**Review Article**

**Digital Citizenship Literacy in Education: A Comparative Review of International and Chinese Perspectives**

**Abstract**

Rapid technological advancements significantly reshape individuals' work, learning, and daily interactions, creating a digital society populated by digital citizens. Digital citizenship literacy (DCL) has thus become crucial, prompting international efforts by organizations like UNESCO and national initiatives such as China's Education Informatization 2.0. This study employs a comparative literature review to analyze international and Chinese research regarding DCL concepts and measurement within educational contexts. By identifying similarities and differences between these research bodies, the paper clarifies DCL definitions, evaluates existing measurement tools, and offers guidance for enhancing digital citizenship education, promoting equity, and sustainable digital society development.

**Keywords**: Digital citizenship literacy, Literature review, Educational context, Comparative studies

1. Introduction

The rapid evolvement of modern technologies brings significant changes to peoples’ work, learning, and daily lives. These technologies, like big data and artificial intelligence (AI), create a virtual digital society where individuals possess a new identity—digital citizens. Different countries and organizations throughout the world have actively explored and practiced issues related to citizen behavior in the digital society. For instance, UNESCO published “Global Citizenship Education: Topics and Learning Objectives” in 2015, which emphasizes digital citizenship education as a key component of global citizenship education and aims to equip learners with the skills and values needed to navigate the digital world, including digital literacy, cybersecurity, and digital ethics (UNESCO, 2015). China has also published relevant policies to promote the digitalization of education and enhance digital citizenship literacy (DCL). For example, the Ministry of Education in China released the “Education Informatization 2.0 Action Plan” in 2018 to upgrade education informatization from 1.0 to 2.0, emphasizing the deep integration of technology and education, the construction of an "Internet + Education" platform, the enhancement of DCL, and the advancement of educational modernization. As critical digital citizens, current teachers and students live alongside the internet and are surrounded by various modern technologies. To adapt to the rapidly developing digital era, it is essential for them to enhance their digital citizenship literacy, namely the comprehensive competencies or abilities to live in the digital world. To achieve this, it is fundamental to clarify the concept of DCL and its measurement. Thus, this study focuses on analyzing international and Chinese research regarding the concepts and measurement of DCL in the educational context.

This study uses a literature review methodology by searching and downloading relevant literature from English and Chinese electronic databases. Through a comparative analysis of international and Chinese research regarding digital citizenship literacy, this study aims to clarify the concept of digital citizenship literacy and relevant measurement tools and identify the similarities and differences in international and Chinese research by comparative analysis, thereby helping understand the current state of research in China. This will provide theoretical and practical guidance for future studies in China and contribute to developing digital citizenship education to promote fairness and sustainable development in the digital society.

1. Literature Review

To clarify the concept of DCL and its measurement, this part reviews the relevant definitions and various existing measurement tools developed by international and Chinese researchers. Additionally, to better understand the current research state in China, the following part compares the concepts and measurement tools of digital citizenship literacy in Chinese and international studies to identify their similarities and differences, thereby providing theoretical and practical guidance for future studies regarding enhancing digital citizenship literacy in China.

* 1. Conceptions of Digital Citizenship Literacy (DCL)

2.1.1 Digital Citizenship

From a legal perspective, citizenship refers to individuals who live in a particular country with a specific nationality, possess certain rights, and must fulfill corresponding obligations. Researchers also proposed their understanding of citizenship. For example, Osler and Starkey (2005) defined citizenship as the practice of individuals’ civic rights and obligations in various activities. They also indicated that it is a complicated concept that constantly changes. Nowadays, digital technology has become a significant addition to the dynamics of citizenship research (Ong, 2006). More specifically, the digital society has been empowered by the advancement of technologies. Likewise, people in the digital world also need to be entitled to human rights and obligations. Moreover, they also need to obey pertinent social norms and expectations. Therefore, they are entitled to a different social identity, which is named digital citizenship.

Numerous studies attempted to scope the definition of digital citizenship with differentiated emphasis, among which a few works deserved our attention. Mossberger et al. (2007) argued that digital citizens have the skills to use technology effectively. Ribble (2011) emphasized social norms while practicing a range of informational technologies. UNESCO (2015) advocated human rights and social responsibilities, which citizens should understand and comply with in the digital world. In contrast, the European Commission (2018) focused on the imperative role of skills and competencies to protect personal privacy, respect human rights, and make responsible decisions. Chinese scholars have also contributed their understanding of the essence of digital citizenship. Many of them, such as Zhang and Zhang (2015), Yang et al. (2016), and Qian (2020), emphasized the ability to take part in social activities with various technologies effectively. Furthermore, Li (2020) emphasized promoting social development with technology.

