



DIGITAL CITIZEN PARTICIPATION OF COLLEGE STUDENTS: REALITY AND OPTIMIZATION PATH

Haili Lu, Kefeng Fu, Xiaolin Liu, Wanshan Hu

Shaanxi Normal University, People's Republic of China

E-mail: yjxxiaomao@163.com, 232731056@qq.com,

xiaolinliu@snnu.edu.cn, huws@snnu.edu.cn

Abstract

Digital citizenship participation refers to the utilization of digital technology by individuals or groups for the purpose of engaging in networked participatory behaviors. It involves four interconnected elements: individual, policy, political, and social participation. This study surveyed 446 college students from a private university in China and conducted interviews to explore their digital citizenship participation. It is found that college students' digital citizen participation is characterized by "strong individual interest-driven participation", "weak political concern", and "good digital citizen literacy". In order to improve college students' participation as digital citizens, it is crucial to cultivate digital literacy by applying the core competency framework of digital citizenship as a guiding principle. To create a sustainable path for students' participation, a four-pronged approach is proposed involving multi-stakeholders, namely society, government, schools, and teachers.

Keywords: college students, digital citizenship participation, multi-stakeholders, optimization path, participation characteristics

Introduction

Digital citizenship participation (DCP) is a crucial aspect of digital citizenship literacy, reflecting the ability of digital citizens to respond effectively within digital communities and participate meaningfully in a digital society. DCP is essential in enhancing digital literacy, accelerating digital development, and building a networked nation (Choi, 2016). It is also a must for both promoting education digitization and building educational and talent power in the process of educational transformation. UNESCO has recognized the importance of the age group between 15 to 24, which is "the most closely connected age group in the world". Policy makers throughout the world are focusing on cultivating their skills and core values to deliver highly literate digital citizens and create a safe digital environment. College students in contemporary society are the first generation of true "digital natives" (Al-Zahrani, 2015), whose daily communication is mainly based on digital tools, social media, and mobile devices. And they are vulnerable to being victims of digital risks. Problems related to digital citizenship literacy, such as online fraud, online speech disputes, and cyberbullying have become serious social issues in the digital age. *The Global Digital Citizen Foundation* (GDCCF) has stated that "being a digital citizen is less about civilization and security than it is about a range of complex skills for online participation" (Global Digital–Global Digital Skills Blog, 2022). In essence, the form of citizen participation among college students has evolved, and due attention should be paid to their online participation (Dmitrik, 2020) and a sustainable path is in need to guide their digital participation.

Relevant Constructs of Digital Citizenship Participation

Citizenship serves as the ontological category of digital citizen participation. The concept of citizenship, to a certain extent, entails digital citizen participation. The classic definition of citizenship refers to an individual, as a member of a group, who enjoys rights and obligations within the legal framework. This definition is based on the law and the group and emphasizes the rights and responsibilities of citizens. From a political perspective, citizenship, having national citizenship and the status of a member (Fischman & Haas, 2012) means participating in political activities and assuming political responsibilities. From a social-cultural perspective, citizenship means being a member who participates in activities and enjoys social and cultural rights and welfare (Banks, 2020). In the present study, accordingly, citizenship refers to different forms of existence of citizens in different contexts and is a complex and multifaceted concept that encompasses various aspects of an individual's identity and participation in society.

The rapid iteration of technology has extended traditional citizenship into the online context, allowing citizens to exist in both physical and the virtual world, and connect with each other (Brandau et al., 2022). According to Shakuntala, digital technology has influenced human activities, enabling individuals to actively participate in community activities and life, surpassing traditional forms of participation (Banaji & Buckingham, 2010). In March 2022, the *European Commission* released the *Digital Competence Framework 2.2 (DigComp 2.2, The Digital Competence framework for citizens - Publications Office of the EU, 2022)*, which updates the interaction between citizens and intelligent systems based on *DigComp1.0* and *DigComp2.0*, and emphasizes the field of "communication and collaboration." It has been pointed out that the development of information technology provides people with virtual citizenship and obligations, as well as rights and responsibilities on the Internet (Langran et al, 2011; Simsek et al, 2013). Mossberger defines digital citizenship as "the ability to participate in online social activities" (Mossberger et al., 2007). Digital citizenship in the present study focuses on citizens using digital technology to interact, share, collaborate, and participate in civic activities in the digital age.

