Gadjah Mada, Jl. Sosio Humaniora, Bulaksumur, Sleman Regency, Yogyakarta 55281, Indonesia

⁴ORCID iD: [0000-0002-1623-5897](https://orcid.org/0000-0002-1623-5897), Universitas Pembangunan Nasional Veteran Yogyakarta, Jl. Padjajaran No. 104, Sleman Regency, Yogyakarta 55283, Indonesia

⁵ORCID iD: [0009-0007-6681-2828](https://orcid.org/0009-0007-6681-2828), Universitas Pembangunan Nasional Veteran Yogyakarta, Jl. Padjajaran No. 104, Sleman Regency, Yogyakarta 55283, Indonesia

*Corresponding author, e-mail: puji.lestari@upnyk.ac.id

Abstract

Purpose: This study aimed to develop and validate the Heart Communication Digital Literacy instrument, an integrative model combining the Digital Literacy of *Tular Nalar* (Contagious Reasoning) framework and the Heart Communication Theory. The model was designed to foster critical thinking, empathy, and communication ethics in digital spaces. It consisted of six aspects of heart communication linked to three levels of digital literacy from *Tular Nalar*.

Methods: An exploratory sequential mixed-method approach was used. Qualitative development involved instrument specification and item construction, validated through expert Focus Group Discussions. A 4-point Likert-scale questionnaire was administered to 362 students in Yogyakarta quantitatively. Data were analyzed using JASP via Confirmatory Factor Analysis to evaluate construct validity, and Cronbach's alpha was used to check the reliability.

Findings: Results yielded 32 valid items with good item-total correlations (0.43–0.75) and excellent reliability (Cronbach's Alpha=0.963). CFA indicated that the three-level digital literacy model fit better than the original six-aspect heart communication construct, which proved unidimensional. Thus, this instrument is valid and reliable, and it resulted in the refinement of the Heart Communication Theory dimensions from six to four: Thought Cultivation, Feeling Cultivation, Empathy, and Peace of Heart.

Originality: The study's originality lies in developing a Heart Communication-Based Digital Literacy Instrument that integrates heart communication with the *Tular Nalar* framework to promote empathetic and constructive digital communication. The novelty of this research is found in the four dimensions of Heart Communication, which refine the definition of Heart Communication Theory.

Keywords: Communication Ethics, the Heart Communication Digital Literacy Instrument, Heart Communication Theory.

Introduction

Communication is a basic human need to exchange messages as a means of social interaction. Communication conveys messages, thoughts, and feelings. Communication problems often arise in everyday life. These barriers can include differences in perception, lack of empathy, poor listening skills, and even misinterpretation of messages. Communication barriers can affect anyone, young and old, and can prevent messages

Article History: Received May 10, 2026; Revised August 25, 2026; Accepted September 06, 2026; Published September 10, 2026.

This is an open access article under the [CC-BY](https://creativecommons.org/licenses/by/4.0/) license.

from being conveyed effectively (Hassan et al., 2021; Taylan & Weber, 2023; Tietz et al., 2021). These obstacles can arise from various factors, including the communicator, the recipient, the medium, and the channel used. Common barriers include channel errors, noise, lack of feedback, competing messages, and other distractions (Gyllenstein et al., 2023; Roslan et al., 2020; Shen, 2025). Furthermore, barriers can be psychological, such as prejudice, stereotypes, and motivation; sociocultural, related to ethnic differences, social norms, and language; and nonverbal interaction barriers that affect message clarity (Nuzuli, 2023; Patterson et al., 2021; Zhao, 2023). This shows that the communication process is not simple but requires awareness and the ability to anticipate various obstacles to convey the message effectively (Parrish-Sprowl et al., 2023). Failure to effectively manage these complex barriers can significantly disrupt human interactions and create a ripple effect of negative consequences.

These issues often lead to misunderstandings, interpersonal conflict, and a decline in the quality of social relationships. In a multicultural society, communication challenges are exacerbated by differences in culture, language, and values. These challenges extend beyond cultural differences to include communication development issues in the digital age (Fakhri et al., 2025). The growth of information and communication technology has brought society into a digital age that has completely changed how people connect, even when they are far apart or from different cultures. Digital technologies and media enable real-time connectivity and interaction, allowing individuals to communicate beyond spatial limitations and engage in cross-cultural exchanges more easily than ever before (Sánchez & Delgado, 2025; Stasbeger, 2023). Communication now takes place in a fast-paced, instantaneous, and time-transcending virtual space, often devoid of clear chronology and cultural context. This condition has given rise to the phenomenon of atemporality, the circulation of information without a definite time marker, which in turn can lead to misunderstandings and distortions of meaning in intercultural communication (Charalambous et al., 2025; Maíz-Arévalo, 2022). Understanding these modern communication obstacles requires a closer look at the specific digital channels that now dominate and redefine everyday life.

The growth of information technology has changed how people communicate with each other. Social media, instant messaging apps, and digital platforms are now the primary means of interaction. The extensive use of social media has had a complicated effect on how information spreads (Hamza et al., 2025; Shaheen, 2025). On the other hand, social media should best serve as a tool for spreading positive and helpful messages that provide benefits to society (Naslund et al., 2020). However, the truth is that digital platforms are frequently used to spread harmful content that causes disharmony, including hate speech, provocative material, false information, and fake news, which can lead to large-scale conflicts (Piazza, 2022; Vasist et al., 2024). This situation demands digital literacy and critical awareness to help the public use social media more carefully and responsibly (Alfazri & Syahputra, 2024). Therefore, developing these essential skills is no longer just a choice but a basic requirement for successfully navigating the complex digital world we live in today.

However, field practice shows that many users still ignore communication ethics. This is evident in the rise of privacy violations, such as unauthorized dissemination of personal data, illegal content harvesting, digital voyeurism, doxxing, and oversharing (Barrett-Maitland & Lynch, 2020; Chiauzzi & Wicks, 2019; Marmor, 2023). This phenomenon reveals a gap between people's technical ability to access technology and their awareness of the values involved in its use, leading to a digital literacy deficit,

particularly in ethical aspects (Barrios-del-Ángel et al., 2026; Reddy et al., 2023). Indonesia currently has legal frameworks, such as the Electronic Information and Transactions Law (UU ITE) and the Personal Data Protection Law (UU PDP), which are intended to protect the digital rights of its citizens. However, the effectiveness of these regulations remains limited. Low public understanding of the law, weak enforcement, and the lack of adaptation of legal instruments to technological developments are major obstacles to realizing a safe, healthy, and ethical digital ecosystem (Fakhri et al., 2025). This indicates that formal regulations must be complemented by robust behavioral interventions to reform user behavior truly.

Communication is essential for creating a safe and ethical ecosystem, as it fosters trust and reduces conflict. However, challenges in both in-person and online situations show the importance of a human-centered approach that focuses on empathy and real, meaningful connections (Kunneman et al., 2019; Pratama et al., 2025). One such approach is 'heart communication', a communication pattern that emphasizes emotional sensitivity, empathy, honesty, and integrity. Heart communication encourages individuals to prioritize feelings, respect others, and build more meaningful relationships. In the digital era, heart communication can act as a filter to prevent negative behavior and improve the quality of social interactions. (Lestari, 2023) revealed that character education can be integrated through the Heart Communication Theory (HCT), which includes thought cultivation (*olah pikir*), feeling cultivation (*olah rasa*), managing heart trash (*kelola sampah hati*), sympathy (*simpati*), empathy (*empati*), and living peacefully and happily (*hidup damai dan bahagia*) as a foundation for forming more ethical digital behavior. The use of heart communication is significant in reducing cognitive and emotional factors that frequently lead to antisocial behavior, particularly in high school students. Heart communication is the way of sharing and interpreting thoughts and emotions through a deep sense of inner awareness, a form of communication rooted in conscience. It helps give meaning to human behaviors and decisions, whether they happened before, are happening now, or will happen later.

Applying heart communication to overcome communication problems in digital media requires digital literacy. The theory of heart communication is integrated with Tular Nalar's digital literacy to address communication problems in digital media. Tular Nalar digital literacy consists of three (3) aspects: Knowing (*Tahu*), Responsive (*Tanggap*), and Resilient (*Tangguh*). Knowing is connected to activities that help build and improve one's skills in media and digital literacy. Responsive is the capacity to address and react to issues related to information. Resilient refers to the ability to take action or respond effectively, and then to invite others to work together and get involved in addressing the situation. *Tular Nalar's* digital literacy encompasses several key competencies. *First*, the Knowing competency involves the ability to access and manage information effectively. *Second*, the Responsive competency includes skills related to designing, processing, and sharing information. *Lastly*, the Resilient competency focuses on developing self-resilience, safeguarding personal data, and working collaboratively with others. (Lestari et al., 2021, 2025). Communication problems can be analyzed using the innovative Heart Communication Theory (HCT), which emphasizes that humans have minds and hearts that shape attitudes and behavior. Positive thoughts and feelings will give rise to positive attitudes and behaviors, thereby forming good habits. Through thought and feeling cultivation, individuals can control negative emotions and inner waste, thereby cultivating sympathy and empathy and creating a peaceful, happy life. The Heart Communication Theory (HCT) includes several indicators, namely thought

cultivation (changing thought patterns to be positive), feeling cultivation (diverting negative emotions into constructive energy), managing heart trash (accepting circumstances without being burdened by negative emotions), sympathy and empathy (the ability to understand and feel the conditions of others), and living peacefully and happily (cultivating peace of heart and gratitude). Meanwhile, Digital Literacy, as outlined by [Lestari et al. \(2021\)](#), is grounded in the *Tular Nalar* framework, with the principles of Knowing, Responsive, and Resilient, to increase awareness of digital media.

