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Validity and reliability testing of a digital ethics instrument among junior high school students

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ABSTRACT

Digital ethics is an important aspect of the behavior of junior high school students when interacting and communicating through digital technologies. Therefore, a valid and reliable instrument is needed to measure students' digital ethics. This study aimed to examine the empirical validity and reliability of a digital ethics instrument for junior high school students. The instrument measures four dimensions of digital ethics, namely digital etiquette, digital communication, digital law, and digital rights and responsibilities. The instrument was initially developed with 40 items, then revised based on expert feedback to 30 items, and subsequently reduced to 28 items for empirical testing. The final 28-item instrument was administered to 32 ninth-grade junior high school students who were purposively selected based on characteristics comparable to those of the target population. Empirical validity was analyzed using the Corrected Item-Total Correlation, while internal consistency reliability was assessed using Cronbach's Alpha. The results showed that all 28 items met the validity criteria, with Corrected Item-Total Correlation coefficients ranging from 0.774 to 0.913, which were higher than the r-table value of 0.349. The reliability analysis yielded a Cronbach's Alpha coefficient of 0.988, indicating very high internal consistency. These findings provide initial empirical evidence that the 28-item digital ethics instrument demonstrates adequate item validity and high internal consistency for measuring digital ethics among junior high school students. The instrument can be used by teachers and guidance and counseling practitioners to identify students' digital ethics and support the planning of educational and guidance services related to responsible digital behavior. Further research involving larger and more diverse samples, along with construct validity analysis, is recommended to strengthen the evidence regarding the quality of the instrument.



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Introduction

The development of digital technology has transformed the ways in which students obtain information, communicate, learn, and interact with others. The use of digital technology provides convenience in supporting educational activities and social life; however, it also requires students to use technology appropriately, responsibly, and in accordance with applicable norms. In educational settings, students' digital activities are not limited to learning activities but also include communication and social interaction through

digital technologies. Therefore, students need to develop ethical behaviors that enable them to use digital technology appropriately and responsibly. This condition makes digital ethics an important aspect of shaping students' behavior as technology users.

Digital ethics is related to an individual's ability to apply norms, demonstrate courtesy, act responsibly, and respect the rights of others when using digital technologies. In practice, interactions in digital spaces may give rise to various problems, such as inappropriate language use, a lack of courtesy in communication, the dissemination of information without considering its potential impact, privacy violations, misuse of technology, and limited understanding of the rights and responsibilities of digital technology users. According to Putri dan Setyowati (2021), the implementation of digital citizenship education in schools includes developing an understanding of ethical technology use, digital responsibility, and compliance with school regulations. This indicates that digital ethics is not only related to students' technical ability to use digital technologies but also to their ability to demonstrate responsible and ethical behavior in digital environments. Therefore, the development of ethical behavior in the use of technology needs to be an integral part of students' educational process.

This need is increasingly relevant in the context of education in Indonesia, where students' interactions with digital technologies have become an integral part of learning and social communication. Previous studies have highlighted the importance of understanding digital citizenship and responsible digital behavior in educational settings. Prasetyo et al. (2022), for example, examined the psychometric characteristics of digital citizenship among Indonesian students using the Rasch model and demonstrated the importance of appropriate measurement in assessing digital citizenship within the Indonesian context. Similarly, Komalasari et al. (2023) examined digital citizenship among junior high school students in Bandung and emphasized the importance of developing digital citizenship among students in the digital era. In addition, Noviani et al. (2022) found that the use of online learning media was associated with students' digital citizenship attitudes. Ardis dan Abdullah (2026) also examined the digital literacy readiness of elementary school students in using social media and digital information. The findings indicated that students' digital literacy readiness was categorized as high; however, the use of social media and digital information still requires an adequate understanding to ensure that technology is used safely and responsibly. These findings highlight the importance of understanding and measuring students' responsible behavior in using digital technologies within the Indonesian educational context.