In order to understand the concept of digital citizen participation, it is essential to first clarify the concept of citizen participation. Citizen participation is defined as citizen participating in the life of communities to improve the situation of others or change the future of the community (Adler & Goggin, 2005), which is a kind of active political engagement and media consumption. Meanwhile, the *United Nations Children's Fund* defines it as "individual or collective action by people to improve and optimize the well-being of communities or society as a whole" (2017). In a sense, citizen participation is a broader form of participation that encompasses both political and social participation, intertwining people's lives and affecting their own lives and communities in various ways (Dagger, 1997). With the advancement of information technology, the style and methods of citizen participation have also evolved (Gaventa & Barrett, 2012). Young citizens in the digital age tend to focus on "political behavior in online social life" (Bennett et al. , 2009), while Ekman and Amnå propose citizen participation behaviors that are more self-oriented or non-political or even semi-political (Ekman & Amnå, 2012). Non-political or semi-political participation can be seen as implicit political participation, with political participation being a central element of citizen participation (Turner, 2002). Virtually, DCP encompasses two main dimensions. The first dimension involves citizens' potential online participation behavior in their personal lives or individual political needs, often expressed as personal expression or self-realization, which frees citizens from the constraints of physical space and presence, enabling them to fulfill their individual needs through digital space. The second dimension is the explicit online participation form of citizens within their social communities, which is closely related to political, social, economic, and cultural practices. Political participation is considered a core element of DCP, and citizens should actively participate in public affairs and

assume corresponding public responsibilities, promoting their own political identity and social-political integration as members of social communities. The present study defines digital citizen participation as the use of new media, digital information and digital technologies to create and enhance communication channels, and promote responsible and secure individual or collective online activities.

Four Dimensions of Digital Citizen Participation

Moonsun Choi's identified four dimensions that contributed to the ability to participate in online social activities: digital ethics, digital literacy, digital participation, and critical thinking. Digital participation further encompassed four types of participation, including political, economic, cultural, and individual participation (Choi et al. , 2017). Political participation refers to the use of the Internet as a new tool for discussing or engaging in political policies, or using social networking sites for election or public communication; economic participation refers to consumption or financial transactions conducted online; cultural participation refers to cultural behaviors in which individuals engage in group activities; individual participation refers to the ways in which users are more focused on personal online activities. Mike Ribble emphasized the importance of appropriate online behaviors, access to digital resources, and protection of digital security and health, which were further developed into nine sub-categories, with some describing specific ways, others focusing on digital citizens participation awareness (Ribble, 2015).

Admittedly, these constructs suggest that DCP is a critical aspect of digital literacy, reflecting the quality of digital citizens' engagement in the digital community. Based on the previous literature, the present study categorizes digital citizen participation into two fundamental levels: the individual-based network participation behavior and the collective-based network participation behavior. The individual-based network participation behavior involves a clear awareness of individuals' digital skills and needs that can be met by using the Internet, which consists of two aspects: "objective awareness" and "subjective awareness". The former emphasizes network participation behavior as an objective and necessary responsibility, which serves as the basis and premise for individuals to maintain their relationship with the social community and become members of the community. The latter can be referred to as individual participation, which is based on an individual's personal needs, such as one' own value, self-experience, emotional identity (Choi et al. , 2017) .

Furthermore, network participation behavior is an attempt to improve the situation of others or change the future of the community through online participation. It can be achieved from two channels. One is through direct online channels, which means citizens improve the situation of others, known as social participation or potential participation. The other, called political participation (VanFossen, 2006) or internet political action (Kim & Choi, 2018), involves an explicit or indirect channels, as a way of using the Internet as a new tool to discuss or participate in political policies, thus indirectly and explicitly affecting the future of the whole community.

Although digital citizen participation was proven to increase the effective use of digital technology (Bennett et al. , 2009), the level and characteristics of participation is still unknown. Few studies, in particular, have paid little attention to the digital citizen participation of college students. As a core index of digital citizen literacy, it is not advisable to solely describe digital citizen literacy while ignoring digital citizen participation. To address the general research question—what the general situation of digital citizen participation among college students is—three specific research questions were generated.

1. What is the level of digital citizen participation among college students?
2. What are the characteristics of digital citizen participation among college students?
3. How to optimize the path of college students' digital citizen participation?

Research Methodology

Procedures

To address the research questions, a mixed-method approach both qualitative and quantitative was employed. Data were collected through a survey questionnaire to explore the characteristics and general level of college students' digital citizen participation, and in-depth interviews with selected participating students to analyze its causes to provide detailed evidence for the optimization of the path of college students' digital citizen participation. It was done in five steps:

1. Based on the previous literature, the dimensions of college students' DCP were determined, a scale for measuring their participation was developed, and its validity and reliability were tested.
2. Data was collected and descriptive analysis was performed on students' basic information to gain a general understanding of their online purposes and participation.
3. K-means clustering analysis and one-sample t-test analysis were performed to explore the differences in students' DCP levels based on their individual needs and political participation, respectively.
4. One-way ANOVA was applied to explore the characteristics of DCP among different levels.
5. Selected participants were interviewed in-depth to collect qualitative data to corroborate the quantitative findings, and the path of digital citizen participation among college students was put forward.

Sampling

In the present study, probability sampling was performed to ensure that each college student in the survey sample has an equal chance of being selected (Mertens, 2019). Participants were recruited from a private undergraduate university in China. Researchers distributed questionnaires to schools through e-distribution means named Questionnaire Star, and a total of 478 questionnaires were collected with 32 invalid questionnaires eliminated, and 446 valid questionnaires obtained. In the sample, there are 250 male students, accounting for 56.05%, and 196 female students, accounting for 43.95%. After the cluster analysis on the questionnaire data (see Analysis), eight participants were invited to complete an in-depth interview.