Therefore, synthesizing the above studies, we can conclude that digital citizens are individuals who fulfill rights and obligations and possess the skills and responsibility to use technology effectively to engage in various social activities and promote societal development in the digital world.

2.1.2 Digital Citizenship Literacy (DCL)

Generally, digital citizenship literacy (DCL) is the essential competencies and qualities people should possess to adapt to the digital era. Numerous researchers have proposed their interpretations from different perspectives. Table 1 summarizes international and Chinese researchers’ interpretations of DCL.

*Table 1 Review of Interpretations of Digital Citizenship Literacy*

|  |  |
| --- | --- |
| **Authors** | **Interpretations of Digital Citizenship Literacy** |
| (Coleman, 2006) | Emphasized the ability to protect digital rights and fulfill digital responsibilities |
| (Salpeter, 2008) | Concentrated on the ability to use technologies and process digital information |
| (Hollandsworth & Donovan, 2011) | Focused on digital awareness |
| (Simsek & Simsek, 2013) | Focused on social communication skills in the digital society |
| (Marcinek, 2013) | Emphasized affective ability in the digital society |
| (Gazi, 2016) | Concentrated on the ability to engage in digital activities  |
| (Ribble, 2015) | Proposed nine elements: “digital access, digital commerce, digital communication, digital literacy, digital etiquette, digital law, digital rights and responsibilities, digital health, and digital safety.” |
| (Choi et al., 2017) | Proposed five dimensions: “Internet political activities, professional skills, local/global awareness, critical thinking, and interpersonal networks.” |
| (Martin et al., 2020) | Proposed five elements: “cyberbullying, digital footprints, digital privacy, digital etiquette, and digital identity.” |
| (Zhang et al., 2016) | Focused on the abilities and responsibilities to develop the digital society  |
| (Xu et al., 2019) | Focused on “ethics, media/information literacy, civic engagement, and critical resistance.” |
| (Zheng et al., 2020) | Emphasized the ability to use digital technologies legally and ethically |
| (Liu et al., 2020) | Focused on national pride, responsibility, and global awareness  |
| (Zheng & Zhong, 2023) | Emphasized correct values and behavioral habits, as well as essential qualities and critical skills  |

For instance, Coleman (2006) indicated that individuals need the ability to protect their digital rights (e.g., privacy, intellectual property, copyright) and fulfill corresponding responsibilities (e.g., reporting cyberbullying and harm). Salpeter (2008) argued that digital citizens should possess the ability to use various technologies and the competence to select, analyze, judge, and interpret information critically. Hollandsworth and Donovan (2011) emphasized that digital citizens need digital awareness, meaning that individuals should understand current issues about politics, culture, economy, and education resulting from digital technologies widely used daily.

In addition, Simsek and Simsek (2013) stated that digital citizens need social communication skills, like sharing photos/videos or exchanging ideas through blogs and online forums. In addition, Marcinek (2013) emphasized individuals’ affective ability to control negative emotions. Gazi (2016) focused on engaging in various digital society activities to promote personal and societal development, such as participating in government elections through social media and shopping online.

Ribble (2015) defined DCL as three-dimensional behavioral norms of digital technology: “respect yourself/respect others, educate yourself/connect with others, and protect yourself/protect others.” These dimensions cover nine elements: “digital access, digital commerce, digital communication, digital literacy, digital etiquette, digital law, digital rights and responsibilities, digital health, and digital safety.” Also, Choi et al. (2017) analyzed DCL through five dimensions: “Internet political activities, professional skills, local/global awareness, critical thinking, and interpersonal networks.” Furthermore, Florence (2020) defined DCL as the competence of using digital technologies to engage in various online activities and proposed five elements: “cyberbullying, digital footprints, digital privacy, digital etiquette, and digital identity.”

However, relevant research on digital citizenship literacy in China started relatively late and was limited. Zhang et al. (2016) stated that digital citizens should promote the development of a digital society, so they emphasized that digital citizenship literacy needs to reflect both the abilities and responsibilities of individuals in the digital world. Xu et al. (2019) have screened a range of relevant international studies and systematically investigated the concept of DCL from the perspectives of ethical, information literacy, civic engagement, and critical resistance. While Zheng et al. (2020) attempted to conceptualize DCL, which advocated the capabilities to adopt digital technologies in their learning, work, and daily life, in the meantime, they argued that the ethics of using technologies in the digital world should also be at the central role. Furthermore, Liu et al. (2020) contributed to the concept of DCL with elements reflecting national pride, responsibility, and global awareness of people. Recently, Zheng and Zhong (2023) proposed that rightful social values and essential digital competencies should be developed and equipped in the digital society.