The integration of Heart Communication with *Tular Nalar* digital literacy produces communication patterns that are not only linguistically competent but also ethical and empathetic. Thought cultivation skills encourage digital users to think critically before receiving or disseminating information. Feeling cultivation skills and managing heart trash foster emotional control, making people more responsive to potential hoaxes, hate speech, or provocation. Meanwhile, sympathy, empathy, and a peaceful, happy life strengthen a resilient attitude toward maintaining ethics, respecting others, and building a healthy, harmonious digital ecosystem. Based on prior research, a validated instrument is needed to assess heart communication digital literacy.

To test the instrument, two secondary schools were selected to recruit respondents who met the research criteria and to evaluate its validity and reliability. The two schools--SMA Negeri 1 Playen in Gunung Kidul and SMK Negeri 1 Kokap in Kulonprogo--are both integrated into the Jogja Smart School network in the Special Region of Yogyakarta. High school students were chosen because they represent adolescents actively engaged in digital communication and social interaction, making them an appropriate population for assessing Heart Communication Digital Literacy. Furthermore, these specific schools were selected based on recent findings by [Lestari et al. \(2024, 2025\)](#) highlighting significant issues with bullying and cyberbullying at these institutions, thereby providing a highly relevant context for implementing and assessing Heart Communication Digital Literacy. These two schools in Yogyakarta were selected as field-testing sites for initial validation. The study focused on 362 high school students from the two schools as the target population for the initial validation of the proposed instrument. The emphasis was on testing the instrument's measurement properties rather than comparing schools or generalizing findings across diverse educational settings. The primary objective of this process was not to obtain a nationally representative sample. Consequently, the study's findings provide preliminary evidence regarding the instrument's validity and reliability, and further research is recommended to validate it across a wider range of educational environments and geographic regions.

The following are previous studies on heart communication that serve as a basis for this work. [Safitri et al. \(2024\)](#) emphasize that heart communication is a healthy, empathetic, and constructive strategy, especially in the digital era, to reduce the tendency toward silent treatment. Furthermore, research by [Khatami & Sazili \(2025\)](#) shows that applying the Heart Communication Theory can address seniority gaps and prevent hierarchy-based antisocial practices in the workplace. [Jandevi et al. \(2024\)](#) found that heart communication makes a crucial contribution to strengthening social solidarity and encouraging humanitarian action. However, to date, no research has specifically examined the integration of the heart communication concept as a primary strategy in foster communication ethics, including reducing antisocial behavior in schools. Furthermore, research on the concept of *Tular Nalar* presents a framework based on the principles of 'Knowing, Responsive, and Resilient' to raise awareness in digital media ([Lestari et al., 2021](#)). A study conducted by [Lestari et al. \(2019\)](#) discovered that the local

wisdom of Purpusage, combined with heart-to-heart communication, effectively resolved social strife in Lingga Village, Karo, stemming from the rejection of relocating the Mount Sinabung refugees. Through the traditional Runggu (deliberation) process, culminating in Purpusage (living peacefully after the conflict), residents and officials opened up, empathized, and reconciled. Heart-to-heart communication fostered sincerity, sympathy, and empathy, thus creating peace and social harmony. This approach demonstrates that local wisdom can be a peaceful and effective way to resolve social conflict in the community.

Several previous studies have examined the role of heart communication across various contexts, for example, as a healthy, empathetic communication strategy to reduce silent treatment, prevent hierarchy-based antisocial behavior in the workplace, and strengthen social solidarity and humanitarian action. Furthermore, the *Tular Nalar* digital literacy framework, with its principles of Knowing, Responsive, and Resilient, has also been studied as an approach to increasing public digital awareness (Setiansah et al., 2023). However, so far, no research has specifically integrated heart communication with *Tular Nalar* digital literacy to develop a practical instrument to address communication problems, particularly those related to the digital era.

The novelty of this study is reflected in the creation of a digital literacy instrument that utilizes heart communication, which combines heart communication indicators (thought cultivation, feeling cultivation, managing heart trash, sympathy, empathy, living peacefully and happily) with the digital literacy principle of *Tular Nalar* (Knowing Heart Communication, Responsive Heart Communication, Resilient Heart Communication). This integration is expected to help in developing technical skills in digital media. It is also important to influence ethical, empathetic, and constructive communication behavior. Thus, this research offers a new, more holistic approach to solving communication problems, both in daily interactions and in dealing with negative phenomena in the digital space. To establish the theoretical foundation for the proposed instrument, the following section reviews the concepts underpinning this study, including digital literacy, the *Tular Nalar* digital literacy framework, and heart communication. These perspectives provide the conceptual basis for integrating cognitive, affective, and behavioral dimensions into a comprehensive instrument for assessing heart communication-based digital literacy.

The concept of digital literacy is defined differently in educational writings, but all these definitions trace back to the original one introduced by Gilster in 1997. Gilster described digital literacy as the ability to understand and use information in various formats from different sources, especially when presented through computers (Audrin & Audrin, 2022). Govender (2026) also viewed digital literacy as a complex skill that goes beyond basic reading and writing abilities. It includes the skill of using digital technologies efficiently, such as retrieving, examining, assessing, and producing information using digital tools and the internet. In today's digital world, being literate also means being able to think critically, be creative, communicate effectively, and work well with others. In both education and the workplace, using digital tools effectively has become a necessary skill for engagement and success. In professional settings, it encompasses specialized skills such as data analysis and cybersecurity, whereas in education, it helps learners interact with digital media responsibly and effectively. The European Commission's Digital Competence Framework (DigComp) identifies five main areas of digital literacy: information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving. These areas are structured into three

levels of proficiency: basic, intermediate, and advanced. This framework aligns with international education goals, particularly Sustainable Development Goal 4, which focuses on providing inclusive, equitable, quality education. Digital literacy combines technical skills, critical thinking, and ethical understanding, enabling individuals to effectively use, assess, and contribute to the digital world, making it a crucial part of a well-rounded education.

The Digital Literacy Communication Model of *Tular Nalar* was developed around three main dimensions of Tular Nalar and eight foundational competencies, initiated by the Indonesian Anti-Defamation Society (Mafindo), the Maarif Institute, and Love Frankie, with support from Google.org. This critical thinking campaign is implemented through curriculum design, teaching methods, and learning materials such as online modules, videos, public lectures, and training programs across various regions (Lestari et al., 2021). The curriculum consortium involved eight experts, including Novi Kurnia (Chair of JAPELIDI), Puji Lestari (disaster communication expert at Universitas Pembangunan Nasional Veteran Yogyakarta), Syarifah Ema Rahmaniah (health literacy advocate), Arnidah Kanata (curriculum technology specialist), Ni Made Ras Amanda (Chair of ISKI Bali and Children's digital well-being advocate), Fanny S. Alam (Head of Sekolah Damai Indonesia Bandung), Gilang Adikara (lecturer at Yogyakarta State University), and Ramaditya Adikara (novelist and disability activist). The three main dimensions of Tular Nalar: Knowing, Responsive, and Resilient, each represent key dimensions of digital literacy. Knowing refers to the capability to access and handle information within digital and media environments; Responsive reflects the competence to design, process, and share information effectively; and Resilient emphasizes personal resilience, data protection, and active collaboration and participation in addressing issues.

Heart Communication is a conscious, internal process of managing thoughts and feelings that serves as the foundation for human attitudes and actions. Based on the Heart Communication Theory (Lestari, 2023), its dimensions include thought cultivation, feeling cultivation, managing heart waste, sympathy, empathy, living peacefully and happily. This theory assumes that communication originates from thoughts and feelings, which influence one's attitudes and behavior. Positive thinking leads to positive behavior, while negative thinking produces the opposite effect. Therefore, it is essential to manage 'heart trash' so that negative energy can be transformed into positive energy, thereby improving the quality of communication, fostering sympathy and empathy, and guiding individuals toward a peaceful and happy life. This research addresses an urgency to supports the Indonesian government's policies, specifically the Minister of Primary and Secondary Education Regulation No. 6 of 2026 concerning the Realization of a Safe and Comfortable School Culture, as well as the Minister of Primary and Secondary Education Decree No. 17 of 2026 concerning the Realization of an Inclusive Learning Environment, Free from Violence, Bullying, and Discrimination.

Given this urgency, the study aims to develop and validate the Heart Communication Digital Literacy instrument--an integrative model that combines the *Tular Nalar* digital literacy framework with the Heart Communication Theory (HCT). The model is designed to cultivate critical thinking, empathy, and communication ethics in digital spaces and is suitable for implementation in educational settings. It comprises six aspects of heart communication linked to the three levels of *Tular Nalar* digital literacy. The study focuses on the initial psychometric validation of the instrument rather than data collection from a representative sample of the entire high school student population. The instrument is designed to assess levels of heart communication digital

literacy in the context of addressing everyday communication issues. The findings are expected to yield an instrument that provides insights into heart communication digital literacy and can be used to enhance communication problem-solving capabilities at both small and large scales.