Instruments

The survey questionnaire consists of four main sections: (a) demographic information, (b) DCP scale, (c) digital citizenship literacy scale, and (d) The Internet attitude scale. Except for the demographic information, a 5-point Likert scale (5 = strongly agree, 1 = strongly disagree) was applied for categorization. A digital citizenship self-assessment scale developed by Choi (2016) was adapted and modified into a college student online participation scale with 14 items. The digital citizenship literacy scale (34 items) and the Internet attitude scale (5 items) used in this study were adapted from the college students' digital citizenship literacy scale and internet attitude scale developed by Al-Zahrani (2015). According to Bennett's classification of young citizens' political behavior in real-life situations (self-realization in political aspects), political aspects of life were classified into four categories: campus action, personal social action, volunteer service, and online groups participation (Bennett et al., 2009). In order to localize the original scales, high-proficient language teachers were first invited to render the original version into Chinese version independently. The Chinese version was then carried out based

on the students' performance. To better understand the characteristics and attitudes of college students' DCP at different levels, the "Survey of Netizens' Social Consciousness (2019 Edition)" from the China General Social Survey (CGSS), led by Ma Deyong of Renmin University of China, were also refereed during the adaptation process. The coding of the questionnaire for college students' DCP is presented in Table 1.

Table 1
Categories for the College Students "Digital Citizen Participation"

Category	Subcategory	Extraction Factors	Explanation
Individual identity characteristics	Age, gender, grade, Internet purpose, online time	Gender, Internet purpose	Some differences in identity characteristics can indirectly reflect the characteristics of digital citizen participation
individual demand partake	Individual participation	Interpersonal interaction, e-commerce	Help to understand participation levels, and forms of DCP among college students.
	Policy participation	--	
Participation as a community member	social participation	Campus action, social action (personally related), volunteer service, joining online groups	Explore the level and form of student participation
	Political participation	Political engagement awareness, critical awareness, local / global awareness	
Internet attitude	--	Focus on awareness, network security awareness	Understand the cognitive level of a student's active participation

An outline of semi-structured interview was then designed. Two main themes were addressed:(a) The digital citizenship competencies and internet attitudes (i.e., how did they engage in online participation? and (b) the level of digital engagement.

Reliability and Validity Analysis

Based on the statistical analysis using SPSS software, the *KMO* value is found to be .974, and the Bartlett sphericity test shows a significance of $p < .001$, indicating a good fit of the factor model. The *Cronbach's alpha* coefficients for the three sub-scales of college students' digital citizenship literacy, the Internet attitudes, and political participation are .982, .891, and .969, respectively, indicating good internal consistency. Since the questionnaire items were adapted from previous scales, this study used confirmatory factor analysis to verify the construct validity of each scale. The combination reliability (*CR*) values of digital citizenship literacy, the Internet attitudes, and political participation are .976, .874, and .96, respectively, and the average variance extracted (*AVE*) values are .548, .592, and .638, indicating good composite reliability and convergent validity of the questionnaire developed in this study (Fornell & Larcker, 1981). The discriminant validity of each dimension was analyzed using the HTMT method. The results show that all HTMT values are less than .85, indicating good discriminant validity between the factors and a good differentiation of the research data (Fornell & Larcker, 1981).

Research Results

The Level of Digital Citizen Participation among College Students

The present study conducted a survey on the fundamental aspects and competencies of students' Internet usage, in terms of their preference of utilized digital devices, daily online duration, purpose. The data in Table 2 show the preference to surf the Internet via the mobile phone, the purpose for entertainment (89.5%), followed by learning-related purposes (79.6%), and social media access (54.5%), with targeted news search (30.0%) being relatively low.

Table 2

The Status Quo of Digital Citizen Participation among College Students

Online Expertise	Group	N	%	M	SD
Access to digital devices	Cellphone	435	97.5	0.42	0.18
	Tablet PC	388	87.0		
	Computer	206	46.2		
	Others	429	96.2		
Internet duration (everyday)	More than 10 hours	27	6.1	0.54	0.23
	Between 6-10 hours	72	16.1		
	Between 3-6 hours	59	13.2		
	Between 1-3 hours	25	5.6		
	Less than 1 hour	9	2.0		
	Uncertain duration	235	52.7		
Purpose	Never	3	.7	2.62	1.92
	Entertainment	399	89.5		
	Homework	355	79.6		
	Searching for news	134	30.0		
	Visiting social media sites	243	54.5		
	Without specific purpose or killing time	75	16.8		

Classification of Digital Citizen Participation Level

K-means clustering was used for multiple iterations to analyze the differences in online participation. Based on these differences, DCP among college students is divided into five types, as shown in Table 3. The first type, referred to as "Marginalized Participation type" has the lowest average score in each participation behavior, indicating an overall indifferent performance. The second type, "Passive Participation type" has higher levels of participation than the first type, but students' engagement is influenced by external factors, and they tend to refrain from participating unless coerced. The third type, "Integrated Participation type" has higher levels of participation than the second type, but students' engagement is relatively changeable and focused more on entertainment and individual interests. The fourth type, "Voluntary Participation type" has even higher levels of participation, with students actively engaging and integrating into activities. The fifth type, "Radical Participation type" has the highest level of participation, with students not only integrating into activities but also having a certain level of critical thinking. One-sample t-test further reveals the differences in the level of digital citizen participation among college students.

