

Digital Self-Development Based on Digital Identity Theory to Improve the Digital Ethics of Grade 10 Vocational High School Students

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Abstract

The rapid development of information technology has influenced students' digital behavior, including the emergence of ethical challenges in the use of social media. This study aims to develop and test the effectiveness of a digital self-based intervention module to improve the digital ethics of 10th grade vocational high school students. The scope of the study includes the design, development, implementation, and evaluation of the module with a Research and Development (R&D) approach using the ADDIE model. A mixed methods approach was used, with qualitative methods for needs analysis and expert validation, and quantitative methods to measure the module's effectiveness through pretest and posttest. The development phase produced a module containing narratives, illustrations, reflective activities, and digital case studies, validated by three experts, and piloted on 15 students. The analysis results showed a significant increase in students' average scores, from 58.6 in the pretest to 83.3 in the posttest, with an average increase of 24.7 points. These findings indicate that the module is able to improve students' understanding, awareness, and ethical behavior in digital interactions. The developed module not only provides conceptual insights into digital identity and online ethics but also facilitates students to internalize these values through contextual and interactive learning. In conclusion, digital self-based interventions have great potential in shaping positive digital identities and increasing students' responsibility in the digital space, making them worthy of wider implementation in other secondary education contexts.

1. Introduction

The development of information and communication technology over the past two decades has brought global society into a highly dynamic digital era. Social, educational, and personal life now rely heavily on internet-based interactions, with social media becoming a primary means of constructing and expressing identity, particularly among adolescents (Avci et al. 2025). Young people grow up with high exposure to the virtual world, which influences not only their communication patterns but also how they form their self-perceptions (Kim et al., 2025). This digitalization expands the space for identity exploration, which previously only occurred in conventional social spaces (Pérez-Torres, 2024). Furthermore, numerous studies have shown that the existence of a digital identity has a long-term impact on adolescents' ethical decision-making in both online and offline life (Fioravanti, Bocci Benucci, Ceragioli, & Casale, 2022).

The concept of digital identity represents how individuals project themselves in cyberspace, through posts, comments, and participation in digital social spaces (Turkle, 1995). Meanwhile, the concept of digital self describes individuals' reflective awareness in managing their online self-image and how they want to be perceived by the digital public (Nyamwesa, 2024). This phenomenon is understood more deeply through the Social Learning Theory approach developed by Bandura (1977), which states that individual behavior included in the digital world can be formed through the process of observing and imitating role models on social media (Noon, 2020). In the educational context, undirected digital interactions have the potential to lead to deviant behavior, such as digital dependency, social media misuse, and low digital ethics awareness (Lajnef, 2023). Conversely, research shows that designing structured digital interactions through increased social presence and online guidance can create a healthy social media environment and support the development of positive student behavior (Isriyah, Degeng, Lasan, & Muslihati, 2024).

Previous research has shown that learning modules developed based on psychological theories such as social cognitive theory are able to significantly change target behavior through structured learning processes and behavior modification techniques (Baihaqi et al. 2025). This approach is relevant to the development of a digital self-based on Digital Identity Theory because both require systematic design to shape adaptive and ethical behavior in the digital environment (Baihaqi et al. 2025). In addition, assertiveness-based training can

effectively reduce cyberbullying behavior in adolescents by helping students develop healthy communication skills and awareness of the consequences of their actions in the digital space (Hanysha et al. 2023). These findings reinforce the urgency of educational interventions that instill awareness of digital ethics from an early age, especially among vocational high school students who are vulnerable to the negative influence of social media due to high exposure to technology, weak digital self-control, and minimal understanding of media ethics (Hanysha et al., 2023).

This phenomenon is increasingly evident in vocational secondary education environments. Based on initial observations, several problems were identified, such as low learning focus due to digital distractions, dependence on instant content such as "answer submissions," and the use of social media for non-learning purposes during school hours. This situation indicates weak digital self-control and a minimal understanding of media ethics among 10th-grade students (Gazali & Sumarsono, 2025). This is exacerbated by the lack of learning materials that explicitly instill digital ethics and self-reflection in online interactions (Fadillah et al., 2024). Without strengthening the digital self-accompanied by a healthy understanding of digital identity, adolescents are at risk of experiencing a digital identity crisis that negatively impacts their character and moral values (Ramadhani, 2025).