Methods

This study used a sequential exploratory mixed-methods approach integrating qualitative and quantitative methods. The sequential exploratory mixed-methods design is a research approach that combines both qualitative and quantitative methods, starting with the collection and analysis of qualitative data, then moving on to a quantitative phase to examine and validate the initial results (Sugiyono & Lestari, 2024). The qualitative method, using Focus Group Discussions (FGDs) on two occasions. *The first FGD* involved the principal, guidance and counseling teachers from various Jogja Smart Schools, the Special Region of Yogyakarta (*Daerah Istimewa Yogyakarta*, DIY), Educational Communication Technology Center (*Teknologi Komunikasi Pendidikan*, Tekomdik), and psychology and communication experts. The development stage consisted of measuring instrument specifications, item development, and expert review. A *second FGD*, as an expert review, was conducted with the involvement of an expert psychologist specializing in Child and Adolescent Developmental. Upon receiving the instrument specifications from the experts, the research team defined the 'Heart Communication Digital Literacy' dimension and the dimensions to be measured, along with their definitions.

As the next step, the team determined the instrument format: four frequency-response options with scores of 1 for 'never', 2 for 'sometimes', 3 for 'often', and 4 for 'always'. Subsequently, the research team developed items for each aspect using a quantitative method. The instrument development adhered to the American Educational Research Association's (AERA, 2016) measurement tool development standards. The primary rationale for using this standard was to ensure that the Heart Communication Digital Literacy instrument developed met high validity and reliability criteria. The implementation of this method was carried out in two main stages: instrument development and instrument quality testing.

Testing the quality of the measuring instrument consisted of three stages: item selection, validity testing, and reliability testing. All three testing stages were conducted using the JASP statistical program. The item selection stage aimed to select good items based on their relevance to the overall concept of the measuring instrument, and this was tested statistically. Good items have an item-total correlation (rix) value above 0.3 or at least above 0.25 (Stefana et al., 2025). In the validity testing stage, this study conducted content validity testing (obtained through expert review) and construct validity testing. Construct validity testing is intended to determine how well the theoretical construct or measurement model fits the empirical data obtained from the field (Flake & Fried, 2020). Construct validity was assessed using confirmatory factor analysis, which provided insight into how well the model fit the data.

In evaluating model fit, it is advisable to use multiple goodness-of-fit measures to obtain a more comprehensive assessment of the measurement model. Commonly used indicators include the Standardized Root Mean Square Residual (SRMR), the Tucker–Lewis Index (TLI) or Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA), as these measures represent different aspects of model fit. According to Hu and Bentler, acceptable model fit is generally indicated by SRMR and

RMSEA values below 0.08, as well as CFI or TLI values above 0.90, although stricter criteria (e.g., ≥ 0.95) may also be applied for a better model fit (Henrich et al., 2026). After ensuring construct validity, the research team evaluated its reliability by computing Cronbach's alpha. A good measuring instrument has a reliability coefficient of at least 0.7 (Pentapati et al., 2025; Taber, 2018; Zakariya, 2022).

Results

Qualitative research findings from the *first* Focus Group Discussion (FGD) held at Balai Tekkomdik on August 5, 2025, regarding the development of a heart communication digital literacy model, involved 35 participants. These included the Head of Balai Tekkomdik, school principals, guidance and counseling teachers, representatives from five 'Jogja Smart Schools', and the research team. Participants actively shared their experiences with digital literacy initiatives implemented in their respective schools. The discussion also highlighted critical issues, including school-based cyberbullying and antisocial social media monitoring strategies, as well as the need to integrate heart communication into digital literacy efforts. Furthermore, the FGD results indicated that heart communication digital literacy is considered essential for instilling values that foster students' resilience against various antisocial behaviors in schools, such as bullying. Suggestions were also made to ensure that assessment tools are designed to align with students' level of understanding. Below are the views of Yunan Helmi S, Principal of SMA Negeri Ngaglik, Sleman, who supports implementing this heart communication digital literacy model in schools.

"We strongly support the heart communication digital literacy model being adopted in schools with relevant measuring tools for character building, preventing bullying, antisocial behavior, and strengthening students' emotions. We hope that heart communication digital literacy is flexible, contextual, meaningful, touches emotions and spirituality, and grows from students' needs without coercion."

This view is endorsed by Rudy Prakanto, Head of the DIY Center for Educational Communication Technology (Tekkomdik), who supports the phased implementation of heart communication digital literacy across schools within the DIY Smart School network; this approach fosters character development in students, thereby creating safe and comfortable school environments.

"Heart communication digital literacy supports the development of digital literacy skills while instilling positive communication values that are crucial to the learning process. It serves as a highly effective tool for preventing bullying within educational settings. We strongly recommend the widespread adoption of this literacy approach across all schools and educational institutions in DIY."

The *first* FGD results indicated that heart communication digital literacy is suitable for implementation in schools, as measured by a valid instrument. Subsequently, the researchers prepared the measurement instrument and tested its quality. The development of the measuring instrument includes instrument specifications, item development, and expert review. In this case, the Heart Communication Digital Literacy instrument was created using the principles and ideas of the theory and concept of heart communication. The concept of 'Heart Communication Digital Literacy' comprises three elements: Knowing Heart Communication, Responsive Heart Communication, and Resilient Heart Communication. Each concept encompasses six dimensions: thought cultivation, feeling cultivation, managing heart trash, sympathy, empathy, living peacefully and happily. Each dimension has relevant indicators, as shown in Table 1.

Table 1. Design of Heart Communication Digital Literacy Competency measurement Instrument

No	Heart Communication Digital Literacy Concepts	Heart Communication Dimensions	Number of instruments	Digital Literacy Indicator Items
1	Knowing Heart Communication: A person's initial awareness of their own emotions, feelings, and needs as well as those of others in an interaction. At this level, individuals start to grasp the idea and significance of communicating through emotions.	Thought Cultivation: Changing your thinking or perspective to foster more positive thoughts.	1	I know the importance of thinking positively when reading comments on social media.
			2	I understand that debates on social media are only caused by differences in views or perspectives.
			3	I can't overcome my negative thoughts towards comments from people I don't like (-)
		Feeling Cultivation: Recognizing and managing negative emotions to produce more positive or environmentally acceptable actions.	4	I understand that feelings of envy or fomo due to social media can be turned into motivation to develop oneself.
			5	I realize that feelings of annoyance or disappointment need to be managed before being expressed so as not to cause conflict on social media.
			6	I feel that showing anger or irritation towards people we don't like on social media is normal (-)
		Managing Heart Trash: Accepting the situation without being affected or attached to negative emotions.	7	I know that it is important not to let my feelings influence my behavior on social media.
			8	I realize that negative comments on social media do not deserve attention.
		Empathy: The ability to feel and	9	I don't know how to deal with negative emotions caused by negative comments on social media (-)
			10	I understand the uncomfortable feelings experienced by people who

No	Heart Communication Digital Literacy Concepts	Heart Communication Dimensions	Number of instruments	Digital Literacy Indicator Items
		understand other people's feelings from their perspective.	11	receive negative comments on social media. I know what kind of negative impacts will be experienced by people who become victims of cyberbullying.
			12	I feel that my friend is overreacting if he is hurt by negative comments on social media (-)
		Sympathy: Feelings of compassion and pity for others.	13	I understand the significance of offering support to friends who are experiencing cyberbullying.
			14	I understand how important it is to show sympathy to those who share their grief on social media.
			15	I forgot that jokes in <i>chat groups</i> can make other people feel sad or offended (-)
		Living Peacefully and Happily: Efforts to create peace of heart and positive emotions.	16	I realize that keeping up communication on social media is essential to avoid issues in relationships that may arise from social media interactions.
			17	I understood that it is crucial to avoid letting social media comments easily sway my opinions.
			18	I find it difficult to focus on my activities because I think about other people's negative comments (-)
2	Responsive Heart Communication: A person's capacity to react to emotions and	Thought Cultivation: Changing your thinking or perspective to foster more	19	I try to take positive lessons when reading negative comments on social media.
			20	I think that differences of views or opinions on social media are normal.

No	Heart Communication Digital Literacy Concepts	Heart Communication Dimensions	Number of instruments	Digital Literacy Indicator Items
	feelings in a manner that is suitable and fitting for the specific situation they are in. At this stage, people start to grasp and convey internal communication in a more accurate and efficient manner.	positive thoughts.	21	I became overthinking because of a comment in a chat group
		Feeling Cultivation: Recognizing and managing negative emotions to produce more positive or environmentally acceptable actions.	22	I try not to be tempted to join in making jokes about my friends.
		Managing Heart Trash: Accepting the situation without being affected or attached to negative emotions.	23	I try to express my opinions fairly on social media without showing anger or irritation.
			24	I immediately reply to comments that bother me (-)
			25	I try to turn feelings of inferiority into a drive to improve my performance.
			26	I try to let go of resentment so it does not get in the way of my relationships with others.
			27	I let feelings of envy and fomo make me hate other more successful people (-)
		Empathy: The ability to feel and understand other people's feelings from their perspective.	28	I try to understand differences of opinion from the perspective of the situation experienced by other people.
			29	I can feel the psychological impact experienced by friends who receive negative comments or ridicule.
			30	I give laughing or angry emoticons to other people's opinions that do not agree with my views (-)
		Sympathy: Feelings of compassion and pity for others.	31	I show support to friends who are being cyberbullied
			32	I give support emoticons to other people who tell me about bad or sad experiences.