Table 3
Categories for the College Students "Levels for Digital Citizen Participation"

Performance dimension (446) <i>M/t</i>	Marginalized Participation type (7) <i>M/t</i>	Passive Participation type (171) <i>M/t</i>	Integrated Participation type (92) <i>M/t</i>	Voluntary Participation type (96) <i>M/t</i>	Radical Participation type (80) <i>M/t</i>
Digital citizenship(3.889)	3.247/1.10*	3.284/9.69***	3.904/20.77***	4.152/31.82***	4.893/87.22***
Internet attitude(3.688)	3.085/0.26*	3.195/5.48***	3.667/11.39***	3.893/15.71***	4.575/20.86***
Political participation(3.431)	1.571/-9.38***	2.801/-8.72***	3.052/1.28*	3.845/22.56***	4.880/58.94***
Individual needs to participate(3.781)	2.631/-2.50**	3.136/7.54***	3.729/11.39***	4.100/39.00***	4.931/99.98***

* $p > .05$; ** $p < .01$; *** $p < .001$; *M/t*, Mean / *t*-value.

Differences in the Levels of Digital Citizen Participation

To explore whether there was heterogeneity in the classification of DCP levels among college students, a comparison was made between the individual participation and political participation in life aspects of the five types of DCP. Except online interpersonal relationships and online shopping, there were significant differences in the forms of political participation in life aspects, as shown in Table 4. The results showed that the radical participation type > voluntary participation type > integrated participation type > passive participation type > marginalized participation type. It can be seen that this classification effectively distinguishes and screens the level of DCP among college students, and once again validates the validity of the classification.

Table 4
One-way ANOVA for "Digital Citizenship Participation Level"

Project	Online interpersonal relationships		Electronic Commerce Social action		Social participation (politics in life)							
					Campus news		Online volunteer		Online community			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
MPT	3.214	0.324	3.142	0.839	2.290	0.951	2.294	1.604	1.286	0.488	1.709	1.113
PPT	3.277	0.497	3.233	0.466	3.194	0.477	3.022	0.503	2.963	0.404	2.872	0.542
IPT	4.027	0.551	3.918	0.613	3.892	0.687	3.357	0.720	3.261	0.627	3.050	0.521
VPT	4.197	0.515	4.153	0.441	4.210	0.521	4.012	0.513	3.962	0.521	3.832	0.574
RPT	4.981	0.124	4.918	0.241	4.979	0.157	4.931	0.417	4.900	0.518	4.880	0.537
<i>F</i> -value	188.980***		190.336***		196.589***		172.447***		259.774***		219.013***	
<i>MCR</i>	e>d>c>b>a		e>d>c>b>a		e>d>c>b>a		e>d>c>b>a		e>d>c>b>a		e>d>c>b>a	

** $p < .01$; *** $p < .001$; *MCR*, multiple comparisons.

Differences in Cognitive Attitudes

The awareness of participation is an important indicator of individual's active cognition. From the perspective of cognitive psychology, an individual's cognitive ability is closely related

to their behavioral motivation. The higher the degree of cognition, the stronger the action consciousness. Therefore, exploring different types of digital citizens' awareness of participation can judge the degree of positive cognition and active participation of university students' digital citizenship. Comparing the sense of participation in the five types of university students' digital literacy, except for the perception of network security, other items showed a trend of variation according to the level of university students' DCP. Among them, media attention awareness, political participation awareness, critical awareness, and local/global awareness are all shown as follows: radical participation type > voluntary participation type > integrated participation type > passive participation type > marginalized participation type, as shown in Table 5.

