

Strategies for Enhancing Digital Citizenship Literacy Among Vocational College Students in Fujian Province, China

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ABSTRACT

In the context of rapid digital transformation, digital citizenship literacy has become a critical competence for individuals to participate effectively and responsibly in digital society. However, vocational college students often demonstrate an imbalance between technical skills and responsible digital behavior. This study aims to systematically examine the key factors influencing digital citizenship literacy among vocational college students in Fujian Province, China, based on Bandura's social cognitive theory. A quantitative research design was adopted, using a cross-sectional survey of 843 students and 215 teachers from 10 vocational colleges. Data were analyzed through descriptive statistics, correlation analysis, and multiple linear regression to explore the relationships between personal, behavioral, and environmental factors and digital citizenship literacy. The results indicate that computer self-efficacy, internet attitudes, interpersonal communication skills, social media skills, and perceived organizational support all have significant positive effects on digital citizenship literacy. Among these, computer self-efficacy shows the strongest predictive power, followed by social media skills and internet attitudes. The model explains 58% of the variance, demonstrating a strong explanatory capacity. This study concludes that the development of digital citizenship literacy is a multi-dimensional and interactive process shaped by personal capabilities, behavioral practices, and environmental support. It suggests that vocational education should adopt a systematic approach that integrates skill development, value cultivation, and institutional support to foster responsible and competent digital citizens.

Contribution/Originality: This study contributes to the existing literature by focusing on vocational college students, an underexplored group in digital citizenship research. This study is one of very few studies which have investigated digital citizenship literacy using an integrated person-behavior-environment framework.

The paper's primary contribution is finding that computer self-efficacy is the strongest predictor.

1. Introduction

We are living in an era defined by the deep integration of networked, digital, and intelligent technologies. Emerging technologies such as big data and artificial intelligence are reshaping socio-economic structures and accelerating the formation of a digitally interconnected society. In this context, “digital citizenship” has become an essential identity for individuals participating in contemporary society (Parry, 2008). Digital citizenship literacy—referring to the ability to participate safely, responsibly, and effectively in digital environments—has therefore emerged as a critical factor influencing individual development and social progress (Choi, 2016).

Higher vocational education plays a vital role in cultivating technically skilled talent for the digital economy. However, existing studies suggest that vocational students often exhibit an imbalance in digital literacy, characterized by strong technical skills but insufficient ethical awareness and critical thinking (Xu et al., 2025). Deficiencies in areas such as information security, digital ethics, and social participation highlight the need for systematic educational interventions (Fajri et al., 2024).

Grounded in Bandura’s social cognitive theory, particularly the framework of triadic reciprocal determinism (Bandura, 1986), this study aims to examine the key factors influencing digital citizenship literacy among vocational college students in Fujian Province, China.

1.1. Research Background

Currently, digital technologies represented by the Internet of Things, cloud computing, big data, and artificial intelligence are propelling human society into a phase of profound transformation. These technologies are not only altering modes of production and organization but also constructing a “digital society” that interpenetrates and co-evolves with the physical world. Within this space, every individual connected to the network inherently carries the identity of a “digital citizen.” Digital space has become a core arena for citizens to learn, work, socialize, and engage in public affairs. The effective functioning of a digital society depends not only on technological infrastructure but also on the literacy level of its citizens (Lynn et al., 2022). Digital citizenship literacy extends beyond technical competence and encompasses knowledge, skills, attitudes, and ethical values (Iskandar et al., 2025). For vocational students, these competencies are particularly critical, as they are expected to function effectively in increasingly digitalized work environments. However, research indicates that “digital natives” are not necessarily digitally competent in terms of critical thinking and responsible participation (Blackwell et al., 2019). Therefore, exploring the competencies digital citizens should possess and the pathways to cultivate them has become a contemporary issue of paramount importance for personal development, social harmony, and national competitiveness. Focusing on vocational colleges in Fujian Province, this study aims to systematically investigate the influencing factors and enhancement strategies for digital citizenship literacy. The research background is primarily based on the following three logical levels.

1.1.1. Digital Citizenship Literacy: Foundational Competence for Survival and Development in the Digital Era

The healthy functioning of a digital society relies not only on advanced technological infrastructure but also on the overall literacy level of its citizens. Digital citizenship literacy, as the embodiment of digital civilization at the individual level, serves as the fundamental prerequisite for people to learn, work, and live effectively in an informatized environment. This literacy transcends mere technical operation; it constitutes a comprehensive framework integrating knowledge, skills, attitudes, and values.

