

Development of Youth Digital Citizenship Scale and Implication for Educational Setting

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ABSTRACT

Digital citizens need comprehensive knowledge and technological accessibility to the internet and digital world and teachers have a responsibility to lead them to become digital citizens. However, existing Digital Citizenship Scales contain too broad ranges and do not precisely focus on the target students, so teachers do not have clear criteria for facilitating young people to have digital citizenship, which leads to problems in the direction and goals of digital citizenship education. This study aims to clearly identify the Digital Citizenship Scale for adolescents perceived by teachers who are responsible for their students' digital citizenship education and to present the needs and direction of school-based education to satisfy the identified Digital Citizenship Scales. A five-factor Digital Citizenship Scale called S.A.F.E model, meaning leading character of Self-identity in digital environment, Activity in online(Reasonable Activity and Social/cultural engagement), Fluency for the Digital tools, and Ethics for digital environment, was derived through Exploratory Factor Analysis (EFA) and further cross-validated through Confirmatory Factor Analysis (CFA) with 200 pre-service teachers and in-service teachers. The S.A.F.E model, derived by teachers, shows high reliability and construct validity to be used as a digital citizenship scale for students through concept analysis, EFA, and CFA verification. Based on the theoretically rigorously derived SAFE model, the educational requirements and direction to become active and critical citizens in the online community were discussed.

Keywords

Adolescent digital citizenship scale, Adolescent digital citizenship education, Factor analysis, Teachers' perspective on digital citizenship scale

Introduction

In the digital age, where the boundaries between online and offline are blurred due to the rapid development of information and communication technologies, the conceptual scope of citizenship should no longer be limited to that of traditional one. While the traditional approaches for citizenship which emphasize rights and responsibilities as citizens are valid, additional efforts to review and redefine what are the appropriate concepts of citizenship matching to the 21st internet age have been made continuously (Bennett, Wells, & Rank, 2009; Hermes, 2006). Although, in this context, the concept of digital citizenship emerged, the definition and use of term for the digital citizenship vary from scholar to scholar. In addition to digital citizenship, the names cyber citizenship, online and network citizenship, or internet citizenship are used interchangeably, but the definition of digital citizenship varies slightly depending on what emphasis is placed (Bennett & Fessenden, 2006; Ribble, Bailey, & Ross, 2004). Based on existing studies that have defined digital citizens as people who use technology effectively and properly (Isman & Gungoren, 2014; Ribble, 2011), digital citizenship can be defined as the qualities required for citizens to use digital tools and behave in various digital environment (Searson, Hancock, Soheil, & Shepherd, 2015).

In harmony with the emergence and emphasis of digital citizenship, the changes in the school classroom environment into the use of digital devices, the internet and digital textbooks, implication of smart education, and activation of online classes have become a global trend (Cristol et al., 2015). Regardless of students' acceptance of cyberspace, information and digital world have already become and will be a big stream for future society. In this ongoing cyber space, therefore, adolescents in the process of maturing self-identity need to establish their value and identity for digital citizenship more clearly (Lee, Aiken, & Hung, 2012; ISTE, 2016; Ribble, 2011) in online environment. Beyond the level of past safety online education to prevent potential dangers faced by youth, it has become important to foster actively participatory citizens with self-identity and expand the capabilities for the future digital and networked society comprehensively (Jones & Mitchell, 2016). In this sense, as pointed out by Jones and Mitchell (2016), the direction of digital citizen education for youth should be differentiated from simple digital literacy education and cyberbullying prevention; attention for (1) putting into practice proper use of internet resources for respect and tolerance for others in online and (2) utilizing internet resources to increase reasonable participation in online should be paid. In addition, the

establishment of identity in the internet space that meets the development stage of the youth should be treated as an important aspect.