Table 5
Ideological Aspects for "Different Levels of Digital Citizenship Participation"

Project	Media awareness		Political participation consciousness		Critical consciousness		Local / Global awareness		Cyber security perception	
	M	SD	M	SD	M	SD	M	SD	M	SD
MPT	1.809	0.741	1.571	0.534	1.381	0.487	1.714	0.951	3.200	0.748
PPT	2.863	0.355	2.935	0.323	2.690	0.553	3.14	0.455	3.194	0.388
IPT	3.177	0.573	3.179	0.494	2.847	0.699	3.543	0.636	3.804	0.593
VPT	3.885	0.495	3.932	0.414	3.746	0.624	4.052	0.489	4.102	0.468
RPT	4.854	0.363	4.956	0.197	4.820	0.497	4.950	0.219	4.822	0.409
F-value	324.065***		498.574***		222.595***		231.786***		182.527***	
MCR	e>d>c>b>a		e>d>c>b>a		e>d>c>b>a		e>d>c>b>a		e>d>c>a>b	

*** $p < .01$; *** $p < .001$; MCR, multiple comparisons.

Interview

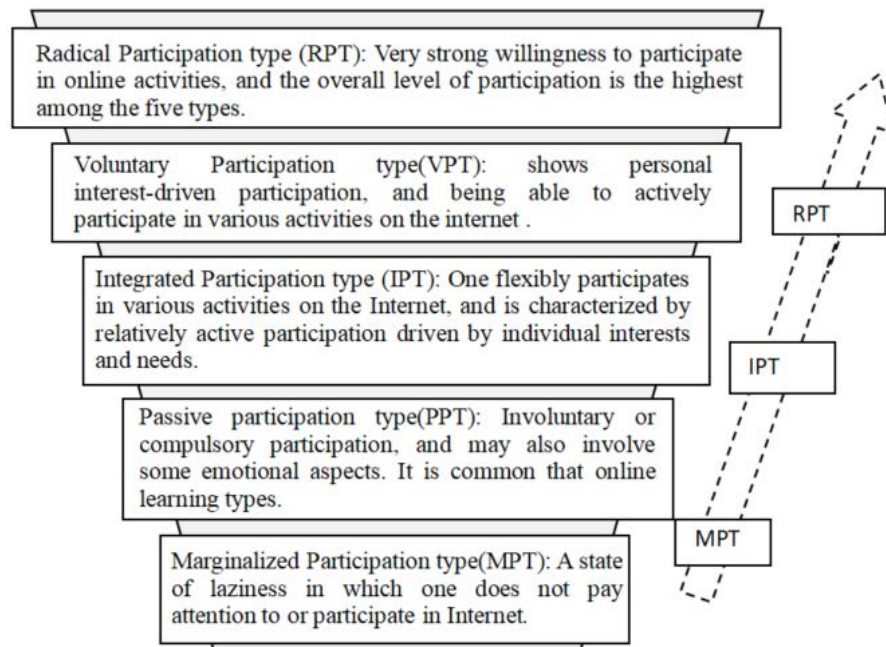
Based on the results of the quantitative study, the researchers found that among the eight interviewed university students, one participant belonged to radical participation type (S1), two participants belonged to the voluntary participation type (S2, S3), two participants belonged to the integrated participation type (S4, S5), two participants belonged to the passive participation type (S6, S7), and one participant belonged to marginalized participation type (S8). Through in-depth interviews, it was found that the most participants were engaged in personalized participation based on their interests, which mainly focused on individually-driven network activities. Their participation was characterized by being of various levels. Noticeably, one participant (S08) expressed his unwillingness to participate in any kind of activities.

Discussion

The Level of Digital Citizenship Participation Among College Students

The results revealed that the level of digital citizen participation among university students varied a lot, as shown in Figure 1.

Figure 1
The Level of Digital Citizen Participation Among University Students



Radical participation type (RPT) shows very strong willingness to participate in online activities, and the overall level of participation is the highest among the five types. Respondent S1 replied, "Well, I think the Internet is good for all. I can achieve everything on the internet, and my life will be in the darkness without it. Previous research has found similar tributes in these participants (Choi, 2016), who have higher digital citizen literacy and internet attitudes (Al-Zahrani, 2015); voluntary participation type (VPT) shows personal interest-driven participation, such as self-realization or personal expression based on personal interests. Through the results in Table 3, it can also be found that individuals have the greatest diversity in participation compared to digital participation. This also confirms Bennett's explanation of changes in citizen participation (Bennett, 1998); integrated participation type (IPT) means that one flexibly participates in various activities on the Internet and the participants (S4, S5) belong to this type. Just as the respondent (S4) "Er, it all depends, and I would like to use digital devices to search for some resources and meet my digital needs, but you know, we are real human, and prefer to enjoy the real communication with others."; passive participation type (PPT) mainly shows involuntary or compulsory participation, and may also involve some emotional aspects. It is common that online learning types, like MOOCS, witness high dropout rate and low satisfaction. Two participants (S6, S7) from the interview reported that they were unwilling to attend the online course but for earning credits; marginalized participation type (MPT) has lower levels of participation and awareness than the overall level, indicating that their participation in the online environment is low and passive. As one of the participants (S8) reported he preferred to buy daily wares in cash rather than e-bank for it is rather insecure with online transaction. This also verifies the "Dutiful Citizen" tendency proposed by the *Digital Engagement Evaluation Team (DEET)* (Peixoto, et al. , 2016) and (Bennett, 1998). Respondent S8 said, "I feel bored and upset on the Internet. I don't want to interact with anyone. I just want to pass the exam at college."