From the scope of the citizenship concept, DCL is used to describe the essential competencies and qualities in the digital society. After synthesizing the above researchers’ different interpretations, the competencies and qualities consist of three main aspects: knowledge, attitudes, and skills. Specifically, digital citizens need to understand digital rights and responsibilities and be aware of digital issues. Also, they should possess correct values and ethical norms to use digital technologies safely and responsibly. In addition, they should possess the skills or abilities to use technologies effectively, process digital information, communicate online, control emotions, and actively participate in digital society activities to promote personal and societal development.

* 1. Measurement of Digital Citizenship Literacy (DCL)

Research on developing measurement tools for DCL has a long history. Many researchers have developed different measurement instruments to assess teachers' and students’ DCL in education. Table 2 summarizes relevant international and Chinese measurement tools.

*Table 2 Review of Measurements of Digital Citizenship Literacy*

|  |  |  |
| --- | --- | --- |
| **Authors** | **Dimensions**  | **Samples**  |
| (Isman et al., 2014) | Digital access, digital communication, digital literacy, digital rights and responsibilities, digital security, digital etiquette, digital law, digital commerce, and digital health and wellness | University students |
| (Jones et al., 2016) | Online respect and civic engagement | School students |
| (Choi et al., 2017) | Critical perspective, Technical skills, Networking agency, Local/global awareness, Internet political activism | University students |
| (Hollandsworth et al., 2017) | Digital etiquette or online behavior, digital rights and responsibilities, digital security, and digital literacy | K-12 students and teachers |
| (Wang Fan, 2018) | Digital health, Digital safety, Digital ethics, Digital Learning | Middle school students |
| (Xu et al., 2019) | Internet political activities, Technical skills, Local/global awareness, Critical perspective, Networking agency | University students |
| (Liu and Liu, 2021) | Ethical quality, Technical skills, Local/global awareness, Critical perspective, Networking agency | Primary teachers |
| (Zhong et al., 2021) | Digital identity and dignity, Digital citizenship awareness and accountability, Understanding of and compliance with internet etiquette, Digital communication and collaboration capabilities, Degree of internet addiction, Understanding of and compliance with relevant laws and regulations | University students |

Based on Ribble's (2011) nine elements of DCL, Isman et al. (2014) developed a new scale consisting of 34 items across three categories: “student learning and academic performance, student environment and behavior, and student life outside the school environment.” The scale includes nine dimensions: digital access, digital communication, digital literacy, digital rights and responsibilities, digital security, digital etiquette, digital law, digital commerce, and digital health and wellness. The researchers collected 229 undergraduate students' questionnaires and conducted the reliability and validity analyses with exploratory factor analysis and Cronbach’s Alpha value calculation. The result showed that the scale was an effective measurement tool.

With an emphasis on social respect and civic engagement in the digital world, Jones et al. (2016) developed and validated an instrument to measure DCL with 11 items. After collecting 979 surveys, this study explored the factorial structure and studied the reliability and validity of this instrument. Eventually, the newly developed scale proved to be a valid instrument to evaluate digital citizenship educational schemes. Likewise, through the efforts of synthesis of various digital citizenship concepts as well as interview studies of relevant experts, Choi et al. (2017) developed a digital citizenship literacy scale (DCS) with 26 items. The DCS comprises five constructs, namely, critical perspective, technical skills, networking agency, local/global awareness, and internet political activism. Five hundred-eight college students were surveyed in this study, and the factorial structure of DCS was confirmed. In the meantime, Hollandsworth et al. (2017) also contributed another version of the digital citizenship literacy scale with 20 items, consisting of four constructs: digital etiquette, digital rights and responsibilities, digital security, and digital literacy. 450 K-12 students’ and teachers’ questionnaires were collected and analyzed to confirm the reliability and validity of the scale.

However, the research on DCL measurement in China is limited. Referring to the concept of DCL proposed by Ribble (2011), Wang (2018) designed a questionnaire to assess the DCL of middle school students. The questionnaire covers four major dimensions, including digital health, digital safety, digital ethics, and digital learning, with a total of 17 items. One thousand eighty-six secondary school students participated in this study, and exploratory factor analysis was employed to investigate the factorial structure of the instrument and supported in the confirmatory factor analysis studies. Finally, the instrument was proved to be a reliable and valid scale to evaluate digital citizenship literacy.