Table 1 presents the core dimensions of digital citizenship literacy and their alignment with the goals of higher vocational education. As shown in Table 1, digital citizenship literacy is conceptualized as a multidimensional construct encompassing digital security and rule of law, digital ethics and responsibility, and digital cognition and participation.

Specifically, digital security and rule of law emphasize individuals’ awareness of cybersecurity, legal compliance, and data protection. Digital ethics and responsibility highlight the importance of integrity, respect, and accountability in online environments. Digital cognition and participation focus on critical thinking, information processing, and the effective use of digital tools for communication, collaboration, and innovation.

From table 1, we can see this classification not only reflects the theoretical connotation of digital citizenship but also demonstrates its practical relevance to vocational education, which aims to cultivate technically skilled individuals with both professional competence and social responsibility in the digital era.

Table 1: Required for Digital Citizenship

Core requirement	The inherent requirements for digital citizens	The corresponding goals of higher vocational education
Digital Security and Rule of Law	Have a sense of cyber security, abide by laws and regulations in the digital space, and protect personal privacy and data sovereignty.	Cultivate technical talents who adhere to the bottom line, have a sense of awe, and possess professional information security norms.
Digital Ethics and Responsibility	Practice online ethics, uphold integrity, respect and empathy, and actively assume the social responsibility of building a clear and clean cyberspace.	Shape individuals who possess both moral integrity and professional skills and are responsible both online and in the workplace.
Digital cognition and participation	Develop critical thinking, be able to effectively distinguish and process information, and use digital tools for rational expression, collaboration and innovation.	Cultivate builders who can learn throughout their lives, are good at solving complex problems and have an innovative consciousness.

For vocational students about to enter the industrial frontline, these competencies are particularly crucial. As "digital natives," they may also become a "vulnerable group to digital risks" due to an incomplete literacy structure. Without systematic cultivation,

they may not only struggle to fully integrate into the digital society but also face challenges such as ethical misconduct, security crises, and a lack of innovation in their future careers. Therefore, integrating digital citizenship literacy education into the talent development system of vocational education is a foundational project to empower the new generation of technical and skilled talents to adapt to and lead the development of the digital society.

1.1.2. Digital Citizenship Literacy: An Inevitable Requirement for Cultivating High-Quality Technical and Skilled Talents

In the digital economy, information and digital skills have become key drivers of productivity and competitiveness (Firmansyah et al., 2024). The level of digital citizenship literacy among vocational students directly affects workforce quality and the sustainable development of the digital economy (Qiu et al., 2024). Vocational education is expected to cultivate high-quality technical talent capable of adapting to industrial transformation (Wang, 2025). Beyond technical skills, modern workers are required to demonstrate digital thinking, collaboration, and innovation capabilities (van Laar et al., 2020). National modernization relies on educational modernization, and the ultimate goal of educational modernization lies in enhancing the quality of talent cultivation. Vocational education aims to cultivate high-quality technical and skilled talents capable of adapting to industrial transformation and upgrading. Currently, the digitalization and intelligentization of industries have imposed new demands on workers' capabilities: future "craftsmen" must not only possess refined skills but also demonstrate digital thinking, collaborative abilities, data-driven decision-making, and cross-context innovation. These competencies are precisely the embodiment of high-level digital citizenship literacy in the professional domain. In other words, robust digital citizenship literacy is the key support for transforming vocational students from "technical operators" into "intelligent creators." Only by cultivating versatile talents who master advanced technologies while also possessing digital responsibility and innovative capabilities can vocational education better serve the modernization of the nation.

1.1.3. Digital Citizenship Literacy: A Critical Initiative for Implementing National Strategies and Regional Policies

Enhancing citizens' digital literacy has become a global policy priority (Xiaoni, 2020). In China, national strategies emphasize the integration of digital technologies into education and the cultivation of responsible digital citizens (Yan & Yang, 2020). In the digital era, one of the intersections between "prioritizing moral education" and "educational informatization" lies precisely in cultivating digital citizens with digital ethics, cyber morality, and a sense of social responsibility. Therefore, strengthening digital citizenship literacy education is an inevitable pathway to implement the national strategy for educational modernization.

This national strategy has been actively embraced and implemented with regional characteristics. Taking Fujian Province, China, as an example, as the starting point for the practice of "Digital China," it has undertaken forward-looking explorations in educational digitalization. The Fujian Provincial Department of Education explicitly advocates for "cultivating digital citizens for the intelligent era" and promotes initiatives such as the "Fujian Course Alliance" and the development of digital libraries in higher education institutions. These efforts facilitate course sharing, credit recognition, and the co-construction and sharing of high-quality digital educational resources, providing

resource support and an implementation environment for digital literacy education in higher education institutions, including vocational colleges. These practices not only offer real-world samples for this study but also imbue it with significance in serving regional development and refining local experiences.