In order to educate young people to develop appropriate citizenship in the digital world, it is necessary for teachers to establish clear criteria for determining the degree and extent of education. Digital citizenship education is not simply about teaching the use of digital tools. It is the process of preparing students for life in a world full of abundant skills. In the digital age, teachers no longer serve as mere communicators of knowledge, but as guides, mentors, role models, facilitators and counselors of information activities (Jones, Mitchell, & Walsh, 2014; Lee, 2017; Ribble, 2015). In other words, in a global digital age, teachers play a very important role in innovative classroom activities related to the elements of active and positive digital citizenship. Teachers have the most direct responsibility to educate and guide students in digital citizenship. Consequently, in order to achieve the successful digital citizenship education for youth, a criterion for the digital citizen education that the teacher recognizes must be prepared. On the basis of this, a valid and reliable Digital Citizen Scale derived from the teacher's perspective is required. In accordance with this requirement, A five-factor Digital Citizenship Scale called S.A.F.E model, meaning leading character of Self-identity in digital environment, Activity in online, Fluency for the Digital tools, and Ethics for digital environment, was derived through Exploratory Factor Analysis (EFA) and further cross-validated through Confirmatory Factor Analysis (CFA). This study made efforts to develop a valid and reliable digital citizenship scale from the teacher's point of view. A road map should be provided for programs that are more closely aligned with the direction of youth digital citizenship education and are interested in improving positive behavior in online.

Defining digital citizenship

Perspective of digital citizenship approach

As interest in digital citizenship began to emerge, researches regarding the scope and definition of digital citizenship have continued. Traditionally, under the name of digital, researches on the ethical aspect called netiquette and the ability to access and utilize digital technology have begun. As a consequence, according to the previous literature, the greatest part of the category of digital citizens is the emphasis on ethical aspect, which means responsible behavior in the online environment (Farmer, 2011; ISTE, 2016; Lenhart et al., 2011; Ribble, Bailey, & Ross, 2004; Ribble, 2011). The concept of ethics or etiquette varies from acknowledging the rights of others and taking responsibility for their actions to enhancing respect for others, protecting intellectual property rights, and not cyberbullying in the online environment. In addition, there is a strong tendency to emphasize the ability to utilize digital media and interact with others successfully (Dede, 2009; Mossberger, 2009) through online communication. Media and information literacy as a digital citizenship have been focused on by many scholars as well (Simsek & Simsek, 2013). This capability is viewed as a comprehensive concept such as accessibility to digital media and activities through a variety of methods, keeping up with changing technologies using digital tools and managing issues involving computer problems or security.

As a matter of fact, the perspective of digital citizenship emphasizes on various participation and activities in online beyond the above-mentioned level (Mossberger, Tolbert, & McNeal, 2007). One representative example is the tendency to emphasize political, cultural, and economic involvement and involvement through online (Simsek & Simsek, 2013). These activities can be regarded as extending the range of citizenship required in real life to that of digital life through appropriate communication and decision making process. In the same context, the establishment of critical consciousness and the manifestation of resistance (Bennett, Wells, & Rank, 2009) through the internet are also confirmed as the category of highly emphasized digital citizenship. This ability reflects the belief and ability to achieve social justice through the internet. Finally, some researchers approach digital citizenship in terms of internet-specific abilities and self-efficacy. This aspect has also been seen as specialized ability to participate in online activities and communicate his or her opinions clearly as a citizen (De Marco, Robles, & Antino, 2014). The results of these studies reveal that the ability to collaborate and communicate with others, the main competence of digital citizenship, is directly related to internet self-efficacy and information literacy (Livingstone & Helsper, 2009).

Literature review: Framework for digital citizenship scale

The followings are the various discussions about the components of digital citizenship that are fundamental to the development of digital citizenship scale. The components of digital citizenship are largely presented as cognitive factor (e.g., communication ability, autonomous judgment ability, rational decision making ability, and

critical thinking ability), emotional factor (e.g., human dignity, tolerance, community consciousness, responsibility, and care), and behavioral factor (e.g., active participation, autonomous regulation, compliance with laws and regulations). Ribble (2011), the most prominent scholar of digital citizenship research, presented nine components of digital citizenship; (1) digital access, (2) digital consumption, (3) digital communication, (4) digital literacy, (5) digital etiquette, (6) laws and regulations related to digital use, (7) digital rights and responsibilities, (8) digital health, and (9) digital security (Ribble, 2011). In addition, International Society for Technology in Education (ISTE) presented nine digital citizenship components; (1) Equal digital rights and access for all, (2) Treating others with respect in online environments, no cyber-bullying, (3) No stealing or damaging others' digital work, identity or property, (4) Appropriate decisions when communicating through digital channels, (5) Using digital tools to advance learning and keeping up with changing technologies, (6) Responsible online purchasing decisions while protecting payment information, (7) Upholding basic digital rights in digital forums, (8) Protecting personal information from forces that might cause harm, (9) Limiting physical and psychological health risks of technology (Brichacek, 2014). The iKeepSafe organization (see <http://www.ikeepSAFE.org/>), a nonprofit organization, aims to promote successful digital citizen elements through: (1) Balancing Digital Usage, (2) Practicing Ethical Digital Usage, (3) Protecting Personal Information, (4) Maintaining Healthy and Safe Relationships, (5) Building a Positive Reputation, (6) Achieving Digital Security (Searson et al., 2015).