With the foundational work of the five-factorial structure of scale developed by Choi et al. (2017), Xu et al. (2019) further contextualized into Chinese society. The 25-item instrument comprises five different factors, such as internet political activities, technical skills, local/global awareness, critical perspective, and networking agency. Nine hundred sixty-two college students were recruited for this study, and the re-developed scale was also a valid instrument to measure college students’ digital citizenship in China. Additionally, Liu and Liu (2021) also contextualized the instrument initially designed by Choi et al. (2017) in the teachers' digital citizenship literacy studies. A 25-item scale, which comprises five dimensions such as ethical quality, technical skills, local/global awareness, critical perspective, and networking agency, was developed. Questionnaires from 240 primary school teachers were collected and analyzed for this study, and eventually, the scale was proved to be a valid instrument. Similarly, after synthesizing different concepts of DCL, Zhong et al. (2021) proposed that it comprises five different constructs, including digital identity and dignity, digital accountability, digital communication and collaboration capabilities, digital addiction, and compliance with digital regulations. They then surveyed 1188 college students in China and validated their scale.

In summary, by reviewing international and Chinese studies measuring individuals’ digital citizenship literacy, we can find that different scholars proposed various dimensions of digital citizenship literacy based on well-established theoretical frameworks of digital citizenship and target populations and contexts. This reflects that digital citizenship literacy is a comprehensive concept with a multifaceted nature. In addition, the above measurement tools were developed for different groups and cultural contexts, including college and K-12 students and teachers in different countries, so researchers considered different groups’ needs and specific cultural and social contexts when designing the items of the scales. However, there are several standard features of the above measurement tools, such as emphasis on the use of technologies and digital participation, particularly the adherence to ethical norms, behavioral standards, and legal regulations, and focus on digital citizens' awareness, including information awareness, local and global awareness, respect, protection, responsibility, and identity.

1. Comparison of International and Chinese Studies of Digital Citizenship Literacy
	1. Comparison of Conceptions of Digital Citizenship Literacy

According to Bloom's Taxonomy of Learning Domains (1956), learning consists of three aspects: knowledge, attitudes, and skills. Currently, the three aspects are widely used in education as the essential elements of competency. Hence, a detailed comparative analysis of international and Chinese researchers’ interpretations of digital citizenship literacy from dimensions of knowledge, attitudes, and skills is presented below to find their similarities and differences.

1. Knowledge

Similarities:

There are two similarities found in both two groups mentioned above. First, the importance of understanding digital rights (e.g., privacy, intellectual property) and responsibilities (e.g., reporting cyberbullying) have been emphasized in both groups ((e.g., Coleman, 2006; Zhang et al., 2016). Moreover, both emphasized the imperative role of digital awareness (e.g., Hollandsworth & Donovan, 2011; Liu et al., 2020). That is, people should be aware of current affairs in the digital era, such as politics, society, and culture.

Differences:

Although both groups paid attention to the importance of understanding digital rights and responsibilities, international scholars like Ribble (2015) often focused on universal aspects, while Chinese scholars like Liu et al. (2020) regard national pride and responsibility as essential components of DCL. This reflects the unique socio-political climate and the collective pride in Chinese culture.

1. Attitudes

Similarities:

Both Chinese and international researchers paid attention to the essential roles of mutual respect and digital etiquette in DCL (e.g., Ribble, 2015; Florence, 2020; Xu et al., 2019; Zheng et al., 2020). They also emphasized that people should be responsible for reporting cyberbullying and harm (Coleman, 2006) and promoting the development of the digital world (Zhang et al., 2016).

Differences:

Compared with international scholars, Chinese researchers like Liu et al. (2020) emphasized national identity and they attempted to combine national pride and global awareness into DCL, which demonstrates their different values in cultural identities.

1. Skills

Similarities:

After individuals acquire a large amount of information from the Internet, it is crucial for them to make a sound judgment or evaluation. Because of this, both international and Chinese researchers have realized the importance of critical thinking and capacities to analyze, evaluate, and interpret digital information as essential components of DCL (e.g., Salpeter, 2008; Choi et al., 2017; Xu et al., 2019; Zheng et al., 2020). Meanwhile, both also paid attention to the capacity to use technologies for the purpose of communication and collaboration (e.g., Simsek and Simsek, 2013; Zheng et al., 2020).