In summary, this study is grounded in the developmental trends of the digital society, the distinctive characteristics of vocational education, and the guidance of national and regional policies. Focusing on vocational colleges in Fujian Province, China, it systematically analyzes the influencing factors and enhancement strategies for digital citizenship literacy. The research aims to provide theoretical insights and practical pathways for constructing a digital citizenship education system with Chinese characteristics in vocational education, thereby contributing to the cultivation of "digital craftsmen" who are both technically proficient and socially responsible.

1.2. Problem Statement

Existing research indicates that digital environments lack well-established norms comparable to those in offline contexts, leading to challenges in regulating online behavior (Blackwell et al., 2019). Insufficient digital citizenship literacy may result in issues such as privacy violations and unethical online behavior (Althibyani & Al-Zahrani, 2023). Moreover, low levels of digital literacy are associated with increased exposure to online risks, including cyber victimization and psychological challenges (Pituk et al., 2025).

1.2.1. Individual Level: Weakened Survival and Development Capabilities with Accumulating Risks

a. High Risks of Cybersecurity and Privacy Breaches

Students lacking digital literacy generally exhibit weak abilities in information discernment and awareness of privacy protection, making them easy targets for illegal activities such as online fraud and data theft. Relevant cases show that some students, due to credulously believing in online loan advertisements, have fallen into cycles of debt. Frequent incidents of personal information leakage have even led to offline personal safety threats.

b. Prominent Issues of Mental Health and Behavioral Misconduct

Excessive immersion in virtual spaces can easily lead to the degradation of real-world social skills and the dysfunction of self-management mechanisms. Research indicates a negative correlation between the duration of internet use and the level of digital literacy. Prolonged exposure to "information cocoons" can weaken critical thinking abilities and exacerbate psychological issues such as internet dependence, anxiety, or depression. A small number of students, due to a weak sense of the rule of law, have participated in online violence or spread rumors, even crossing legal boundaries.

c. Insufficient Professional Competitiveness and Adaptability

In the context of the digital economy, digital literacy has become a core competency in the job market. If students only possess basic operational skills but lack higher-order abilities such as data thinking, information security protection, and collaborative

innovation, they will face declining competitiveness and difficulties adapting to rapidly evolving professional environments.

1.2.2. Social Level: Rising Governance Costs and Pressures on the Civilized Ecosystem

a. Disorder in Cyberspace and Erosion of Trust Mechanisms

The lack of digital citizenship literacy directly contributes to the spread of online rumors, an increase in infringement incidents, and the proliferation of irrational behaviors. For example, phenomena such as university students forwarding false information or participating in irrational online gatherings not only disrupt public order but also erode the foundation of social trust, driving up the costs of social governance.

b. Deepening Digital Divide and Exacerbating Challenges to Social Equity

Groups with lower digital literacy—such as students from remote areas or economically disadvantaged families—are at a significant disadvantage in accessing and utilizing digital resources, which may further reinforce social marginalization. Regional imbalances in the development of digital education will solidify existing social stratification and hinder talent mobility and social equity (Wang, 2025).

c. Cultural Value Inheritance and Ideological Security Under Pressure

The uncontrolled dissemination of content such as historical nihilism and extremist ideologies in cyberspace can easily mislead the value formation of young people. If students lack sufficient information discrimination and value judgment capabilities, it may shake their identification with mainstream ideologies, affecting cultural confidence and social cohesion.

1.2.3. National Level: Constraints on Strategic Security and Long-Term Development

a. Talent Shortages Impeding the Quality Upgrade of the Digital Economy

Citizens' digital literacy serves as a foundational support for the development of the digital economy. Low-literacy groups struggle to effectively drive industrial intelligent transformation, leading to insufficient efficiency in technology application (Arnaud et al., 2024). For instance, enterprises experiencing information leakage incidents due to employees' weak data security awareness may slow down the overall industry upgrade process.

b. Bottlenecks in Talent Structure Hindering the Construction of a Cyberpower

China urgently needs versatile talents who not only master digital technologies but also possess a sense of the rule of law and ethical awareness. If college students remain at the level of tool application without a strong understanding of cyber law—such as awareness of intellectual property protection and data compliance capabilities—it will be difficult to meet the demands of cyberspace governance, affecting the country's voice and rule-making capabilities in the digital domain.

c. Increasingly Prominent International Competition and Security Risks

Deficiencies in citizens' digital literacy may leave the country dependent on others in key areas such as AI ethics and cross-border data governance. Failure to systematically enhance the digital literacy of young people could lead to an over-reliance on external technological systems in the transformation of domestic industries, exacerbating the risk of "digital dependency." Simultaneously, low-literacy groups may become potential targets for infiltration by external forces, posing threats to national information security.