Based on the aforementioned digital citizenship components, attempts to develop digital citizenship scale have been made (Choi, Glassman, & Cristol, 2017; Isman & Gungoren, 2014; Jones & Mitchell, 2016). In the most recent study on digital citizenship scale, Choi, Glassman, and Cristol (2017) developed a digital citizenship scale for adults by studying graduate students and university students. In this study, the digital citizenship scale is composed of five elements (e.g., Internet Political Activism, Technical Skills, Local/Global Awareness, Critical Perspective, and Networking Agency), and the scope of the applying range is limited to the level of participation of young adults in the internet-centric community life. Meanwhile, in a study that developed digital citizenship scale focusing on respect, patience, and civic engagement in on-line, two factors (e.g., online respect and online civic engagement) were suggested as the scale for identifying the most essential digital citizenship (Jones & Mitchell, 2016). To mention one more representative study, Isman and Gungoren (2014), with the goal of completing the digital citizenship for the 21st century, developed digital citizenship scale based on the three elements suggested by Ribble, Bailey, and Ross (2004), such as respect (etiquette, access, law), educate (communication, literacy, commerce) and protect (rights and responsibility, safety / security, health and welfare).

The previous studies mentioned above have some limitations in that the concept of traditional citizenship is transformed to the category of on-line, or the psychological and social elements required for digital citizens are not applied in a comprehensive manner. In addition, the majority of studies also focused on general digital citizenship scale for the adult citizen. Even if there is digital citizenship scale for students, digital citizenship scale for students was centered on adult college students. For this reason, it does not include the comprehensive digital citizenship scale that juvenile youth who are in the process of self-identity formation should have. Table 1 summarizes the content and limitations of the main DC framework and scale mentioned so far.

Table 1. Contents and limitations of the previous Digital Citizenship frameworks

Researcher / Institution	Contents and factors	Main target subjects	Limitations
Ribble (2011)	9 factors	Mainly technology leaders and teachers	Some elements are beyond the scope of individual student responsibilities (i.e., rights, communication, education, and access).
ISTE Brichacek (2014)	9 factors	Teachers and students (All Grades)	It presents the digital citizenship competencies required of the students, but mainly focuses on skills and attitudes and lacks of knowledge.
iKeepshape (http://www.ikeepSAFE.org/)	6 factors	Students (All Grades)	It focuses on skills and attitudes, and lacks identity factors.
Choi, Glassman, & Cristol (2017)	5 factors	Adult (over college students)	It is limited to the participation of adults in the Internet-centric community.
Jones & Mitchell (2015)	2 factors	Students(11-17)	It includes digital citizenship scale for adolescents, but is limited to ethics and participation in online.
Isman & Gungoren (2014)	9 factors	College students	It merely confirms Ribble's research from the viewpoint of college students.

Youth identity and digital citizenship education

Adolescents' identity and digital environment

Adolescence, described as “storm and stress” (Harold, Colarossi, & Mercier, 2007), is an inevitable stage of development in which the relationship of parent and friend changes (Huang et al., 2014), and the confusion of identity and role coexist (Erikson, 1968). During these developments, biological changes related to puberty, a new psychosocial desire for relationships, the development of identities and social roles keeping abreast of the change of the environment, and changes in perceptions related to sophisticated thinking skills take place (Adams & Marshall, 1996; Berzonsky, 2003; Erikson, 1968; Giddens, 1991). In addition, as adolescents enter higher education and broaden their range of activities, new rights and obligations are legitimately given. Therefore, adolescence is a time when adolescents face the task of autonomy, the importance of identity issues, and the desire to establish self-consciousness in a dynamic ecological environment (Barth, 2014; Harold et al., 2007). In summary, adolescents define themselves as members of a group in the context of the environment and articulate their identity in the context of dialogue and relationships with others.