Several previous studies have underscored the importance of digital literacy interventions for shaping ethical behavior in cyberspace. However, many approaches remain normative, without systematically integrating aspects of digital self-awareness (Amalia et al., 2025). Furthermore, most digital literacy modules lack a robust theoretical framework, such as the integration of Turkle's Digital Identity Theory and Bandura's (Kim et al., 2025). Previous research also tends to be descriptive and fails to develop contextual learning models tailored to the needs of vocational high school students, who are characterized by a high vocational and practice orientation (Aker, Park, Headrick, Page, & Wisniewski, 2025). Although research on digital identity and online ethics is increasing, there remains a gap in the development of structured, empirically based learning modules. Research that explicitly develops digital self-based learning modules integrated with digital identity and social learning theories, particularly for vocational high school students, is still rare (Hossain et al., 2024). In fact, vocational high school students are a group that is very vulnerable to the negative influence of social media due to the high level of exposure to technology but not yet balanced with strengthening of character and ethical awareness (Ikasari et al., 2025).

Despite the growing research on the development of digital identity and the digital self in adolescents, significant weaknesses remain in the implementation of formal education. Most studies still focus on the quantity of social media use, such as online duration whereas empirical findings show that the quality of digital engagement such as authentic self-presentation has a greater influence on self-concept clarity and identity distress (Beaumont & Wang, 2023). Self-presentation models such as social feedback seeking and upward social comparison have also been shown to increase the risk of mental health disorders, yet they have not been integrated as a basis for designing digital ethics educational interventions (Larsen, 2024). Meanwhile, digital identity dimensions such as self-presentation, social comparison, role modeling, and online audiences have been widely studied, but not many have been translated into practical learning modules relevant to the vocational characteristics of vocational high school students (Mascheroni, 2023). Thus, this study addresses three main gaps: the need for modules that prioritize the quality of digital interactions over mere duration of use; the absence of educational interventions that foster digital ethics through reflective digital self-awareness; and the limited development of modules based on digital identity theory and social learning specifically aimed at vocational high school students.

Based on the description, this study focuses on developing and testing the effectiveness of a digital self-based learning module designed using the Digital Identity Theory (Turkle) and Social Learning Theory (Bandura) approaches in improving the digital ethics of grade 10 vocational high school students. This module is expected to shape healthy digital identity awareness and guide students to become ethical, reflective, and responsible digital citizens in both virtual and real life.

2. Method

This research is a type of development research (Research and Development/R&D) that aims to produce a digital self-based intervention module to improve the digital ethics of grade 10 vocational high school students. The research approach used is mixed methods, which combines qualitative and quantitative approaches in a complementary manner. The use of mixed methods was chosen because it is considered capable of providing a more complete picture: qualitative data is used to explore in depth the needs of users (students and guidance counselors), the context of the digital ethics phenomenon, and expert validation of the product's feasibility; while quantitative data is used to measure the effectiveness of the module through pretest and posttest tests and student responses through a Likert scale questionnaire. Thus, this method allows for richer analysis because it can capture both subjective and objective dimensions of the phenomenon being studied. The development model used is the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model. The procedures for each stage are summarized in the following workflow table 1, for greater systematic and easier understanding.

Table 1. Stages of the ADDIE Development Model

Stage	Main Activities
Analysis	Identifying needs through questionnaires and interviews with students and guidance counselors; analyzing problems related to digital distractions, unethical behavior, and low digital identity awareness.
Design	Preparation of module design: objectives, content structure, learning strategies, activity flow, and preparation of research instruments (validation sheets, needs questionnaires, student response questionnaires, pretest & posttest questions).
Development	Preparation of modules in the form of narratives, illustrations, case studies, reflective activities, session evaluations; validation by material experts, media experts, and language experts.
Implementation	Limited trial (5 students) and extensive trial (15 students); pretest implementation, module implementation in several sessions, observation of student engagement, filling out response questionnaires, and posttest.
Evaluation	Analysis of pretest & posttest data, student responses, and observation notes; evaluation of the module's strengths & weaknesses based on the data.