1.3. Research Objectives

This study is based on Bandura's triadic interaction theory of social cognition and focuses on the development of digital citizenship skills among students in vocational colleges in Fujian Province. Based on empirical research findings, combined with the characteristics of vocational education and regional development needs, it proposes systematic and operational strategies for enhancing the digital citizenship skills of students in vocational colleges in Fujian Province, providing references for educational practice and policy formulation.

1.4. Research Significance

1.4.1. Theoretical Significance

First, it promotes the localization and structuring of digital citizenship literacy theory. By integrating China's socio-cultural context and the characteristics of vocational education, this study attempts to construct a theoretical framework for digital citizenship literacy applicable to vocational students, providing a more relevant conceptual foundation for theoretical development and empirical research in this field.

Second, it expands the explanatory power and application pathways of social cognitive theory in the field of education. By introducing the "triadic reciprocal determinism," this study constructs and tests a "person-behavior-environment" interaction model to reveal the dynamic mechanisms of digital citizenship literacy formation, enriching the theoretical connotations of educational psychology in the digital era.

Third, it explores literacy development theories within the context of vocational education. Focusing on the technical practice environment and professional identity of vocational students, this study analyzes their shaping effects on digital citizenship literacy, preliminarily forming a literacy development theory aligned with the growth patterns of technical and skilled talents.

1.4.2. Practical Significance

First, it provides a basis for vocational colleges to implement digital citizenship education. By identifying key influencing factors, it offers empirical support for curriculum design, teaching reform, and campus culture development, helping to cultivate "digital craftsmen" who possess both digital literacy and vocational skills.

Second, it provides references for educational policy formulation. The research findings can serve as empirical evidence and decision-making support for the development of

digital literacy education plans and the establishment of evaluation systems at regional and national levels.

Third, it enhances the transferability and sustainability of the research. The analytical framework and research methods constructed in this study can provide references for related research in other regions or educational stages, promoting the continuous accumulation and practical deepening of knowledge in this field.

1.4.3. Innovative Significance

Compared with previous research, the innovations of this study are mainly reflected in the following aspects:

First, it focuses on the student population in vocational colleges, filling the research gap on digital citizenship literacy in this group and highlighting their critical role in the development of the digital economy.

Second, based on social cognitive theory, it systematically analyzes the interactive influences of personal, environmental, and behavioral factors, deeply revealing the psychological and social mechanisms of literacy formation.

Third, it emphasizes empirical research and contextualized pathways, promoting the deep integration of digital citizenship literacy education and vocational education, providing theoretical support and practical guidance for cultivating high-quality technical and skilled talents adapted to the digital era.

2. Literature Review

2.1. The Concept and Connotation of Digital Citizenship

The concept of "citizen" originates from ancient Greece, referring to members of a city-state who enjoyed the right to participate in politics. Since modern times, citizenship has gradually integrated with ideas such as freedom, equality, and rights, forming the theory of citizenship centered on civil rights, political rights, and social rights as proposed by Marshall. Entering the era of globalization, with the increase in shared challenges and the strengthening of global connections, concepts such as "global citizenship" have emerged, expanding the connotation of citizenship to include participation in transnational and cross-cultural public life.

Since the 1990s, the rapid development of digital technology has given rise to the "digital society" based on the internet. In this new social form, individuals are not only users of technology but also members of the digital society with corresponding rights and responsibilities, known as "digital citizens." Currently, the academic definition of digital citizenship remains inconsistent, with two main perspectives:

One perspective emphasizes technology use and access, defining digital citizens as individuals capable of effectively utilizing digital technology for learning, work, and life (Mossberger et al., 2007). The other perspective, while acknowledging technology use, places greater emphasis on behavioral norms and ethical responsibilities. For example, the 2010 National Education Technology Plan of the United States emphasizes that digital citizens should use digital technology and information safely, legally, and

ethically. Ribble further systematically proposed a nine-element framework for digital citizenship, covering dimensions such as digital etiquette, security, law, and health, and mapped real-world civic principles to the digital environment (Choi, 2016).

Table 2 presents a comparison between the characteristics of a “good citizen” in the real world and those of a “good digital citizen” in the virtual environment. As shown in Table 2, while digital citizenship inherits the fundamental principles of traditional citizenship—such as respect for human rights, ethical behavior, and social responsibility—it also extends these principles into the digital context with new forms of expression and practice. Specifically, behaviors such as respecting others, avoiding harm, and maintaining integrity in the real world are translated into digital norms, including avoiding cyberbullying, protecting digital identity and property, and ensuring responsible online communication. In addition, digital citizenship places greater emphasis on information security, privacy protection, and the responsible use of digital technologies. This comparison highlights the dual nature of digital citizenship literacy, which combines traditional civic values with the unique requirements of the digital environment. It provides an important conceptual foundation for constructing the analytical framework of this study.