The Characteristics of Digital Citizen Participation Among College Students

The digital citizen participation style of college students is primarily driven by their interests. This aligns with previous studies (Bennett et al., 2009) which found that college students were engaged in digital citizen participation primarily for self-realization purposes and preferred to participate in relaxed online activities. Research has also shown that college students widely use digital devices like computers and smartphones, which is consistent with the previous finding that college students prioritized instant information over new social technologies such as blogs and wikis (Jones & Healing, 2010; Kennedy et al., 2009)

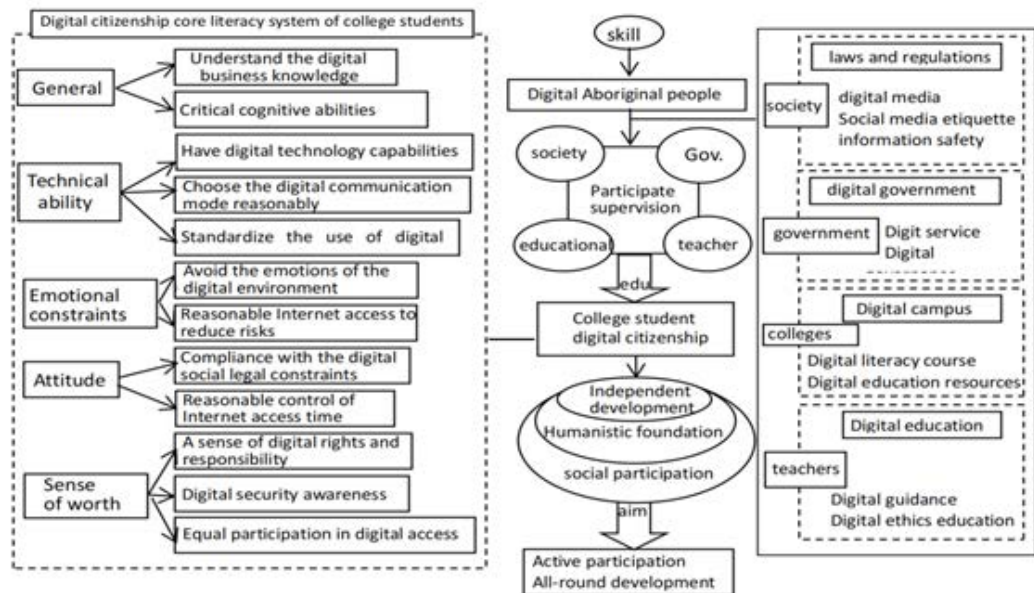
In addition, college students exhibit a weak sense of responsibility and low awareness of political participation. From Table 4 and in-depth interviews it is displayed that the level of political participation in daily life was lower than the means for interpersonal interaction and online shopping activities. College students have weak awareness and interest in political participation on the Internet. Early research has also noted this shift in political engagement (Graaf & Inglehart, 1998; Zukin, 2006), characterized by young people showing increasing interest in politics based on themselves.

Again, college students demonstrate a strong digital citizenship literacy and a positive attitude towards the internet. By combining the results of qualitative and quantitative analyses, it has been found that they are generally at a slightly above-average level although slight variations exist in the types of college students' DCP and attitudes towards the Internet. College students expressed their desire for more convenient and relaxed ways of communication. Therefore, they have higher demands and expectations for interpersonal communication on the internet (Al-Zahrani, 2015). They are constantly learning and growing through their participation.

An Optimized Path

As digital citizen participation is a component of digital citizenship literacy, it is necessary to cultivate the most fundamental digital citizenship literacy of college students in order to promote their reasonable and positive participation. Against this background, popularizing the core literacy of digital citizenship among college students is particularly important. This enables them to think critically, participate safely, and use technology reasonably. Combining with the general situation of digital citizen participation among college students, the present study proposes a cultivation model for the core literacy of digital citizenship among college students, based on the "core literacy of digital citizenship" of students and the four-in-one implementation path of multi-stakeholders, namely, society, government, schools, and teachers, to guide students to achieve the goals of "active participation" and "all-round development" in the digital age, as shown in Figure 2.

Figure 2
An Optimized Path



Firstly, with the continuous integration of technology and social development, society cannot do without talents with digital technology. Therefore, paying attention to the development of digital citizenship literacy, especially the core literacy of digital citizens among college students, can not only promote college students' active participation in the digital environment, but also promote the healthy development of social digitization. Society is the basic unit of citizens' life and the driving force of human development. Therefore, improving the digital citizenship literacy of college students and cultivating their participation cannot be separated from this basic unit of society. At the social level, the most fundamental thing is to strive to create a safe digital space, establish and improve laws and regulations related to the network, strengthen the popularization and deepening of digital literacy education, promote digital tools and skills, and understand social media etiquette, so that college students can better adapt to the development and changes of the digital age. Secondly, promote the construction of platforms for digital citizen participation, provide more open, fair, and transparent participation platforms, and enable college students to better participate in the construction of digital citizenship. Finally, strengthen network security construction, enhance social trust, establish digital citizen communities, and enable students to participate in the construction of digital citizenship with confidence.