In this study, digital ethics is conceptualized as an ethical dimension of digital citizenship Ribble (2011) proposed nine elements of digital citizenship that describe various aspects of individuals' behavior as digital citizens. Based on this framework, the present study focuses on measuring digital ethics through four aspects related to students' ethical behavior in using digital technologies, namely *digital etiquette*, *digital communication*, *digital law*, and *digital rights and responsibilities*. These four aspects were subsequently operationalized into behavioral indicators that served as the basis for developing the digital ethics scale used in this study.

Operationally, *digital etiquette* refers to students' behavior in demonstrating politeness and respect toward others when interacting through digital technologies, while also considering the impact of technology use on others. This aspect is measured through two indicators: (1) demonstrating polite behavior and respect for others in digital interactions, and (2) using digital technologies while considering their impact on others. *Digital communication* operationally refers to students' ability to exchange information through digital technologies appropriately and responsibly. This aspect is measured through two indicators: (1) selecting appropriate digital communication media based on the purpose of communication, and (2) conveying information responsibly through digital technologies. *Digital law* operationally refers to students' understanding of and behavior in complying with applicable regulations when using digital technologies and respecting the ownership of others' digital works. This aspect is measured through two indicators: (1) complying with applicable rules and regulations concerning the use of digital technologies, and (2) respecting the copyright and ownership of others' digital works. *Digital rights and responsibilities* operationally refers to students' understanding and behavior in respecting the rights of digital technology users and fulfilling their obligations and responsibilities when using digital technologies. This aspect is measured through three indicators: (1) respecting their own rights and the rights of others when using digital technologies, (2) fulfilling their obligations as users of digital technologies, and (3) using digital technologies responsibly as users. The four aspects comprise nine indicators that serve as the basis for developing the items of the digital ethics scale. Thus, digital ethics in this study is not measured as a general construct but is limited to students' behaviors related to politeness in digital interactions, the use of technology for communication, compliance with digital regulations, and the fulfillment of rights and responsibilities as digital technology users.

Measuring students' digital ethics requires an instrument capable of systematically representing the aspects of ethical behavior involved in the use of digital technologies. Instruments used in educational research need to

provide evidence of validity and reliability to ensure that the data obtained are scientifically accountable. In the context of online education, developing instruments that are appropriate to students' characteristics is also important to obtain defensible and meaningful measurements. Wahyuni et al. (2024), for example, developed an inventory to measure academic resilience among senior high school students in online learning through systematic instrument development and testing procedures. Their findings highlight the importance of systematic instrument development to obtain a measurement tool that is appropriate to the characteristics of the construct and the learners in digital learning contexts. Validity refers to the extent to which an instrument measures the construct it is intended to measure, whereas reliability concerns the consistency of the instrument's measurement results. Therefore, the instrument development process needs to be accompanied by an evaluation of individual item quality and the internal consistency of the instrument. Empirical testing is particularly important because an instrument designed to measure students' digital ethics must provide accurate and consistent information about the construct being measured.

Although previous studies have examined digital citizenship, students' digital behavior, and the implementation of digital citizenship education, relatively few studies have specifically focused on the development and empirical testing of digital ethics instruments for junior high school students within the Indonesian educational context. Prasetyo et al. (2022) focused on the psychometric characteristics of digital citizenship using Rasch analysis, whereas Komalasari et al. (2023) examined the state of digital citizenship among junior high school students. Putri & Setyowati, (2021) examined the implementation of digital citizenship education in developing responsible digital citizens. These studies provide important evidence regarding digital citizenship and students' digital behavior. However, they do not specifically focus on the development and empirical testing of a measurement instrument that operationalizes a particular ethical dimension of digital citizenship into indicators appropriate for junior high school students. This gap highlights the need for a measurement instrument that can provide more focused empirical information regarding students' ethical behavior in using digital technologies.