Table 2: Comparison between Citizens in the Real World and Those in the Virtual World

A "good citizen" in the real world	A "Good digital citizen" in the virtual world
Advocate for equal human rights	Advocate for equal access to digital rights and technologies
Be polite to others and never deceive them	Respect others online and never engage in cyberbullying
Do not steal and do not harm the personal or property safety of others	Do not plagiarize or damage others' digital works, digital identities or digital properties
Communicate clearly and respectfully with others and have empathy	When communicating with others through various digital technology channels, make the right decisions
Actively accept education and cultivate the habit of lifelong learning	Utilize digital tools to enhance learning and keep pace with technology
Spend and manage money responsibly	Shop online responsibly and protect payment information well
Safeguard basic human rights such as privacy and freedom of speech	Safeguard basic human rights in digital forums
Protect yourself and others from harm	Protect personal information and stay away from external factors that may cause harm
Actively improve one's physical and mental health	Actively reduce the risks that technology may pose to physical and mental health

The above table reveals that digital citizenship literacy possesses a dual nature: on one hand, it inherits the core tenets of traditional citizenship literacy, encompassing rights, responsibilities, and ethics; on the other hand, it reflects the characteristics of the era, deeply intertwined with digital technology, online environments, and digital assets. This provides an important basis for constructing an evaluation framework for the digital citizenship literacy of vocational college students in this study, indicating the need to balance the universal principles of civic education with the specific requirements of the digital environment.

At the measurement level, different definitions have led to different approaches: the "skills-access" approach, represented by Mossberger et al. (2007), emphasizes objective usage capabilities and resource accessibility; the "norms-responsibility" approach, represented by Ribble and Bailey (2004, 2007), focuses on cognition, attitudes, and ethical intentions. Both approaches have their emphases but also limitations: the former may overlook higher-order participation and critical dimensions, while the latter may be constrained by predetermined norms, making it difficult to fully reflect active and creative digital practices.

Therefore, this study posits that the measurement of digital citizenship literacy should avoid simply applying a single scale. Instead, it should integrate existing theories while considering the developmental characteristics and professional contexts of vocational college students, thereby constructing a composite theoretical framework. This framework should encompass multiple dimensions, including skill application, security norms, critical thinking, responsible participation, and professional innovation. Based on this, measurement tools with contextual appropriateness should be developed or adapted.

In summary, despite differences in definitional perspectives, there is a basic consensus in academia: digital citizens should not only possess the ability to use digital technology appropriately and responsibly, fulfilling corresponding digital rights and obligations, but also actively participate in the life of the digital society, promoting its healthy development.

3. Research Methods

3.1. Research Design and Justification

This study adopts a quantitative research approach using a non-experimental cross-sectional survey design. Quantitative methods are appropriate for examining relationships among variables and testing theoretical models using large-scale data (Yusup et al., 2019). Given that this study aims to investigate the influencing factors of digital citizenship literacy and test the relationships among personal, behavioral, and environmental variables, a quantitative design is considered suitable. The cross-sectional design allows data to be collected at a single point in time, enabling efficient analysis of associations between variables (Martinez et al., 2017)

3.2. Research Location

The study was conducted in Fujian Province, China. Fujian was selected due to its strategic role as a pilot region for the "Digital China" initiative and its advanced development in digital economy and educational informatization. This context provides a representative and relevant setting for examining digital citizenship literacy among vocational college students.

3.3. Population

The target population of this study consists of full-time students enrolled in higher vocational colleges in Fujian Province. In addition, teachers from the same institutions were included as stakeholders to provide complementary perspectives on environmental factors influencing students' digital citizenship literacy.

3.4. Sample Size and Justification

The final sample included 806 valid student responses and 206 valid teacher responses. The sample size exceeds the minimum requirements for statistical analysis. According to Gorsuch (1983), factor analysis requires at least 5-10 times the number of items, while multiple regression analysis requires at least 10-15 cases per independent variable (Green, 1991). Given that this study includes 63 items and multiple predictors, the sample size is considered sufficient to ensure statistical validity and reliability.

3.5. Sampling Method

A combination of convenience sampling and cluster sampling was employed. Initially, several vocational colleges in Fuzhou were selected through convenience sampling based on accessibility and willingness to participate. Subsequently, cluster sampling was applied within these institutions by selecting intact classes or academic groups. This approach ensures feasibility while maintaining a relatively natural distribution of participants.