Differences:

International scholars often value more on technical skills when talking about DCL (e.g., Gazi, 2016; Ribble, 2015), while in Chinese studies, personal contribution to social development is often highlighted (e.g., Zhang et al., 2016; Liu et al., 2020) due to the impact of the Chinese culture of collectivism.

3.2 Comparison of Measurement of Digital Citizenship Literacy

International empirical studies about DCL measurement have a longer and more extensive research history. Domestic Chinese studies tend to borrow the conceptual frameworks from their international counterparts and frame them with Chinese cultural and political elements (Chen & Zhang, 2022). Therefore, international and Chinese empirical studies of measuring DCL demonstrate their interconnections and differences.

Similarities:

Before developing measurement tools, researchers from both groups, such as Isman et al. (2014) and Xu et al. (2019), attempted to establish their conceptual framework of DCL. Moreover, both international and domestic Chinese studies tend to introduce numerous constructs to describe the concept of DCL, given its complexities, though the specific dimensions often vary.

The standard statistical analysis procedure, such as exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and Cronbach’s alpha value were followed in the scale validation studies for both international and domestic Chinese studies to ensure the appropriate factorial structure as well as the reliability and validity studies of their newly developed scales. Resultantly, the theory-endorsed scales often demonstrate statistical robustness.

Once the instrument of measuring DCL was developed and validated, both international and domestic, Chinese studies highlighted the imperative roles of adopting these scales to evaluate and enhance one’s digital citizenship literacy. In other words, the ultimate objective of developing scales for DCL from both groups is to use these scales in practical educational contexts to assess and enhance specific groups’ DCL.

Differences

International research on the measurement of DCL has a more extended history. International scholars have developed a variety of scales to measure the different educational stages of students and teachers in different contexts. However, related studies in China are still in their early stages. Generally, Chinese scholars developed scales based on internationally established theoretical frameworks or modified international valid scales in order to suit local needs.

Compared with international scholars, Chinese researchers emphasized Chinese cultural differences by adapting international frameworks for digital citizenship literacy to local cultural and educational contexts in China. For example, Wang (2018) considered that Chinese middle school students usually use digital devices for amusement, making friends, and learning and seldom for communication and commerce, so the author only developed four dimensions of digital citizenship literacy to assess students’ digital health, safety, ethics, and learning.

International researchers often focused more on broader issues when developing scales to measure individuals’ DCL, such as civic engagement (Jones et al., 2016) and global awareness (Choi et al., 2017). Although Chinese scholars took global awareness into consideration when designing scales (e.g., Xu et al., 2019; Liu & Liu, 2021), most of them concentrated more on addressing specific issues in local contexts. For example, Wang (2018) integrated DCL with academic learning, which reflects the importance of academic learning in the Chinese context. Also, considering the problems of Chinese students’ internet addiction, Zhong et al. (2021) added the measurement of the degree of internet addiction to the scale.

To summarize, when developing measurement tools, scholars from both groups often use established theoretical frameworks for reference to design multiple dimensions to measure the DCL of teachers and students from different educational stages, countries, and regions. Besides, to ensure the measurement tools' effectiveness, both used scientific methods to confirm the validity and reliability. Lastly, they highlighted the practical application of these scales to enhance one’s DCL. Nevertheless, compared with international research, studies in China regarding DCL measurement are still in the early stages. Considering cultural and contextual differences in China, most researchers tended to develop more tailored scales to measure DCL to address specific issues.

4. Conclusion

4.1 Summary of Findings

This study briefly reviews relevant international and Chinese research about DCL, highlighting its growing importance in the digital age and clarifying its conception and measurement. Both international and Chinese researchers have significantly contributed to the conceptualization and measurement of DCL. By comparing both groups in terms of their understanding and measurement of DCL, the present study provides a deep analysis of their similarities and differences, thereby better understanding the current state of Chinese research on DCL and offering future research directions in China.

4.2 Future Research Directions in China

Chinese scholars have demonstrated innovation in theoretical research and practical application of DCL. They emphasized localization and were influenced by unique social, political, and cultural contexts in defining DCL. They also considered Chinese cultural and contextual differences in developing scales to measure DCL in the educational context. However, the research on DCL in China is still underexplored. More specifically, there is little exploration of teachers’ and students’ DCL in different areas of China, such as urban and rural areas. Thus, future researchers could develop localized measurement tools for DCL among different population groups, like students from urban and rural areas of China, and conduct comparative studies. Additionally, with the rapid development of AI and its wide use in education, researchers could also explore emerging technologies, such as AI, in assessing and enhancing teachers' and students’ DCL in China.

**Disclaimer** (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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