In addition, a secure online environment cannot be constructed only by social forces, but government intervention is needed. Some social virtual platforms not only distort the core values of college students, but also generate some misleading types of participation. This is likely to impair the mainstream culture and dilute local customs and practices. Emerging technologies such as data mining and machine learning have not fundamentally solved the problem, but instead make users feel the formality of the content. Therefore, the government should strengthen intervention and control, prevent inappropriate behaviors and risks in the process of digital governance, and establish a relationship of mutual trust and cooperation with citizens. At the same time, the government is also expected to strengthen digital construction to provide more convenient and efficient public services to meet citizens' digital needs.

Still, schools play a crucial role in creating a healthy and green digital campus environment by preventing network fraud, online violence, and harmful online content. A series of courses

related to digital citizenship should be offered, imparting knowledge of digital literacy and network security to improve students' digital skills and cognitive levels. At the same time, schools should fully establish digital education resources via the national smart education public service platform to integrate digital citizenship awareness, skills, and good will into the elective courses. A variety of digital participation activities can be launched, such as digital volunteering, digital media production, and digital project competitions to encourage students to participate in digital citizenship.

Finally, the updating technology has changed people's way of life, but teachers still play a guiding role in students' digital behaviors. And teachers need to realize their social responsibility and guide students to participate in online activities reasonably, use technology responsibly, and increase their sympathy and understanding of others. The basic responsibility of teachers after all is to create or disseminate knowledge.

Conclusion and Implications

This study revealed different levels of digital citizen participation among university students. Although students demonstrated good digital citizenship literacy and attitude towards the internet, they tended to focus more on interest-driven participation and had a weaker willingness to engage in political participation. However, digital development cannot proceed without the political participation of digital citizens, which is one of the essential elements of digital citizenship. Therefore, more attention should be paid to cultivating university students' digital citizen participation and enhancing their comprehensive willingness to participate. Moreover, this study found that external environment guidance is the key to developing university students' digital citizen participation in the educational digital environment. This study could also help to implement solutions that address the common phenomenon of university students' digital citizen participation. Despite these findings, further research will be in need to identify the factors affecting university students' digital citizen participation.

Acknowledgements

This study is funded by Shaanxi Social Science Fund Project (2022P038) and key research project results of Heilongjiang Education Science Plan in 2023 (GJB1423310)

Declaration of Interest

The authors declare no competing interest.

References

- Adler, R. P., & Goggin, J. (2005). What do we mean by "civic engagement"? *Journal of Transformative Education*, 3(3), 236-253.
- Al-Zahrani, A. (2015). Toward digital citizenship: Examining factors affecting participation and involvement in the internet society among higher education students. *International Education Studies*, 8(12), 203. <https://doi.org/10.5539/ies.v8n12p203>
- Banks, J. A. (2021). Diversity, group identity, and citizenship education in a global age. In *Handbuch Bildungs-und Erziehungssoziologie* (pp. 1–24). Springer Fachmedien Wiesbaden. https://doi.org/10.1007/978-3-658-31395-1_20-1
- Banaji, S. , & Buckingham, D. (2010). Young people, the internet, and civic participation: An overview of key findings from the CivicWeb project. *International Journal of Learning and Media*, 2(1), 15-24.