No	Heart Communication Digital Literacy Concepts	Heart Communication Dimensions	Number of instruments	Digital Literacy Indicator Items
3	Resilient Heart Communication: Not only do they understand and respond well to others' emotions, but they can also motivate and support others to express themselves more genuinely and with greater understanding. At this point, people can manage emotional difficulties and maintain balance across different communication scenarios.	Living Peacefully and Happily: Efforts to create peace of heart and positive emotions.	33	I allowed my friend to be mocked because I did not want to get caught up in the argument (-)
			34	I try to maintain communication in <i>the chat group</i> to keep the members' relationships harmonious.
			35	I try not to be influenced by comments on social media.
			36	I got involved in a debate on social media (-)
		Thought Cultivation: Changing your thinking or perspective to foster more positive thoughts.	37	I write on social media to combat hate speech.
			38	I express a view on social media so that others can see an issue in a more positive light.
			39	I ignore calls to eradicate cyberbullying (-)
			40	I also upload videos or messages on social media that inspire others to manage their emotions.
		Feeling Cultivation: Recognizing and managing negative emotions to produce more positive or environmentally acceptable actions. Managing Heart Trash: Accepting the situation without being affected or attached to negative emotions.	41	I remind my friends to write messages in a normal manner, even if they are angry or offended.
			42	I let the atmosphere of the argument in <i>the chat group</i> get more heated (-)
			43	I invite my friends to ignore negative comments on social media.
			44	I also upload messages about friendship or respect for others on social media.
			45	I think that the problems my friends experience due to social media are not my business (-)

No	Heart Communication Digital Literacy Concepts	Heart Communication Dimensions	Number of instruments	Digital Literacy Indicator Items
		Empathy: The ability to feel and understand other people's feelings from their perspective.	46	I remind my friends that jokes in <i>group chats</i> can offend other people.
		Sympathy: Feelings of compassion and pity for others.	47	I invite friends to be mindful of others' feelings in every social media interaction.
			48	I impose my views or opinions on others (-)
			49	I am involved in anti-bullying campaign activities on social media.
			50	I invite friends to provide support to friends who are being bullied in chat groups.
			51	I do not show any attention to friends who are <i>bullied</i> in chat groups (-)
		Living Peacefully and Happily: Efforts to create peace of heart and positive emotions.	52	I also upload videos or messages that make other people feel grateful.
			53	I help create a culture of care and respect on social media.
			54	I am happy to see the situation heating up on social media (-)

Note: This table presents the initial conceptual design of the measurement instrument. Qualitative indicators are structured to reflect the integration of *Tular Nalar's* digital literacy levels and heart communication dimensions prior to the expert review.

Based on Table 1, the research team created 12 items for each aspect, divided into three levels of digital literacy: Knowing Heart Communication, Responsive Heart Communication, and Resilient Heart Communication. Each level in each aspect consists of four items: two favorable and two unfavorable. The total number of items was 54. After developing the items, the research team conducted a Focus Group Discussion (FGD) to review the items and simplify them. A *second* FGD, as an expert review, was conducted with the involvement of an expert psychologist specializing in Child and Adolescent Developmental, specifically addressed the measurement tool that was used in the study. The instrument was designed to assess the degree of heart communication digital literacy, covering aspects such as thought cultivation, feeling cultivation, managing heart trash, sympathy, and empathy, as well as efforts to achieve a peaceful and happy life. Several key findings emerged during the expert validation process: regarding the alignment of statements concerning the 'managing heart trash' dimension, most were found to overlap with the measurement of the 'feeling cultivation' dimension. Sympathy was deemed to be inherent in empathy. Regarding negative sentence structures, statements such as 'I do not verify the accuracy of information' were considered confusing for high school

students, as they required a higher level of logical reasoning. Consequently, it was recommended that similar items be rephrased into positive statements to avoid comprehension bias. Table 2 shows the findings from the expert review.

Table 2. Expert review results

Rated Aspect	Expert Findings	Revise
Conformity of statement items	Most of the items matched the measured aspects. However, five items were less relevant or less aligned with the measured aspects, including the thinking process item, which reflected attitudes rather than knowledge.	Revise the item content to match the aspects being measured.
Sentence format	Statements like <i>"I did not check the accuracy of the information"</i> confuse high school students. The words <i>'always'</i> and <i>'commitment'</i> do not match the answer choices, which already include behavioral frequency.	Change to positive sentence form. Remove words in items that indicate frequency.
Number of items per aspect	Too much can be overwhelming for students.	Set the ideal limit to 3 items per aspect.

Note: This table summarizes the qualitative evaluation from the expert review phase. No statistical data were used. The findings informed revisions to sentence structures and item quantities to eliminate comprehension bias and align with the target respondents' cognitive levels.

Based on the expert review results, the research team improved item content and wording and reduced the number of items. The number of items per aspect decreased from twelve to nine, with each literacy level consisting of two favorable items and one unfavorable item. Table 3 is the blueprint for the 54-item Digital Literacy for Heart Communication instrument, resulting from the expert review.

Table 3. Blueprint for Heart Communication Digital Literacy Instruments

Level of Literacy	Aspects	Number of Items	
		Favorable	Unfavorable
Knowing Heart Communication	Thought Cultivation: Understanding and recognizing the importance of changing one's mindset or perspective to cultivate more positive thoughts.	1,2	3
	Feeling Cultivation: Understands and is aware of the importance of recognizing and managing negative emotions, which helps produce more positive or socially appropriate behaviors.	4,5	6
	Managing Heart Trash: Understanding and being aware of the importance of accepting the situation without being influenced by or attached to negative emotions.	7,8,	9

	Empathy: Understanding and being aware of the importance of the ability to sense and comprehend others' feelings from their perspective.	10,11	12
	Sympathy: Understanding and being aware of the importance of the ability to sense and comprehend others' feelings from their perspective.	13,14	15
	Living Peacefully and Happily: Understanding and recognizing the importance of efforts to cultivate peace of heart and positive emotions.	16,17	18
	Thought Cultivation: Responding more appropriately by changing one's mindset or perspective, thereby generating more positive thoughts.	19,20	21
Responsive Heart Communication	Feeling Cultivation: Responding more appropriately by recognizing and managing negative emotions, thereby leading to more positive or socially acceptable actions.	22,23	24
	Managing Heart Trash: Respond more appropriately by accepting the situation without being influenced by or attached to negative emotions.	25,26	27
	Empathy: Providing a more appropriate response by sensing and understanding others' feelings from their perspective.	28,29	30
	Sympathy: Responding more appropriately by showing compassion and concern for others.	31,32	33
	Living Peacefully and Happily: Responding more appropriately by striving to cultivate peace of heart and positive emotions.	34,35	36
	Thought Cultivation: Inspiring and encouraging others to change their way of thinking or perspective, thereby fostering a more positive mindset.	37,38	39
Resilient Heart Communication	Feeling Cultivation: Inspiring and encouraging others to recognize and manage negative emotions, thereby leading to more positive or socially acceptable actions.	40,41	42

Managing Heart Trash: Inspiring and encouraging others to accept the situation without being affected by or attached to negative emotions.	43,44	45
Empathy: Inspiring and encouraging others to sense and understand others' feelings from their perspective	46,47	48
Sympathy: Inspiring and encouraging others to show compassion and care for others.	49,50	51
Living Peacefully and Happily: Inspiring and encouraging others in their efforts to cultivate peace of heart and positive emotions.	52,53	54

Note: This table outlines the revised blueprint of the instrument following the expert validation. It details the specific distribution of favorable and unfavorable items and serves as the structural basis for subsequent quantitative field testing.

The instrument in [Table 3](#) was tested quantitatively, with 362 respondents participating in data collection. The respondents were students from two schools in the Special Region of Yogyakarta (DIY), as shown in [Figure 1](#), with 157 (43.4%) from a secondary school in Playen, Gunung Kidul, and 205 (56.6%) from a secondary school in Kokap, Kulonprogo. The respondents were students in grades 10 to 12, comprising 156 (43.1%) males and 206 (56.9%) females, as shown in [Figure 2](#).