Based on these needs, the digital ethics scale was developed based on four elements of digital citizenship proposed by Ribble (2011), namely *digital etiquette*, *digital communication*, *digital law*, and *digital rights and responsibilities*. At the initial stage, the instrument consisted of 40 items. Subsequently, the instrument was refined based on feedback and considerations from the validators, resulting in a reduction to 30 items and then to 28 items for empirical testing. The revisions were made to improve the clarity, relevance, and alignment of the items with the conceptual dimensions of digital ethics and the characteristics of junior high school students. The changes in the number of items were part of the refinement process based on expert judgment and were not the result of item deletion based on statistical analysis.

The 28-item instrument was subsequently administered to 32 ninth-grade junior high school students. The pilot study was conducted to obtain initial empirical evidence of item validity and instrument reliability. Participants were purposively selected based on characteristics comparable to those of the target population but were not included in the main research sample. Item validity was analyzed using the *Corrected Item-Total Correlation*, while instrument reliability was assessed using Cronbach's Alpha coefficient. This study is expected to contribute to the provision of a digital ethics measurement instrument with an adequate conceptual foundation and initial empirical evidence to support research and guidance and counseling services for junior high school students.

The use of technology in guidance and counseling services also requires guidance and counseling teachers to be prepared to understand and appropriately utilize digital technologies. Aswar et al. (2022) indicated that guidance and counseling teachers require training in *cyber counseling* as a form of technology-based guidance and counseling service. In this context, the availability of an instrument capable of identifying students' ethical behavior in using digital technologies can support the assessment process as part of guidance and counseling services. Therefore, this study aimed to examine the empirical validity and reliability of a digital ethics instrument for junior high school students in Indonesia.

Method

This study employed a quantitative approach with a research design focused on instrument development and testing. The study aimed to obtain empirical evidence of the validity and reliability of the Digital Ethics Scale developed for junior high school students. The research stages included developing the instrument blueprint, constructing the items, conducting content validation through *expert judgment*, refining the instrument, administering the pilot test, analyzing item validity, and assessing instrument reliability.

The Digital Ethics Scale was developed based on the concept of *digital citizenship* proposed by Ribble (2011). Of the nine elements of *digital citizenship*, this study focused on four elements that are directly related to

students' ethical behavior in using digital technologies, namely *digital etiquette*, *digital communication*, *digital law*, and *digital rights and responsibilities*. These four elements were subsequently elaborated into indicators that served as the basis for constructing the questionnaire items.

At the initial stage, the instrument consisted of 40 items comprising both *favorable* and *unfavorable* statements. The items were developed by considering the alignment among the construct, dimensions, indicators, and characteristics of junior high school students. Subsequently, the instrument underwent content validation through *expert judgment*. Content validation was conducted by two expert validators with relevant expertise and experience in guidance and counseling, education, and instrument development. The validators evaluated the relevance, clarity, and appropriateness of each item in relation to the construct, dimensions, and indicators being measured. Content validation was conducted to obtain initial evidence that the instrument items adequately represented the intended construct before empirical testing.

Based on the feedback and considerations provided by the validators, the instrument was refined, reducing the number of items from 40 to 30 and subsequently to 28 items for the pilot test. The changes in the number of items were made based on expert judgment before any statistical analysis of the pilot test data was conducted. Thus, the reduction in the number of items from 40 to 30 and subsequently to 28 was part of the instrument refinement process and was not the result of item deletion based on statistical analysis.

The instrument was pilot-tested with 32 ninth-grade junior high school students from Class IX E, aged 14–15 years. Participants were selected using *purposive sampling* based on characteristics comparable to those of the target population. The use of purposive sampling was based on the similarity between the characteristics of the pilot participants and those of the target population. Ninth-grade students were selected because they had characteristics that were relatively comparable to those of eighth-grade students, who were the target population of the main study. These characteristics included the same educational level, a relatively similar developmental age range, the same school environment, and experience using digital technologies for learning activities and everyday communication.