3.6. Data Collection

Data were collected using a structured self-administered questionnaire distributed via an online survey platform. The survey was conducted in a controlled classroom setting, where participants completed the questionnaire by scanning a QR code. To ensure data quality, several measures were implemented, including IP restrictions, minimum completion time requirements (180 seconds), and one-time submission per device. Each session typically lasted approximately 10-15 minutes.

3.7. Research Instrument

The study utilized a validated Digital Citizenship Literacy Scale developed by Choi et al. (2017). All items were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The instrument was adapted through translation and back-translation, expert review, and pilot testing to ensure cultural appropriateness.

3.8. Data Analysis

Data were analyzed using SPSS 26.0 and AMOS 26.0. The analysis procedures included:

- i. Descriptive statistics to summarize sample characteristics;
- ii. Reliability and validity tests using Cronbach's alpha and confirmatory factor analysis (CFA);
- iii. Correlation analysis to examine relationships among variables;
- iv. Multiple linear regression analysis to identify key predictors of digital citizenship literacy.

These methods ensure both descriptive and inferential insights into the research problem.

3.9. Ethical Considerations

Ethical principles were strictly followed throughout the study. Participation was voluntary, and informed consent was obtained from all participants prior to data

collection. The first page of the questionnaire included a consent statement outlining the purpose of the study, confidentiality, and anonymity. No personally identifiable information was collected. The study complied with institutional academic ethics guidelines.

4. Results

4.1. Descriptive Statistics

Table 3 presents the demographic characteristics of the student sample (N = 806).

Table 3: Demographic Characteristics of Respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	335	41.56
	Female	471	58.44
Origin	Rural	356	44.17
	Urban	450	55.83
Grade	Freshman	197	24.44
	Sophomore	348	43.18
	Junior	261	32.38

As shown in Table 3, the sample is relatively balanced in gender distribution, with a slightly higher proportion of female students. The majority of respondents are sophomores, indicating a stable and representative sample structure.

4.2. Reliability Analysis

As shown in Table 4, all constructs exhibit Cronbach's α values above 0.70, indicating strong internal consistency and reliability of the measurement instrument.

Table 4. Reliability Results (Cronbach's Alpha)

Construct	Cronbach's α
Computer Self-Efficacy	0.918
Internet Attitudes	0.893
Interpersonal Communication Skills	0.891
Social Media Skills	0.762-0.894
Organizational Support	0.823-0.891
Digital Citizenship Literacy	0.849-0.866

4.3. Validity Analysis

The KMO value of 0.951 and significant Bartlett's test ($p < 0.001$) indicate that the dataset is suitable for factor analysis.

Table 5: KMO and Bartlett's Test

Indicator	Value
KMO	0.951
Bartlett's Test (p-value)	0.000

The extracted 14 factors explain 68.84% of the total variance, indicating strong structural validity.

Table 6: Total Variance Explained

Factor	Variance (%)
Factor 1-14	68.837 (Cumulative)

4.4. Descriptive Analysis of Key Variables

Overall, the mean scores indicate a moderate level of digital citizenship literacy among students. Social media skills show relatively higher levels, while interpersonal communication skills are comparatively lower.

Table 7: Descriptive Statistics

Variable	Mean	SD
Computer Self-Efficacy	3.441	0.825
Internet Attitudes	3.415	0.917
Interpersonal Communication Skills	3.305	0.933
Social Media Skills	3.668	0.767
Organizational Support	3.591	0.830
Digital Citizenship Literacy	3.636	0.750

4.5. Correlation Analysis

As shown in Table 8, all independent variables are significantly positively correlated with digital citizenship literacy. Computer self-efficacy shows the strongest relationship.

Table 8: Correlation Matrix

Variables	DCL
Computer Self-Efficacy	0.68**
Internet Attitudes	0.62**
Interpersonal Communication Skills	0.59**
Social Media Skills	0.65**
Organizational Support	0.57**

(** $p < 0.01$)

4.6. Regression Analysis

The regression model is statistically significant and explains 58% of the variance. Computer self-efficacy is the strongest predictor, followed by social media skills and internet attitudes.

Table 9: Regression Results

Variable	β	Significance
Computer Self-Efficacy	0.32	$p < 0.001$
Social Media Skills	0.28	$p < 0.001$
Internet Attitudes	0.25	$p < 0.01$
Interpersonal Communication Skills	0.18	$p < 0.05$
Organizational Support	0.15	$p < 0.05$

Model Fit:

F = 85.32

Adjusted R² = 0.58

5. Discussion

This study aimed to examine the key factors influencing digital citizenship literacy among vocational college students through the lens of social cognitive theory. The findings provide strong empirical support for the proposed person-behavior-environment framework and offer several important theoretical and practical insights.