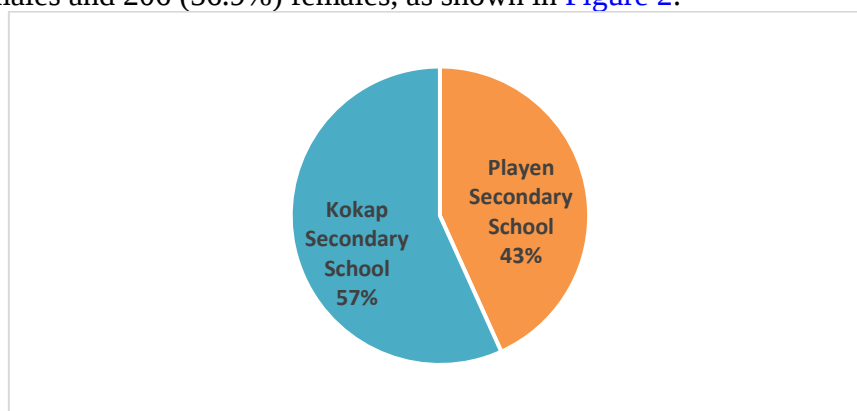


Figure 1. Percentage of the participants' school (source: Researcher processing, 2025)

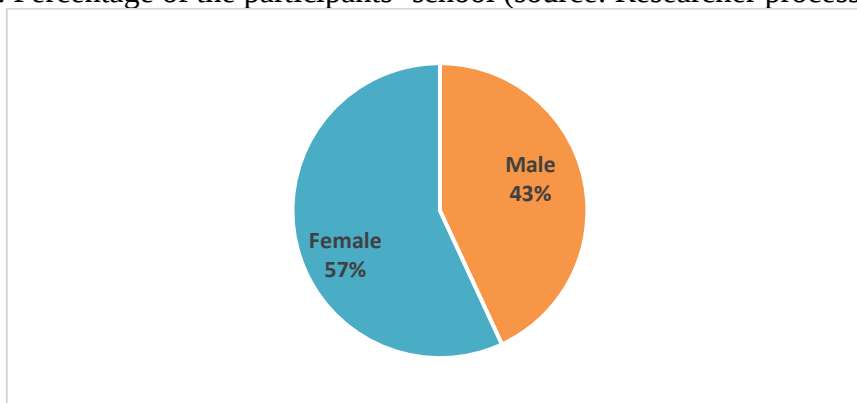


Figure 2. Percentage of the participants' gender (source: Researcher processing, 2025)

The quality test of the measuring instrument included item selection, validity testing, and reliability testing. Based on item analysis, all 36 favorable items had an RIC value of 0.3 or higher. On the other hand, the 12 most unfavorable items had correlation values below 0.3. Based on these results, the digital literacy instrument for heart communication only included favorable items for further construct validity analysis. In accordance with [Sudaryono et al. \(2019\)](#), unfavorable items can interfere with the validity of the measuring instrument. This can be caused by unfavorable items being collected in a separate cluster in the measurement model's factorial analysis. Therefore, unfavorable items should not be used. [Table 4](#) presents the RIC values for the items that were tested.

Table 4. List of item-total correlation values (rix)

Literacy Level	Aspect	Item		Item		Item	
		Favorable 1		Favorable 2		Unfavorable	
		Number	rix	Number	rix	Number	rix
Knowing Heart Communication	Thought Cultivation	1	0.582	2	0.616	3	0.094
	Feeling Cultivation	4	0.545	5	0.710	6	0.208
	Managing Heart Trash	7	0.570	8	0.609	9	0.236
	Empathy	10	0.614	11	0.653	12	0.155
	Sympathy	13	0.633	14	0.698	15	0.212
	Living Peacefully and Happily	16	0.555	17	0.646	18	0.162
	Thought Cultivation	19	0.618	20	0.577	21	0.199
	Feeling Cultivation	22	0.553	23	0.576	24	0.131
Responsive Heart Communication	Managing Heart Trash	25	0.541	26	0.635	27	0.309
	Empathy	28	0.696	29	0.631	30	0.313
	Sympathy	31	0.666	32	0.603	33	0.311
	Living Peacefully and Happily	34	0.566	35	0.691	36	0.277
	Thought Cultivation	37	0.365	38	0.612	39	0.243
	Feeling Cultivation	40	0.393	41	0.682	42	0.331
	Managing Heart Trash	43	0.611	44	0.494	45	0.209
	Empathy	46	0.581	47	0.664	48	0.362
Resilient Heart Communication	Sympathy	49	0.293	50	0.601	51	0.332
	Living Peacefully and	52	0.456	53	0.584	54	0.255

Literacy Level	Aspect	Item Favorable 1		Item Favorable 2		Item Unfavorable	
		Number	rix	Number	rix	Number	rix

Happily

Note: This table presents the statistical item-total correlation values (rix) obtained from the field testing. The data demonstrate that favorable items successfully met the validity threshold ($rix > 0.3$), while unfavorable items did not and were subsequently excluded to prevent measurement bias.

The findings from the construct validity test using CFA indicate that the measurement model with six aspects of heart communication does not fit the field data (Figure 3). This is very likely due to the large interconnectedness of the aspects, and the construct of heart communication is more appropriately viewed as a single dimension (unidimensional). The CFA results also show that the measurement model fits better if divided into three levels of digital literacy: Knowing Heart Communication, Responsive Heart Communication, and Resilient Heart Communication. The suitability indicators for the construct at these three levels of digital literacy include CFI = 0.90, GFI = 0.98, SMSR = 0.08, and RMSEA = 0.09. The SMSR and RMSEA values are less satisfactory because the discrepancy between the proposed theoretical model and the actual data exceeds the 0.6 limit. However, the CFI and GFI values indicate a strong fit between the measurement model and the empirical data (both above 0.9). The SMSR and RMSEA values above the maximum limit may also be due to the high interconnectedness among the three levels of digital literacy in *Tular Nalar*. However, the measurement model with these three levels of literacy is quite fit.

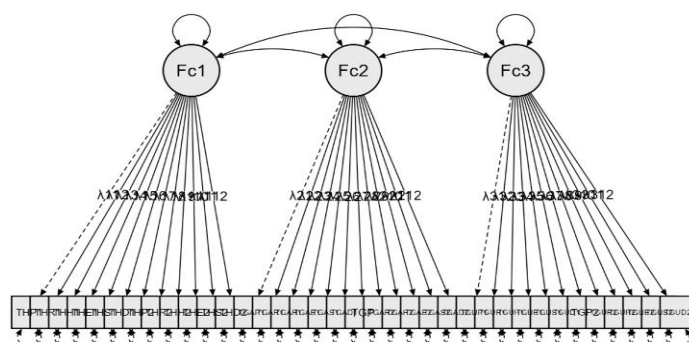


Figure 3. Heart communication digital literacy measurement model
(source: Researcher processing, 2025)

The correlation between aspects of heart communication is very high. This occurs because aspects of heart communication, such as thought cultivation, feeling cultivation, managing heart trash, sympathy, empathy, and living peacefully and happily, are interconnected at the attitudinal level. Thought cultivation can influence feeling cultivation or emotional states in understanding situations. Sympathy and empathy are concrete actions or responses resulting from feeling cultivation. Likewise, managing heart trash involves recognizing, accepting, and responding to it. Managing heart trash is also influenced by the competence of thought cultivation, and feeling cultivation. Good management is expected to result in a peaceful and happy life. Field data indicate that the construct of heart communication digital literacy can be further categorized into three levels: Knowing Heart Communication, Responsive Heart Communication, and Resilient Heart Communication. These three levels reflect how well a person can understand, reply to, and make thoughtful decisions based on digital information in heart communication.

The Knowing Heart Communication level indicates that individuals are focused on self-improvement, reflected in their ability to access and manage information. This ability is linked to clear, critical, and reflective thinking regarding various information received. Heart communication fosters moral awareness and ethical thinking, so that individuals are not only intellectually intelligent but also careful in selecting the truth of the information they receive. Thought cultivation at this level forms the main foundation for other indicators, namely, feeling cultivation, managing heart trash, sympathy, empathy, and living peacefully and happily.

The Responsive Heart Communication level emphasizes the ability to address information issues through designing, processing, and sharing information. This level primarily concerns feeling cultivation, sympathy, and empathy. Feeling cultivation enables one to understand the emotional and social context of the information received, while sympathy and empathy guide individuals to deliver thoughtful responses. Heart Communication Digital literacy encompasses both technical proficiency and the capacity to care for others' feelings in digital interactions. Thinking cultivation here plays a balancing role.

The Resilient Heart Communication level reflects the ability to act wisely, build resilience, and collaborate with others. This level primarily concerns the management heart trash. It demonstrates the ability to control unpleasant emotions that frequently surface in digital encounters, such as rage, envy, and hostility. A peaceful and happy life also manifests emotionally and spiritually in digital interactions. Digitally resilient individuals maintain composure, respect differences, and inspire healthy collaboration in cyberspace. Thinking cultivation, feeling cultivation, sympathy, and empathy help balance the components of managing heart trash. Without critical thinking and emotional understanding, a person will not be able to manage heart trash and manifest it into peace and happiness. Thus, managing heart trash can be integrated with feeling cultivation to transform negative emotions into positive energy.

The item total correlation values ranged from 0.43 to 0.75, and the Cronbach's Alpha (α) value was 0.963 with 36 favorable items. These values indicate that the statement items in this instrument generally have a strong and consistent relationship in measuring the construct of Heart Communication Digital Literacy. Overall, this instrument is reliable and suitable for further research, subject to a modification that integrates the managing heart trash dimension into the feeling cultivation dimension, as sympathy is already inherent in empathy. However, further refinement of the heart communication construct is recommended. The CFA results demonstrated that the original six-aspect model did not perfectly fit the field data, as the dimensions are highly interconnected and exhibit more unidimensional behavior. This statistical finding aligns with the expert review, which identified that the 'managing heart trash' dimension significantly overlaps with 'feeling cultivation', and 'sympathy' is already inherent in 'empathy'. The four dimensions of Heart Communication Theory (HCT) are shown in Table 5.

Table 5. Four dimensions of Heart Communication Theory (HCT)

Dimensions of Heart Communication Theory	Dimensions of Heart Communication Theory Refinement
Thought Cultivation (<i>Olah Pikir</i>): Changing your thinking or perspective to foster more positive thoughts.	Thought Cultivation (<i>Olah Pikir</i>): Changing your thinking or perspective to foster more positive thoughts.