The pilot participants were not included in the main research sample to minimize the potential influence of prior experience with the instrument on the results of the main study. Data obtained from the 32 respondents were used to examine item validity and the reliability of the Digital Ethics Scale. This number was used as the initial pilot sample for the instrument. A minimum of 30 respondents can be used to assess questionnaire reliability at the *pilot study* stage (Bujang et al., 2024). Thus, the 32 respondents in this study met the recommended minimum number for initial reliability testing. The pilot study involved 32 ninth-grade students, comprising 19 female students (59.4%) and 13 male students (40.6%), with an age range of 14–15 years. Participants were purposively selected based on characteristics that were relatively comparable to those of the target population. The pilot test was conducted after the item development and refinement process had been completed (Mikkonen et al., 2022). The data were subsequently analyzed using the *Corrected Item-Total Correlation* to examine item validity and Cronbach's Alpha coefficient to assess the reliability of the instrument.

The instrument used a four-point Likert scale with four response options: Strongly Agree (SS), Agree (S), Disagree (TS), and Strongly Disagree (STS). Scores were assigned according to the direction of each statement. For *favorable* items, scores ranged from 4 for Strongly Agree to 1 for Strongly Disagree. For *unfavorable* items, the scoring was reversed, with a score of 1 assigned to Strongly Agree and a score of 4 assigned to Strongly Disagree. Reverse scoring for the *unfavorable* items was performed before statistical analysis to ensure that the scoring direction of all items was consistent in representing the level of digital ethics. Subsequently, the data from each respondent were tabulated and analyzed using IBM SPSS Statistics.

Instrument validity in this study included content validity and empirical validity. Content validity was established through *expert judgment* regarding the alignment of the items with the predetermined construct, dimensions, and indicators of digital ethics. Content validity is an important initial stage in instrument development because it is used to ensure that the item content adequately represents the domain of the construct being measured. Subsequently, empirical item validity was analyzed using the Corrected Item-Total Correlation. This technique was used to determine the relationship between the score of an individual item and the total instrument score after excluding the contribution of that item from the total score.

In this study, item validity was assessed using the Corrected Item-Total Correlation. The obtained coefficients were compared with the *r*-table value of 0.349 as the decision criterion. With 32 pilot-test respondents, the degrees of freedom (*df*) were 30, and the critical *r* value at a 5% significance level for a two-tailed test was 0.349. Items with a *Corrected Item-Total Correlation* coefficient greater than 0.349 were considered to meet the empirical validity criterion and were retained for subsequent analysis.

Instrument reliability was assessed using the Cronbach's Alpha coefficient. Cronbach's Alpha is one of the commonly used indices for evaluating internal consistency, referring to the extent to which items within an instrument are interrelated in measuring the same construct. A Cronbach's Alpha value of 0.70 or higher is often used as a practical guideline for indicating adequate internal consistency in research. However, this value was not treated as an absolute cutoff because the interpretation of reliability should consider the purpose of measurement, the characteristics of the instrument, the number of items, and the characteristics of the respondents (Hussey et al., 2025).

In this study, the Cronbach's Alpha coefficient was used to determine the internal consistency of the Digital Ethics Scale, which consisted of 28 items, after reverse scoring was applied to the *unfavorable* items. The resulting coefficient was then used as the basis for assessing the level of internal consistency of the instrument. This study focused exclusively on testing the validity and reliability of the instrument. Therefore, the study did not include an examination of the effectiveness of the sociodrama technique, comparisons between the experimental and control groups, or analyses of changes in *pretest* and *posttest* scores. These analyses were part of the main study, which used the instrument after it had met the required criteria.