First, the results indicate that computer self-efficacy is the most significant predictor of digital citizenship literacy. This finding is consistent with prior studies emphasizing the central role of self-efficacy in shaping digital competence and behavior (Hatlevik et al., 2015). From the perspective of social cognitive theory, self-efficacy influences individuals' cognitive processes, motivation, and behavioral choices (Bandura, 1986). Students with higher levels of computer self-efficacy are more confident in navigating digital environments, more willing to engage in online participation, and more capable of managing digital risks. This explains why self-efficacy exerts the strongest influence among all variables.

Second, social media skills emerge as another critical determinant of digital citizenship literacy. This finding highlights the importance of behavioral competence in digital environments. Unlike traditional digital skills, social media skills involve complex abilities such as information evaluation, content creation, and online interaction. Consistent with previous research (van Laar et al., 2017), individuals with stronger digital skills are more likely to engage in responsible and productive online behaviors. The results suggest that practical engagement with digital platforms plays a crucial role in shaping digital citizenship literacy.

Third, internet attitudes significantly influence digital citizenship literacy, indicating the importance of cognitive and affective factors. Individuals with positive and rational attitudes toward the internet are more likely to adopt ethical norms and demonstrate responsible behavior in digital spaces. This finding aligns with existing literature suggesting that attitudes toward technology shape usage patterns and behavioral intentions (Ng, 2012). It also supports the argument that digital citizenship is not only a matter of skills but also of values and dispositions.

Fourth, interpersonal communication skills are found to have a significant, albeit relatively weaker, impact on digital citizenship literacy. This suggests that offline social competencies can be transferred to online contexts. Students with strong communication skills are better able to express opinions, manage conflicts, and engage in constructive dialogue in digital environments. This finding reinforces the view that digital citizenship extends traditional civic competencies into virtual spaces (Choi, 2016).

Finally, perceived organizational support has a positive effect on digital citizenship literacy, highlighting the importance of environmental factors. According to social cognitive theory, the environment provides both opportunities and constraints that shape individual behavior. Institutional support, including access to digital resources, training opportunities, and normative guidance, can enhance students' motivation and

ability to develop digital citizenship literacy. This finding is consistent with previous studies emphasizing the role of educational environments in digital competence development (Hatlevik et al., 2015).

Overall, the findings confirm that digital citizenship literacy is a multidimensional construct shaped by the dynamic interaction of personal, behavioral, and environmental factors. The relative strength of these factors suggests that internal cognitive variables (e.g., self-efficacy) play a more dominant role, while behavioral and environmental factors provide essential support and reinforcement.

This study contributes to the literature by empirically validating the applicability of social cognitive theory in the context of digital citizenship literacy. It extends existing research by integrating multiple dimensions into a unified analytical framework and by providing evidence from vocational education, a context that has been relatively underexplored. The findings also offer important implications for educational practice, suggesting that effective interventions should combine skill development, attitude cultivation, and environmental support to promote responsible and competent digital citizens.

Ethics Approval and Consent to Participate

The researchers used the research ethics provided by the Research Ethics Committee of University Malaysia Sabah (UMS). All procedures performed in this study involving human participants were conducted in accordance with the ethical standards of the institutional research committee. Informed consent was obtained from all participants according to the Declaration of Helsinki.

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Conflict of Interest

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References

Althibyani, H., & Al-Zahrani, A. (2023). Investigating the effect of students' knowledge, beliefs, and digital citizenship skills on the prevention of cybercrime. *Sustainability*, 15(15), 11512. <https://doi.org/10.3390/su151511512>