Feeling Cultivation (<i>Olah Rasa</i>): Recognizing and managing negative emotions to produce more positive or environmentally acceptable actions.	Feeling Cultivation (<i>Olah Rasa</i>): Recognizing and managing negative emotions by managing liver waste to produce motivation and actions that are more positive or environmentally acceptable.
Managing Heart Trash (<i>Kelola Sampah Hati</i>): Accepting the situation without being affected or attached to negative emotions.	
Empathy (<i>Empati</i>): The ability to feel and understand other people's feelings from their perspective.	Empathy (<i>Empati</i>): The ability to sense and understand the feelings of others from their perspective.
Sympathy (<i>Simpati</i>): Feelings of compassion and pity for others	
Living Peacefully and Happily (<i>Hidup Damai dan Bahagia</i>): Efforts to create peace of heart and positive emotions.	Peace of Heart (<i>Kedamaian Hati</i>): A state of mental and emotional stability rooted in self-awareness that enables an individual to accept reality, practice gratitude, and manage expectations realistically, thereby remaining calm when facing life's various challenges.

Note: This table illustrates the refinement of the Heart Communication Theory (HCT) into four core dimensions. In the refined model, 'Managing Heart Trash' is integrated into 'Feeling Cultivation', 'Sympathy' is consolidated into 'Empathy', and 'Living Peacefully and Happily' is redefined as 'Peace of Heart.'

Consequently, the Heart Communication dimension comprises four aspects: thought cultivation, feelings cultivation, empathy, and peace of heart. This measurement tool serves as a foundation for future research aimed at refining the definition of Heart Communication Theory (HCT): an individual's communication capability involving the thought cultivation (*olah pikir*), directing thoughts toward positive matters) and feeling cultivation (*olah rasa*), transforming negative emotions into positive ones by converting heart trash into positive energy and motivation), while prioritizing empathy (*empati*) to foster peace of heart (*kedamaian hati*). Positive heart communication competence will influence positive attitudes and behaviors across various levels of communication. Thus, the formula for Heart Communication Theory (HCT) is: Thought Cultivation+Feeling Cultivation+Empathy=Peace of Heart→Positive Attitude→Positive Behavior.

Discussion

The study's findings show that the construct of Heart Communication Digital Literacy tends to form a structure based on literacy levels, Knowing Heart Communication, Responsive Heart Communication, and Resilient Heart Communication, rather than strictly following the six conceptual aspects originally proposed. This finding

suggests that the construct's empirical structure reflects a hierarchical process of competence development in digital communication ethics and emotional awareness. In today's information culture, digital literacy is commonly considered a multifaceted skill that encompasses cognitive, social, emotional, and ethical aspects of information processing and response, in addition to the capacity to operate digital tools (Martínez-Bravo et al., 2022). Consequently, this hierarchical progression illustrates that mastering digital communication ethics is a step-by-step evolution rather than a simultaneous acquisition of skills.

The *first* level, Knowing Heart Communication, reflects an individual's cognitive awareness and understanding in evaluating information and managing internal processes such as thinking and emotional awareness. The results of this study show that thought cultivation serves as the foundation for other components, such as feeling cultivation, empathy, and sympathy. This finding aligns with previous studies emphasizing that digital literacy involves critical thinking and reflective judgment in interpreting digital information environments. Digital literacy frameworks highlight that individuals must develop cognitive and critical evaluation skills to assess information credibility and avoid misinformation (Martínez-Bravo et al., 2022). Additionally, studies on digital literacy have revealed that people who are more digitally literate typically exhibit better information management and reflective learning behaviors, which support more efficient learning and decision-making processes in digital environments (Aydınlar et al., 2024). In essence, establishing this robust cognitive foundation is a prerequisite for individuals to actively and appropriately engage with others online.

The *second* level, Responsive Heart Communication, represents the ability to respond appropriately to information through emotional awareness, empathy, and sympathy. The present findings reveal that feeling cultivation plays a central role in enabling individuals to offer constructive responses in digital interactions. This finding lends credence to the idea that digital literacy encompasses not only technical proficiency but also socioemotional abilities that affect how people engage and communicate in virtual spaces. Because digital communication often requires people to interpret emotional cues, manage interpersonal relationships, and demonstrate ethical behavior in online interactions, studies have highlighted the significant influence of socio-emotional competencies on the development of digital literacy (Martínez-Bravo et al., 2022; Reichert et al., 2020). Therefore, responsiveness in digital communication can be interpreted as the manifestation of emotional intelligence within digital literacy practices.

The *third* level, Resilient Heart Communication, reflects the ability to maintain emotional stability, manage negative emotions, and inspire others to communicate responsibly in digital environments. The results indicate that managing “heart trash” and fostering peace and happiness are important elements of digital resilience. Resilience in the context of digital literacy refers to a person's ability to manage digital risks, preserve psychological health, and participate positively in online communities. According to empirical research, digital literacy helps people become more psychologically resilient by empowering them to deal with digital obstacles, participate successfully in digital learning environments, and gain confidence when exploring digital information (Li et al., 2026). Therefore, digital resilience represents the culmination of this hierarchical process, transforming passive users into ethical and emotionally stable digital citizens.

The substantial interconnections among the six dimensions of heart communication are another significant conclusion of this study. This suggests that these aspects may represent different manifestations of a single underlying construct related to emotional-

ethical competence in communication. Such findings are consistent with multidimensional models of digital literacy that emphasize integrating cognitive, emotional, and social competencies rather than treating them as isolated skills. Digital literacy frameworks increasingly highlight that responsible digital participation requires a combination of critical thinking, emotional awareness, ethical values, and collaborative attitudes (Ilomäki et al., 2023; Wider et al., 2026).

From a methodological perspective, the CFA results, which show a better fit when the construct is structured into three literacy levels, also support the developmental perspective of competence acquisition. In many educational and communication frameworks, literacy is conceptualized as a progressive process that begins with understanding and proceeds to application (Chiu et al., 2024; Dyba et al., 2024). It ultimately leads to transformative or influential actions in social contexts. This hierarchical structure reflects how individuals gradually move from cognitive awareness to socially responsible digital behavior.

Lastly, the instrument's strong internal consistency in assessing the Heart Communication Digital Literacy construct was indicated by a high reliability coefficient ($\alpha=0.963$). The strong item-total correlations also confirm that the items consistently represented the same underlying construct. High reliability values in digital literacy instruments were commonly reported when the construct encompasses integrated competencies across cognitive, emotional, and social dimensions, as these competencies tend to reinforce one another in shaping digital communication behavior.

Furthermore, from a practical standpoint, the validation of this instrument offers significant implications for educational institutions, particularly in mitigating the prevalent issues of cyberbullying and antisocial behavior among students. As highlighted during the qualitative expert review and FGD phase, educators and guidance counselors require contextual, emotion-based tools for character building. This newly validated instrument can serve as a diagnostic assessment tool for schools to map the emotional and digital competence of their students. By identifying which specific levels--Knowing Heart Communication, Responsive Heart Communication, or Resilient Heart Communication--require improvement, schools can design targeted intervention programs. For instance, if a student cohort scores low on the 'Resilient' level, schools can implement specific emotional regulation and peer-support workshops rather than merely enforcing punitive disciplinary measures. Consequently, this shifts the educational approach to digital literacy from a purely technical skill-building exercise to a holistic, preventive character-education strategy that actively fosters a safe school environment.

Additionally, the empirical recommendation to refine the Heart Communication dimensions from six to four aspects provides valuable insights into adolescents' psychological development. The CFA finding that 'managing heart trash' overlaps significantly with 'feeling cultivation', and 'sympathy' merges with 'empathy', closely reflects the cognitive and emotional processing typical of high school students. At this developmental stage, adolescents often evaluate their emotional responses holistically and may not yet possess the emotional granularity required to distinguish between feeling cultivation and the internal mechanism of discarding its negative residue (managing heart trash). Similarly, the nuanced theoretical distinction between feeling for someone (sympathy) and feeling with someone (empathy) is generally perceived by adolescents as a singular empathetic response during fast-paced digital interactions. Recognizing this behavioral reality is crucial for developing future educational modules; it ensures that the concepts taught are practically aligned with the students' actual psychological

frameworks, making the Heart Communication Digital Literacy model both scientifically robust and highly applicable in real-world settings.

Overall, the study's conclusions aid in developing a conceptual model of digital literacy that incorporates emotional intelligence and ethical communication. The 'Heart Communication Digital Literacy' framework offers a complementary perspective to existing digital literacy models, emphasizing thought cultivation, feeling cultivation, empathy, and peace of heart as essential competencies for responsible digital interaction. This perspective is highly relevant in today's digital era, where communication is increasingly mediated by technology and often lacks the emotional cues present in face-to-face interactions. A limitation of this research is that it has only been tested on adolescents in two secondary schools and has not yet been evaluated with young children, a demographic crucial for character formation.