Results and Discussions

Validity Analysis

The item validity analysis was conducted to obtain empirical evidence regarding the performance of each item in measuring the digital ethics construct. The analysis was performed on the 28 items of the Digital Ethics Scale using the *Corrected Item-Total Correlation*. An item was considered to meet the empirical validity criterion when its *Corrected Item-Total Correlation* value exceeded the predetermined *r*-table value of 0.349. Item analysis is an important stage in instrument development because it provides evidence regarding the performance of individual items within a measurement scale (Boateng et al., 2018). The results of the item validity analysis are presented in Table 1.

Table 1. Results of the Item Validity Analysis of the Digital Ethics Scale

Item	Corrected Item – Total Correlation	Description
P1	0.886	Valid
P2	0.878	Valid
P3	0.907	Valid
P4	0.900	Valid
P5	0.912	Valid
P6	0.825	Valid
P7	0.858	Valid
P8	0.896	Valid
P9	0.843	Valid
P10	0.913	Valid
P11	0.798	Valid
P12	0.844	Valid
P13	0.852	Valid
P14	0.839	Valid
P15	0.859	Valid
P16	0.872	Valid
P17	0.907	Valid
P18	0.806	Valid
P19	0.774	Valid
P20	0.896	Valid
P21	0.866	Valid
P22	0.890	Valid
P23	0.858	Valid

Item	Corrected Item – Total Correlation	Description
P24	0.873	Valid
P25	0.904	Valid
P26	0.791	Valid
P27	0.783	Valid
P28	0.834	Valid

Source: Primary data analyzed using IBM SPSS Statistics 23

Based on Table 1, all 28 items obtained *Corrected Item-Total Correlation* values ranging from 0.774 to 0.913. All of these values were higher than the *r*-table value of 0.349. The lowest correlation coefficient was obtained for item P19 (0.774), whereas the highest was obtained for item P10 (0.913). Based on the predetermined criterion, all 28 items met the empirical validity criterion and were therefore retained for the reliability analysis.

These results indicate that each item had a strong relationship with the overall score of the Digital Ethics Scale in the pilot sample. This finding is consistent with the instrument development framework proposed by Boateng et al. (2018), which places item analysis as an important stage in evaluating item performance. . Eristi dan Erdem (2017), in the development of the *Media Literacy Skills Scale*, used a minimum item-total correlation of 0.30 as one of the criteria for evaluating item performance. Similarly, Alom dan Ramalingappa (2025) used a value of 0.30 as a reference for evaluating item performance in the development and validation of the *Digital Literacy Scale*. Compared with these criteria, the *Corrected Item-Total Correlation* values obtained in the present study indicate a strong relationship between each item and the overall score of the Digital Ethics Scale.

These findings are also consistent with previous psychometric studies concerning constructs related to the use of digital technologies in the Indonesian educational context. Prasetyo et al. (2022) examined the psychometric characteristics of digital citizenship among Indonesian students using the Rasch model and demonstrated the importance of empirical psychometric analysis in evaluating digital citizenship instruments. Harmawati et al. (2024) examined digital literacy among Indonesian students, including aspects of ethics and safety in the use of digital media. Sapriya et al. (2025) developed a digital literacy assessment instrument for senior high school students in Indonesia using Rasch model analysis and emphasized the importance of evaluating item functioning and instrument reliability. Karitas dan Suwartono (2023) also developed and evaluated the psychometric characteristics of a digital literacy assessment instrument for Indonesian students. Overall, these studies demonstrate the importance of systematic psychometric evaluation in the development of instruments related to digital behavior and competencies.

This study specifically focused on digital ethics among junior high school students by operationalizing four dimensions derived from Ribble (2011) *digital citizenship* framework, namely *digital etiquette*, *digital communication*, *digital law*, and *digital rights and responsibilities*. The *Corrected Item-Total Correlation* results provide initial evidence that all 28 items had strong relationships with the overall score of the Digital Ethics Scale in the pilot sample. These findings support the decision to retain all items after the refinement process based on expert judgment.