The research instruments used consisted of a questionnaire on the needs of students and guidance and counseling teachers to map the digital ethics problems faced, an expert validation sheet covering aspects of material, media, and language to assess the feasibility of the module, pretest and posttest questions to measure the level of understanding and behavior of students' digital ethics before and after using the module, and a student response questionnaire with a Likert scale to determine students' acceptance and assessment of the module.

The validity of the instrument in this study focused on the validity of the learning module, which was conducted through expert testing (material, media, and language). Aspects assessed included content suitability, presentation systematics, language readability, and media applicability. The reliability of the questionnaire instrument was not statistically tested, as the primary focus of this study was on the module's feasibility as a development product.

Data analysis was conducted using two approaches. First, qualitative analysis was used to process data from interviews, observations, and expert input through data reduction, data presentation, and drawing conclusions. Second, quantitative analysis was used to process the questionnaire results and pretest and posttest scores. The effectiveness of the module was analyzed by comparing pretest and posttest results using a t-test, while student questionnaire responses were analyzed using descriptive statistics in the form of average scores and percentages.

This study has limitations, namely that the module trial was limited to a small number of students and was conducted at only one vocational high school. This requires caution when generalizing the research results to a broader context. Furthermore, the reliability of the questionnaire instrument was not tested quantitatively, so interpretation of the results places more emphasis on the product's feasibility than on the instrument's psychometric strength. These limitations are expected to serve as a reference for further research involving more participants, a wider range of schools, and more in-depth instrument reliability testing.

3. Results and Discussion

This research is development research (Research and Development/R&D) using the ADDIE model which includes five systematic stages: Analysis, Design, Development, Implementation, and Evaluation. The main objective of this research is to produce and test the effectiveness of a digital self- based intervention module in improving the digital ethics of grade 10 vocational high school students. After the development stage is completed, the module is then implemented on a limited basis to 15 students. The effectiveness of the module is tested by comparing student learning outcomes before using the module (pretest) and after receiving intervention through the developed module (posttest).

The analysis results showed significant improvement across the entire study sample. Pretest scores reflected students' initial understanding of basic digital ethics concepts, while posttest scores reflected the extent to which that understanding developed after experiencing the digital self- directed intervention module. Table 2 is a comparison table between the pretest and posttest scores for each student.

Table 2. Comparison of Pretest and Posttest Values

No	Initials of students	Pretest Score	Posttest Score	Improvement
1	S01	58	83	+25
2	S02	55	85	+30
3	S03	62	82	+20
4	S04	60	84	+24
5	S05	59	80	+21
6	S06	57	81	+24

No	Initials of students	Pretest Score	Posttest Score	Improvement
7	S07	56	83	+27
8	S08	60	86	+26
9	S09	58	82	+24
10	S10	55	85	+30
11	S11	59	84	+25
12	S12	61	83	+22
13	S13	60	82	+22
14	S14	57	85	+28
15	S15	56	84	+28

The table above shows that all students experienced an increase in their scores, ranging from +20 to +30 points. The average pretest score, which was originally 58.6, increased to 83.3 in the posttest, resulting in an average difference of 24.7 points. This consistent improvement across all students demonstrates that the digital self- based intervention module significantly contributes to improving students' understanding of digital ethics.

Visually, the difference between pretest and posttest scores is also consistently depicted in the following graph:

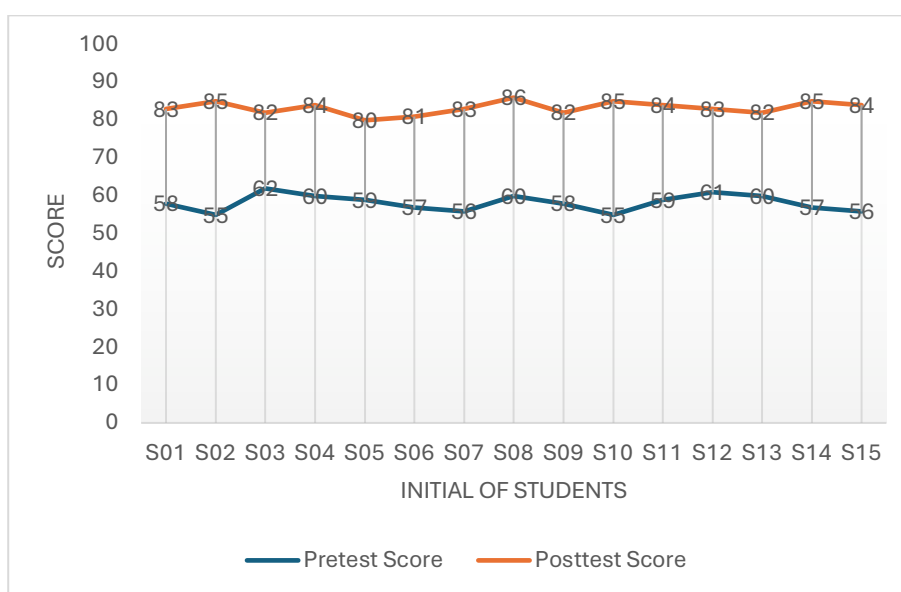


Figure 1. Comparison of Pretest and Posttest Values

The improvement in posttest scores experienced by all students provides empirical evidence that the digital self- based intervention module developed is truly effective in increasing understanding and awareness of digital ethics. This result can be explained by the module's purposeful development using the ADDIE model, ensuring that each stage is truly tailored to student needs. For example, during the analysis phase, it was discovered that students' understanding of digital ethics was still low. Therefore, during the design and development phase, the material was structured with an emphasis on self-awareness and real-life examples. This systematic design process makes the module relevant to learning needs, making it understandable that students showed a significant improvement in their scores after the module was implemented.

Furthermore, the success of this module is also inseparable from the digital self-approach, which successfully encourages students to recognize their own digital identities and reflect on their behavior in the digital space. Students become more aware that every action in cyberspace leaves a digital footprint that has implications for their reputation, thus forming self-regulation in behavior. This reflective process aligns with Bandura's self-regulation theory, which emphasizes that self-awareness is key to establishing responsibility and controlling behavior. Therefore, the significant increase in posttest scores can be understood as a consequence of students' increased awareness of their digital identities.

The module's content, structured with contextual examples relevant to students' daily lives, also plays a crucial role in enhancing this understanding. Most vocational high school students are highly engaged in social media use and online interactions, making material directly related to their experiences easier to understand and more quickly internalized. This supports Vygotsky's constructivist view that learning is more effective when linked to the students' social and cultural realities.

In addition to the relevance of the content, the interactive presentation of the modules through discussions, case analyses, and self-reflection exercises allows students to actively participate in constructing their own understanding rather than passively receiving the material. This active engagement fosters a deeper and more meaningful learning process, ensuring that the understanding gained is more lasting and impacts daily behavior.

This improved score reflects that the digital self-based intervention was able to help students recognize their digital identity and develop more ethical behavior in interacting in the digital space. This aligns with the primary objective of the module development, which was to provide a conceptual and practical understanding of the importance of ethics in the use of technology, particularly social media, in the lives of vocational high school students who are closely connected to the digital world. This finding is also consistent with research (Livingstone & Helsper, 2007) which emphasizes that self-awareness-based digital literacy contributes to more responsible digital behavior.

Thus, the increase in posttest scores was not a coincidence, but rather the result of a combination of systematic learning design, a reflective approach that fosters self-awareness, relevance of the material to students' real-life experiences, and presentation that encouraged active participation. This finding is possible because the digital self-based intervention module not only serves as a medium for knowledge transfer but also as a means of internalizing digital ethical values, encouraging students to behave more ethically in the digital space.

4. Conclusion

Based on the research results, it can be concluded that the development of a digital self-based classical guidance module has significant potential in improving the digital ethics of 10th grade students in vocational high schools. This module was designed with a Research and Development (R&D) approach through a simplified ADDIE model, and integrates digital identity theory and social learning principles. The development results indicate that this module is able to respond to learning needs relevant to the challenges of the digital era, particularly in forming a positive digital identity and increasing students' ethical awareness in interacting in the digital space. In addition, the findings of this study open up opportunities to propose a new hypothesis that digital self-based guidance interventions can improve students' self-regulation and digital responsibility. Therefore, the implementation of this module needs to be further empirically tested to ensure its effectiveness and validity in a broader context and across educational units.

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Data Availability

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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