Conclusion

This study successfully developed the Heart Communication Digital Literacy instrument, which was designed to meet the requirements for good validity and reliability. According to the construct validity test (CFA) results, the assessment model structure fit better when divided into three Tular Nalar digital literacy levels-Knowing Heart Communication, Responsive Heart Communication, and Resilient Heart Communication-because the six aspects of heart communication originally proposed were highly correlated and more appropriately positioned as a single dimension (unidimensional). With good internal consistency (Cronbach's alpha = 0.963) and item-total correlations ranging from 0.43 to 0.75. Research results demonstrate that the instrument is valid and reliable overall. These statistical findings align with expert reviews, which identified significant overlap between the 'managing heart trash' dimension and 'feeling cultivation' as well as the fact that 'sympathy' dimension is inherent within 'empathy'. The refined definition of Heart Communication Theory (HCT) characterizes it as an individual's communication ability involving the thought cultivation (directing the mind toward positive matters) and the feeling cultivation (transforming negative emotions into positive ones by converting heart trash into positive energy and motivation), while prioritizing empathy to foster peace of heart. Positive heart communication competence influences positive attitudes and behaviors across various levels of communication. Thus, the formula for Heart Communication Theory (HCT) is: Thought Cultivation+Feeling Cultivation+Empathy=Peace of Heart→Positive Attitude→Positive Behavior. Future researchers are recommended to utilize this definition, which comprises the four dimensions of Heart Communication Theory.

Authors' Contributions and Responsibilities

Puji Lestari contributed significantly to the study's conception, methodology, funding acquisition, writing, initial draft, and supervision. Agnes Indar Etikawati contributed significantly to the manuscript's inquiry, validation, visualization, formal analysis, data curation, writing, review, and editing. Theodorus Chrisna Bagas Adiyoso took responsibility for visualization, formal analysis, data curation, and writing the manuscript. Sri Isworo Ediningsih took responsibility for the investigation and validation of results. Priyahita Garmadyuti Suryawijaya took responsibility for the investigation and writing the manuscript.

Conflict of Interest

We attest that we have no conflict of interest with any financial, personal, or other links from other individuals or organizations that are connected to the topics included in the manuscript.

Generative AI Statement

This article was not produced by artificial intelligence; rather, it is the authors' own work.

Acknowledgements

The researcher would like to express gratitude to the Ministry of Higher Education, Science, and Technology of the Republic of Indonesia's Directorate of Research and Community Service, Directorate General of Research and Development, for funding this study through the 2025 applied research scheme grant under contract number 099/C3/DT.05.00/PL2025 and subcontract number 508/UN62.21/PG.00.01/2025. The Institute for Research and Community Service (LPPM) Universitas Pembangunan Nasional Veteran Yogyakarta, research partners Balai Teknologi Komunikasi Pendidikan (Balai Tekkomdik) of the Special Region of Yogyakarta, and two Jogja Smart Schools--SMA Negeri 1 Playen Gunung Kidul and SMK Negeri 1 Kokap Kulonprogo Daerah Istimewa Yogyakarta--that participated in the data collection process.

References

- AERA. (2016). *Standards for Educational & Psychological Testing*. American Educational Research Association, American Psychological Association, & National Council on Measurement in Education.
- Alfazri, M., & Syahputra, J. (2024). Literasi Digital dan Etika Komunikasi dalam Konteks Media Sosial. *JURNAL SYIAR-SYIAR*, 4(2), 50–62. <https://doi.org/10.36490/syiar.v4i2.1555>
- Audrin, C., & Audrin, B. (2022). Key factors in digital literacy in learning and education: A systematic literature review using text mining. *Education and Information Technologies*, 27(6), 7395–7419. <https://doi.org/10.1007/s10639-021-10832-5>
- Aydınlar, A., Mavi, A., Kütükçü, E., Kırımlı, E. E., Alış, D., Akın, A., & Altıntaş, L. (2024). Awareness and level of digital literacy among students receiving health-based education. *BMC Medical Education*, 24(1), 38. <https://doi.org/10.1186/s12909-024-05025-w>
- Barrett-Maitland, N., & Lynch, J. (2020). Social Media, Ethics and the Privacy Paradox. In *Security and Privacy From a Legal, Ethical, and Technical Perspective*. IntechOpen. <https://doi.org/10.5772/intechopen.90906>
- Barrios-del-Ángel, A. X., Jiménez-Ferretiz, L.-E., Silva-Lavín, H., Sánchez-Garza, M. N., Jiménez-Almaguer, K. P., & Reyna-Castillo, M. (2026). Digital Literacy Research for Teaching Excellence in Higher Education: A Bibliometric Perspective. *Education Sciences*, 16(2), 229. <https://doi.org/10.3390/educsci16020229>
- Charalambous, C., Zembylas, M., & Aristidou, X. (2025). Rethinking intercultural communication beyond verbal language: Affect, embodiment and materiality in times of 'crisis.' *Language and Intercultural Communication*, 25(4), 431–441. <https://doi.org/10.1080/14708477.2025.2552529>

- Chiauzzi, E., & Wicks, P. (2019). Digital Trespass: Ethical and Terms-of-Use Violations by Researchers Accessing Data From an Online Patient Community. *Journal of Medical Internet Research*, 21(2), e11985. <https://doi.org/10.2196/11985>
- Chiu, T. K. F., Ahmad, Z., Ismailov, M., & Sanusi, I. T. (2024). What are artificial intelligence literacy and competency? A comprehensive framework to support them. *Computers and Education Open*, 6, 100171. <https://doi.org/10.1016/j.caeo.2024.100171>
- Dyba, T. G., Rowland, S. L., & Fraser, J. A. (2024). A Framework for the Communication Capabilities of scientists. *International Journal of Science Education, Part B*, 14(4), 473–491. <https://doi.org/10.1080/21548455.2024.2412265>
- Fakhri, M. N., Zakiah, F. N., & Novia, L. (2025). Literasi Digital dan Kesadaran Budaya sebagai Solusi Tantangan Atemporalitas dalam Komunikasi Antarbudaya. *Al-Jamahiria: Jurnal Komunikasi Dan Dakwah Islam*, 3(1), 89–102. <https://doi.org/10.30983/al-jamahiria.v3i1.9841>
- Flake, J. K., & Fried, E. I. (2020). Measurement Schmeasurement: Questionable Measurement Practices and How to Avoid Them. *Advances in Methods and Practices in Psychological Science*, 3(4), 456–465. <https://doi.org/10.1177/2515245920952393>
- Govender, I. (2026). Digital Literacy and STEM Skills– What is the Connection? A Systematic Review. *Technology, Knowledge and Learning*, 31(3), 1821–1842. <https://doi.org/10.1007/s10758-025-09879-x>
- Gyllensten, K., Fredriksson, S., Widen, S., & Wayne, K. P. (2023). The experience of noise in communication-intense workplaces: A qualitative study. *PLOS ONE*, 18(1), e0280241. <https://doi.org/10.1371/journal.pone.0280241>
- Hamza, A., Yonghong, D., & Ullah, I. (2025). Dynamic Shifts in Social Media Usage in Pakistan: A Comparative Analysis Across Pre-, During-, and Post-COVID-19 Periods. *Journalism and Media*, 6(2), 59. <https://doi.org/10.3390/journalmedia6020059>
- Hassan, A., Khan, M. H., & Ziberi, D. (2021). Communication Barriers and Process of Feedback in Social Interactions. *International Journal of Media and Information Literacy*, 6(1). <https://doi.org/10.13187/ijmil.2021.1.100>
- Henrich, J. S., Laguerre Van Sickle, L., & Frey, R. F. (2026). Beyond content knowledge: Affective factors continue to influence performance in organic chemistry II. *Chemistry Education Research and Practice*, 27(2), 721–741. <https://doi.org/10.1039/d6rp00023a>
- Ilomäki, L., Lakkala, M., Kallunki, V., Mundy, D., Romero, M., Romeu, T., & Gouseti, A. (2023). Critical digital literacies at school level: A systematic review. *Review of Education*, 11(3), e3425. <https://doi.org/10.1002/rev3.3425>
- Jandevi, U., Lestari, P., & Prayudi, P. (2024). The heartfelt communication model of the “Gerakan Indonesia Membantu” in enhancing awareness among Indonesian students in China. *Informasi*, 54(1), 33–52. <https://doi.org/10.21831/informasi.v54i1.71028>
- Khatami, M. A., & Sazili, S. (2025). Komunikasi hati dalam dinamika senioritas dan bullying di tempat kerja. *Ensiklopedia Social Review*, 7(1), 76–84. <https://doi.org/10.33559/esr.v7i1.2914>
- Kunneman, M., Gionfriddo, M. R., Toloza, F. J. K., Gärtner, F. R., Spencer-Bonilla, G., Hargraves, I. G., Erwin, P. J., & Montori, V. M. (2019). Humanistic communication in the evaluation of shared decision making: A systematic review. *Patient*