Nevertheless, the high *Corrected Item-Total Correlation* values should be interpreted with caution. High correlations indicate a strong relationship between individual items and the overall scale score, but do not, by themselves, establish comprehensive construct validity. In addition, very high correlations among items may indicate potential similarity or content overlap among some items. Therefore, the findings of this study should be understood as initial evidence of empirical validity at the item level, rather than as evidence that the construct validity of the instrument has been fully established. Boateng et al. (2018) emphasized that instrument development and validation require multiple forms of evidence, including evidence regarding the structure or dimensionality of the construct and reliability.

Accordingly, further research involving a larger sample size and more diverse respondent characteristics is needed to strengthen the evidence supporting the validity of the instrument. Exploratory and/or confirmatory factor analysis may also be conducted to examine the dimensional structure of the Digital Ethics Scale and evaluate the possibility of item redundancy. Because the empirical validity evidence in this study was obtained from a pilot test involving only 32 students, the use of the instrument should be regarded as preliminary or conditional until more comprehensive psychometric evidence becomes available.

Reliability Analysis

The reliability analysis was conducted to assess the internal consistency of the 28-item Digital Ethics Scale following the item validity analysis. Reliability was assessed using Cronbach's Alpha. Cronbach's Alpha is widely used to evaluate the extent to which items within an instrument demonstrate internal consistency. Although a coefficient of 0.70 is often used as a practical guideline, the interpretation of Cronbach's Alpha should consider the purpose of the instrument, the number of items, and the characteristics of the sample rather than relying solely on a specific cutoff value (Hussey et al., 2025).

Table 2. Reliability Analysis Results of the Digital Ethics Scale

Reliability Statistics	
Cronbach's Alpha	N of Items
0.988	28

Source: Primary data analyzed using IBM SPSS Statistics 23.

Based on Table 2, the 28-item Digital Ethics Scale yielded a Cronbach's Alpha coefficient of 0.988. This value indicates a very high level of internal consistency among the items. Therefore, the reliability analysis provides additional initial evidence regarding the internal consistency of the 28-item Digital Ethics Scale. However, the high Cronbach's Alpha coefficient should also be interpreted with caution. A very high alpha value may be partly influenced by the number of items and content similarity among items, and therefore does not automatically indicate that the instrument has comprehensive validity (Taber, 2018). Therefore, the reliability coefficient of 0.988 should be understood as evidence of very high internal consistency, while further research is still needed to examine the dimensionality and construct validity of the instrument.

Overall, the results of the item validity and reliability analyses indicate that the 28-item Digital Ethics Scale provides initial evidence of empirical validity at the item level and very high internal consistency within the pilot sample. Nevertheless, these findings represent preliminary psychometric evidence. Further validation involving larger and more diverse samples, along with construct validity analyses, is required before the instrument can be considered comprehensively validated.

Conclusions

Based on the results of the instrument pilot test, the Digital Ethics Scale, developed based on four elements of *digital citizenship*, namely *digital etiquette*, *digital communication*, *digital law*, and *digital rights and responsibilities*, demonstrated adequate preliminary psychometric evidence. The validity analysis involving 32 junior high school students showed that all 28 items had *Corrected Item-Total Correlation* values ranging from 0.774 to 0.913, which were higher than the predetermined *r*-table value of 0.349. Thus, all 28 items met the empirical validity criterion. The reliability analysis yielded a Cronbach's Alpha coefficient of 0.988, indicating very high internal consistency. The 28-item Digital Ethics Scale has potential for practical use in junior high school contexts, particularly as an initial assessment instrument for identifying students' digital ethics and supporting educational programs and guidance and counseling services related to responsible digital behavior. However, because the evidence obtained in this study was based on a relatively small pilot sample of 32 students and did not include comprehensive construct validity testing, the instrument should be regarded as suitable for preliminary or conditional use rather than as a fully validated instrument. Therefore, further validation studies involving larger and more diverse samples, along with construct validity analyses, are needed before the instrument can be implemented more broadly.

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