- Arnaud, J., Mamede, H., & Branco, F. (2024). The relationship between digital transformation and digital literacy: An explanatory model. *F1000Research*, 13, Article 146991. <https://doi.org/10.12688/f1000research.146991.2>
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.
- Blackwell, L., Ellison, N., Elliott-Deflo, N., & Schwartz, R. (2019). Harassment in social virtual reality. *Proceedings of the ACM on Human-Computer Interaction*, 3, 1–25. <https://doi.org/10.1145/3359202>
- Choi, M. (2016). A concept analysis of digital citizenship for democratic citizenship education in the internet age. *Theory & Research in Social Education*, 44(4), 565–607. <https://doi.org/10.1080/00933104.2016.1210549>
- Fajri, S., Fajri, N., Sarnita, F., Fitriani, H., Bago, A., Nitiasih, P., Riastini, P., Gede, I., & Sudatha, W. (2024). Digital literacy and cyber socialization in the context of 21st century education: A systematic review. *International Journal of Applied Science and Sustainable Development*, 6(2). <https://doi.org/10.36733/ijassd.v6i2.9078>
- Firmansyah, D., Ahman, E., & Wahdiniwaty, R. (2024). Economic competitiveness of SMEs: Digital literacy and innovation capability. *MIX: Jurnal Ilmiah Manajemen*, 14(2). https://doi.org/10.22441/jurnal_mix.2024.v14i2.002
- Gorsuch, R. L. (1983). *Factor analysis* (2nd ed.). Lawrence Erlbaum Associates.
- Green, S. B. (1991). How many subjects does it take to do a regression analysis? *Multivariate Behavioral Research*, 26(3), 499–510. https://doi.org/10.1207/s15327906mbr2603_7
- Hatlevik, O. E., Guðmundsdóttir, G. B., & Loi, M. (2015). Digital diversity among students: A multilevel analysis of factors within schools. *Computers & Education*, 81, 345–353. <https://doi.org/10.1016/j.compedu.2014.10.019>
- Iskandar, R., Maksum, A., & Marini, A. (2025). Bridging the gap in digital citizenship literacy: A systematic perspective. *Multidisciplinary Reviews*. <https://doi.org/10.31893/multirev.2025383>
- Lynn, T., Rosati, P., Conway, E., Curran, D., Fox, G., & O’Gorman, C. (2022). The digital citizen. In *Digital towns* (pp. 23–45). Springer. https://doi.org/10.1007/978-3-030-91247-5_2
- Martinez, B., Leotti, V. B., Silva, G. S., Nunes, L. N., Machado, G., & Corbellini, L. G. (2017). Odds ratio or prevalence ratio? An overview of reported statistical methods and appropriateness in cross-sectional studies. *Frontiers in Veterinary Science*, 4, Article 193. <https://doi.org/10.3389/fvets.2017.00193>
- Mohajan, H. K. (2020). Quantitative research in social sciences and its applications. *Journal of Economic Development, Environment and People*, 9(4). <https://doi.org/10.26458/jedep.v9i4.679>
- Mossberger, K., Tolbert, C. J., & McNeal, R. S. (2007). *Digital citizenship: The internet, society, and participation*. MIT Press.
- Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education*, 59(3), 1065–1078. <https://doi.org/10.1016/j.compedu.2012.04.016>
- Parry, F. (2008). Digital citizenship and participation. *Online Information Review*, 32(4), 538–539. <https://doi.org/10.1108/14684520810897421>
- Pituk, P., Chutipattana, N., Laor, P., Sukdee, T., Kittikun, J., Jitwiratnukool, W., Fajriyah, R., & Ayudhaya, W. (2025). Digital media victimization and its impacts. *Informatics*, 12(1), 24. <https://doi.org/10.3390/informatics12010024>
- Qiu, Y., Li, L., & Wang, X. (2024). Digital literacy of vocational students in emerging educational environments. *INTI Journal*. <https://doi.org/10.61453/intij.202405>
- Ribble, M., & Bailey, G. D. (2007). *Digital citizenship in schools*. ISTE.

- Setia, M. S. (2016). Methodology series module 3: Cross-sectional studies. *Indian Journal of Dermatology*, 61(3), 261–264. <https://doi.org/10.4103/0019-5154.182410>
- van Laar, E., van Deursen, A., van Dijk, J., & de Haan, J. (2017). The relation between 21st-century skills and digital skills. *Computers in Human Behavior*, 72, 577–588. <https://doi.org/10.1016/j.chb.2017.03.010>
- Wang, S. (2025). The impact of the digital divide on educational equity. *SHS Web of Conferences*, 222, 04004. <https://doi.org/10.1051/shsconf/202522204004>
- Wang, Y. (2025). High-quality talent cultivation in vocational education under digital transformation. *Education Insights*. <https://doi.org/10.70088/1fxgey90>
- Xu, S., Wang, L., Zhu, S., & Dai, Y. (2025). Digital literacy among vocational students: Evidence from large-scale data. *Scientific Reports*, 15, Article 4078. <https://doi.org/10.1038/s41598-025-04078-1>
- Yan, S., & Yang, Y. (2020). Education informatization 2.0 in China: Motivation, progress, and challenges. *ECNU Review of Education*, 4(2), 410–428. <https://doi.org/10.1177/2096531120944929>
- Yusup, M., Naufal, R., & Hardini, M. (2019). Data analysis techniques in research reporting. *Aptisi Transactions on Management*, 2(2). <https://doi.org/10.33050/atm.v2i2.789>