- Education and Counseling*, 102(3), 452–466.
<https://doi.org/10.1016/j.pec.2018.11.003>
- Lestari, P. (2023). Teori Komunikasi Hati: Analisis dan Implementasi dalam Kehidupan. In *LPPM Universitas Pembangunan Nasional Veteran Yogyakarta*. SEPADAN.
- Lestari, P., Ediningsih, S. I., Setyowati, Y., Prakanto, R., Suryawijaya, P. G., & Ardiyanti, V. Z. (2024). Digital literacy of Heart Communication for reducing bullying model. *International Journal of Communication and Society*, 6(2), 51–68.
<https://doi.org/10.31763/ijcs.v6i2.1725>
- Lestari, P., Etikawati, A. I., Ediningsih, S. I., Prakanto, R., Suryawijaya, P. G., Adiyoso, T. C. B., & Ardiyanti, V. Z. (2025). The effectiveness of the heart communication digital literacy model through Sikomhati.id to reduce cyberbullying in Jogja Smart School students. *International Journal of Communication and Society*, 7(2), 71–82.
<https://doi.org/10.31763/ijcs.v7i2.2411>
- Lestari, P., Kertamukti, R., & Ruliana, P. (2019). Use of Local Wisdom (Purpusage) through Heart-to-Heart Communication in Settling of Social Conflicts in Karo, North Sumatra Indonesia. *Jurnal Komunikasi: Malaysian Journal of Communication*, 35(3). <http://ejournals.ukm.my/mjc/article/view/34432>
- Lestari, P., Kusmantini, T., & Chandrasari, Y. (2021). Digital literacy communication model of ‘tular nalar’ curriculum during COVID-19. *Jurnal Studi Komunikasi (Indonesian Journal of Communications Studies)*, 5(3), 693–708.
<https://doi.org/10.25139/jsk.v5i3.4135>
- Li, X., Su, J., Mao, J., Chen, L., Gao, H., Wang, Y., Wang, K., Chen, L., Huang, H., Zhang, Q., Ji, Y., Zhu, Z., & Fu, C. (2026). The relationship between digital literacy and mental health resilience among college students—Based on the mediating role of digital learning. *Frontiers in Psychology*, 17.
<https://doi.org/10.3389/fpsyg.2026.1755407>
- Maíz-Arévalo, C. (2022). Intercultural Communication in Computer-Mediated Discourse. In I. Kecskes (Ed.), *The Cambridge Handbook of Intercultural Pragmatics* (pp. 588–611). Cambridge University Press.
<https://doi.org/10.1017/9781108884303.024>
- Marmor, A. (2023). Privacy in Social Media. In C. Véliz & C. Véliz (Eds.), *Oxford Handbook of Digital Ethics* (p. 0). Oxford University Press.
<https://doi.org/10.1093/oxfordhb/9780198857815.013.31>
- Martínez-Bravo, M. C., Sádaba Chalezquer, C., & Serrano-Puche, J. (2022). Dimensions of Digital Literacy in the 21st Century Competency Frameworks. *Sustainability*, 14(3), 1867. <https://doi.org/10.3390/su14031867>
- Naslund, J. A., Bondre, A., Torous, J., & Aschbrenner, K. A. (2020). Social Media and Mental Health: Benefits, Risks, and Opportunities for Research and Practice. *Journal of Technology in Behavioral Science*, 5(3), 245–257.
<https://doi.org/10.1007/s41347-020-00134-x>
- Nuzuli, A. K. (2023). Faktor Penghambat dan Pendukung Komunikasi antara Guru dan Siswa Tuna Rungu di SLBN Kota Sungai Penuh. *Jurnal Komunikasi*, 14(1), 49–58.
<https://doi.org/10.31294/jkom.v14i1.14505>
- Parrish-Sprowl, J., Ziberi, L., & Parrish-Sprowl, S. (2023). Editorial: Complexity-based approaches in health communication. *Frontiers in Communication*, 8.
<https://doi.org/10.3389/fcomm.2023.1115983>

- Patterson, M. L., Dunbar, N. E., Mast, M. S., & Fernandez-Dols, J. M. (2021). Editorial: Advances and Obstacles in Contemporary Nonverbal Communication Research. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.731334>
- Pentapati, K. C., Chenna, D., Kumar, V. S., & Kumar, N. (2025). Reliability generalization meta-analysis of Cronbach's alpha of the oral impacts on daily performance (OIDP) questionnaire. *BMC Oral Health*, 25(1), 220. <https://doi.org/10.1186/s12903-025-05496-3>
- Piazza, J. A. (2022). Fake news: The effects of social media disinformation on domestic terrorism. *Dynamics of Asymmetric Conflict*, 15(1), 55–77. <https://doi.org/10.1080/17467586.2021.1895263>
- Pratama, A., Rahmayani, K., Isma, M. A., Ramadhan, F., & Raziq, A. H. (2025). The Role of Communication Ethics in Addressing Social Differences and Relational Challenges in the Digital Era. *OPINI: Journal of Communication and Social Science*, 2(1), 01–12. <https://doi.org/10.70489/ppzw0q07>
- Reddy, P., Chaudhary, K., & Hussein, S. (2023). A digital literacy model to narrow the digital literacy skills gap. *Heliyon*, 9(4). <https://doi.org/10.1016/j.heliyon.2023.e14878>
- Reichert, F., Zhang, J., Law, N. W. Y., Wong, G. K. W., & de la Torre, J. (2020). Exploring the structure of digital literacy competence assessed using authentic software applications. *Educational Technology Research and Development*, 68(6), 2991–3013. <https://doi.org/10.1007/s11423-020-09825-x>
- Roslan, N. M., Rahim, N. A., & Roslan, N. W. (2020). Distraction in Communication During Discussion. *International Journal of Academic Research in Business and Social Sciences*, 10(10), 444–452. <https://doi.org/10.6007/IJARBS/v10-i10/7730>
- Safitri, S. N., Lestari, P., Suryawijaya, P. G., & Adzka, N. (2024). Pengaruh Kompetensi Komunikasi Hati terhadap Perilaku Silent Treatment. *Warta Ikatan Sarjana Komunikasi Indonesia*, 7(2), 166–180. <https://doi.org/10.25008/wartaiski.v7i2.303>
- Sánchez, M. A., & Delgado, J. J. V. (2025). Transformaciones de la comunicación en la era digital: Un análisis comparativo entre canales tradicionales y digitales. *Revista de Comunicación de la SEECI*, 58, 1–17. <https://doi.org/10.15198/seeci.2025.58.e935>
- Setiansah, M., Nuryanti, N., Santoso, E., Runtiko, A., & Novianti, W. (2023). Improving Indonesian seniors' digital resilience and quality of life through the Digital Academy for Seniors program. *Journal of Media Literacy Education*, 15(2), 71–83. <https://doi.org/https://doi.org/10.23860/JMLE-2023-15-2-6>
- Shaheen, H. (2025). Social media marketing research: A bibliometric analysis from Scopus. *Future Business Journal*, 11(1), 41. <https://doi.org/10.1186/s43093-025-00465-2>
- Shen, Y. (2025). Distractions in digital reading: A meta-analysis of attentional interference effects. *Frontiers in Psychology*, 16. <https://doi.org/10.3389/fpsyg.2025.1671214>
- Stasbeger, G. (2023). Digital Media: Shaping Communication, Culture, and Society in the Digital Age. *Global Media Journal*, 21(64), 1–3. <https://www.globalmediajournal.com/open-access/digital-media-shaping-communication-culture-and-society-in-the-digital-age.php?aid=93433>
- Stefana, A., Damiani, S., Granzol, U., Provenzani, U., Solmi, M., Youngstrom, E. A., & Fusar-Poli, P. (2025). Psychological, psychiatric, and behavioral sciences

- measurement scales: Best practice guidelines for their development and validation. *Frontiers in Psychology*, 15. <https://doi.org/10.3389/fpsyg.2024.1494261>
- Sudaryono, Rahardja, U., Aini, Q., Isma Graha, Y., & Lutfiani, N. (2019). Validity of Test Instruments. *Journal of Physics: Conference Series*, 1364(1), 012050. <https://doi.org/10.1088/1742-6596/1364/1/012050>
- Sugiyono, S., & Lestari, P. (2024). *Metode Penelitian Komunikasi (Kuantitatif, Kualitatif, dan Cara Mudah Menulis Artikel pada Jurnal Nasional dan Internasional)* (UNIWARA). Alfabeta.
- Taber, K. S. (2018). The Use of Cronbach's Alpha When Developing and Reporting Research Instruments in Science Education. *Research in Science Education*, 48(6), 1273–1296. <https://doi.org/10.1007/s11165-016-9602-2>
- Taylan, C., & Weber, L. T. (2023). "Don't let me be misunderstood": Communication with patients from a different cultural background. *Pediatric Nephrology*, 38(3), 643–649. <https://doi.org/10.1007/s00467-022-05573-7>
- Tietsort, C. J., Hanners, K. A., Tracy, S. J., & Adame, E. A. (2021). Free Listening: Identifying and evaluating listening barriers through empathic listening. *Communication Teacher*, 35(2), 129–134. <https://doi.org/10.1080/17404622.2020.1851734>
- Vasist, P. N., Chatterjee, D., & Krishnan, S. (2024). The Polarizing Impact of Political Disinformation and Hate Speech: A Cross-country Configural Narrative. *Information Systems Frontiers*, 26(2), 663–688. <https://doi.org/10.1007/s10796-023-10390-w>
- Wider, W., Saad, A., Mahmood, N. A., Ishak, S., Aziz, M. R. A., Wu, C., Wu, H., & Tanucan, J. C. M. (2026). Digital Literacy in Enhancing Collaborative Teaching: A Systematic Review. *The International Review of Research in Open and Distributed Learning*, 27(1), 210–234. <https://doi.org/10.19173/irrodl.v27i1.8717>
- Zakariya, Y. F. (2022). Cronbach's alpha in mathematics education research: Its appropriateness, overuse, and alternatives in estimating scale reliability. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.1074430>
- Zhao, X. (2023). Challenges and Barriers in Intercultural Communication between Patients with Immigration Backgrounds and Health Professionals: A Systematic Literature Review. *Health Communication*, 38(4), 824–833. <https://doi.org/10.1080/10410236.2021.1980188>