- Bennett, W. L. (1998). The UnCivic culture: Communication, identity, and the rise of lifestyle politics. *PS: Political Science and Politics*, 31(4), 740. <https://doi.org/10.2307/420711>
- Bennett, W. L. , Wells, C. , & Rank, A. (2009). Young citizens and civic learning: Two paradigms of citizenship in the digital age. *Citizenship Studies*, 13(2), 105–120. <https://doi.org/10.1080/13621020902731116>
- Brandau, M. , Dilley, T. , Schaumleffel, C. , & Himawan, L. (2022). Digital citizenship among Appalachian middle schoolers: The common sense digital citizenship curriculum. *Health Education Journal*, 81(2), 157–169. <https://doi.org/10.1177/00178969211056429>
- 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>
- Choi, M. , Glassman, M. , & Cristol, D. (2017). What it means to be a citizen in the internet age: Development of a reliable and valid digital citizenship scale. *Computers & Education*, 107, 100–112. <https://doi.org/10.1016/j.compedu.2017.01.002>
- Dagger, R. (1997). *Civic virtues: Rights, citizenship, and republican liberalism*. Oxford University Press on Demand.
- Dmitrik, N. (2020). Digital state, digital citizen: Making fair and effective rules for a digital world. *Legal Issues in the Digital Age*, 1(1), 54–78.
- Ekman, J. , & Amnå, E. (2012). Political participation and civic engagement: Towards a new typology. *Human Affairs*, 22(3), 283–300. <https://doi.org/10.2478/s13374-012-0024-1>
- Fischman, G. E. , & Haas, E. (2012). Beyond idealized citizenship education: Embodied cognition, metaphors, and democracy. *Review of Research in Education*, 36 (1), 169–196.
- Fornell, C. , & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50.
- Gaventa, J. , & Barrett, G. (2012). Mapping the outcomes of citizen engagement. *World Development*, 40(12), 2399–2410. <https://doi.org/10.1016/j.worlddev.2012.05.014>
- Global Digital. (2022). Great critical thinking activities that engage your students. *Global Digital Skills Blog*. <https://globaldigitalcitizen.org/10-great-critical-thinking-activities-that-engage-your-students/#more-48>
- Graaf, N. D. D. , & Inglehart, R. (1998). Modernization and postmodernization: Cultural, economic and political change in 43 societies. *The British Journal of Sociology*, 49(4), 674. <https://doi.org/10.2307/591300>
- Peixoto, T., Fall, M., & Sjoberg, F. (2016, February 25). Evaluating digital citizen engagement: A practical guide. *The World Bank, Washington, DC*. <https://openknowledge.worldbank.org/entities/publication/ad18e12c-e1fb-55f4-89d1-8449d665d0bb>
- Jones, C. , & Healing, G. (2010). Net generation students: Agency and choice and the new technologies. *Journal of Computer Assisted Learning*, 26(5), 344–356. <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1365-2729.2010.00370.x>
- Kennedy, G. , Dalgarno, B. , Bennett, S. , Gray, K. , Waycott, J. , Judd, T. , Bishop, A. , Maton, K. , Krause, K. -L. , & Chang, R. (2009). *Educating the net generation: A handbook of findings for practice and policy*. University of Melbourne Press.
- Kim, M. , & Choi, D. (2018). Development of youth digital citizenship scale and implication for educational setting. *Journal of Educational Technology & Society*, 21(1), 155–171.
- Lenhart, A. , Madden, M. , Smith, A. , & Macgill, A. R. (2009). Teens and social media: An overview. *Washington, DC: Pew Internet and American Life*, 97–119.
- Mertens, D. M. (2019). *Research and evaluation in education and psychology: Integrating diversity with quantitative, qualitative, and mixed methods*. Sage Publications.
- Mossberger, K. , Tolbert, C. J. , & McNeal, R. S. (2007). *Digital citizenship: The Internet, society, and participation*. MIT Press.
- Oliver, B. , & Goerke, V. (2007). Australian undergraduates' use and ownership of emerging technologies: Implications and opportunities for creating engaging learning experiences for the net generation. *Australasian Journal of Educational Technology*, 23(2).
- Ribble, M. (2015). *Digital citizenship in schools: Nine elements all students should know*. International Society for Technology in Education.

- VUORIKARI Rina, R., Kluzer, S., & Punie, Y. (2022). *DigComp 2.2: The digital competence framework for citizens-with new examples of knowledge, skills and attitudes* (No. JRC128415). Joint Research Centre (Seville Site).
- Smith, S. D. , & Caruso, J. B. (2010, October). *The ECAR study of undergraduate students and information technology*. ERIC. <https://eric.ed.gov/?id=ED514182>
- Turner, B. S. , & Isin, E. F. (2002). *Handbook of citizenship studies*. Sage Publications Ltd. <https://www.torrossa.com/en/resources/an/4912058>
- VanFossen, P. J. (2006). The electronic republic? Evidence on the impact of the Internet on citizenship and civic engagement in the US. *International Journal of Social Education*, 21(1), 18–43.
- Vromen, A. (2017). Digital citizenship and political engagement. In *Digital Citizenship and Political Engagement, Interest Groups, Advocacy and Democracy Series* (pp. 9-49). Palgrave Macmillan, London.
- Zukin, C. , Keeter, S. , Andolina, M. , Jenkins, K. , & Carpini, M. X. D. (2006). *A new engagement?: Political participation, civic life, and the changing American citizen*. Oxford University Press.

Received: March 07, 2023

Revised: March 29, 2023

Accepted: April 05, 2023

Cite as: Lu, H., Fu, K., Liu, X., & Hu, W. (2023). Digital citizen participation of college students: Reality and optimization path. *Problems of Education in the 21st Century*, 81(2), 244-257. <https://doi.org/10.33225/pec/23.81.244>

Haili Lu	PhD Student, School of College of Education, Shaanxi Normal University, Chang'an south road 199, China. E-mail: yjxiaomao@163.com
Kefeng Fu	PhD Student, School of College of Education, Shaanxi Normal University, Chang'an south road 199, China. E-mail: 232731056@qq.com
Xiaolin Liu (Corresponding author)	PhD, Associate Professor, School of College of Education, Shaanxi Normal University, Chang'an south road 199, China. E-mail: xiaolinliu@snnu.edu.cn
Wanshan Hu	PhD, Associate Professor, School of College of Education, Shaanxi Normal University, Chang'an south road 199, China. E-mail: huws@snnu.edu.cn