Erikson (1968) emphasized that the development of personally validated identities is the most important part of the main developmental challenges of adolescence. He asserted that if adolescent successfully perceived his or her various roles in an expanded social contexts and relationships, he or she could construct self-identity effectively through “self-sameness and inner continuity” (Erikson, 1968, p. 87). Adolescents consider their role and contribution as they expand the boundaries of familiar relationships and environments. In the process of forming and establishing this identity, interpersonal relations and social context play a very important role (Adams & Marshall, 1996; Erikson, 1968). However, the social context of youth today is significantly different from that of previous generations. In particular, digital media technology creates a new environment for adolescents to express and explore their identity, by way of mobile phones, social networking sites, instant messaging platforms and blogs, virtual worlds and video sharing sites (Davis, 2012). Although there are studies that show an optimistic view of the relationship between digital use and adolescent identity (Lee, Aiken, & Hung, 2012), many studies have shown negative results highlighting potential hazards (Israelashvili, Kim, & Bukobza, 2012; Miles, 2011).

Given the scalability and ubiquity of these digital technologies, it is necessary to raise questions about how youth form and experience their identities in the digital environment. Today's young people were born in the internet age, so they can hardly imagine the absence of computers in relationship and information acquisition. Moreover, they have grown in the digital environment and led their life as a digital native (Prensky, 2001). Consequently, it is meaningful to explore the effects of the digital age on formation for self-identity of adolescents.

Integration digital citizenship with education

The most important part of digital citizenship education is teaching digital literacy, which is computer and internet-based technical skills (Koltay, 2011). Another big axis is the promotion of ethical consciousness represented by the prohibition of cyber-bullying, etiquette, and sense of responsibility that respects the rights of others as well as those of on their own in the digital age (Jones, Mitchell, & Walsh, 2014; Nation et al., 2003). However, as suggested by Jones and Mitchell (2016), it is necessary to discuss digital citizenship education beyond the horizon of digital literacy education and ethics education. Now, digital citizenship education should become a new identity card for the citizens of digital era who are demonstrating their capabilities such as appropriate responsibilities and codes of conduct relating to the use of technology through a reasonable approach (Miles, 2011) to interactive online activities (Ribble, 2015), ability to be productive with a sense of responsibility and criticism about technology (Farmer, 2011), capabilities to use technologies that extend from theoretical context to the social context (Nosko & Wood, 2011), and competence for young citizens to make reasonable and wise choices in a variety of online environments and situations in a comprehensive way (Farmer, 2011; Kassam, 2013; Miles, 2011, Ribble, 2015). Nosko and Wood (2011) emphasized the necessity for effective cooperation between educators, students, and the entire education system in order to develop citizenship awareness in the digital age and to provide effective education and to facilitate culturally appropriate behavior online.

The digital and internet-based activities can positively develop the cognitive and emotional skills needed for adolescents and, moreover, positively reinforce citizen participation in online and offline (Kahne and Spote, 2008; Sherrod, Flanagan, & Youniss, 2002). It is also directly related to cultivating citizenship to act with their own identity and values (Westheimer and Kahne, 2004; Youniss et al., 2002). In this regard, it is necessary to shift the center axis of digital citizenship education to the point of establishing the viewpoints and self-image of

the youth in and out of on-line activities based on tolerance and respect (Jones & Mitchell; 2016; Lenzi et al., 2012). This perspective is reflected as the key category of digital citizenship highlighted in the most recent technical standards for students presented by the International Society for Technology in Education (ISTE). Under this category, the factors are: (1) to cultivate and manage their digital identity and reputation; (2) to engage in positive, safe, legal and ethical behavior when using technology, including social interactions online; (3) to demonstrate an understanding of and respect for the rights and obligations; and (4) to manage their personal data to maintain digital privacy and security (ISTE, 2016). Given the increasing emphasis on the importance of new online identities in ISTE's 2016 standard for students, the inclusion of youth identity in digital citizenship education cannot be to be overemphasized.

Necessity of new framework for adolescents' digital citizenship

The importance of digital citizenship education for establishing the identity of the adolescents in the digital environment and performing its goal is summarized as follows. The most fundamental proviso to the study of digital citizenship for adolescents begin with an understanding of the changing digital environment and characteristics of youth at developmental stage (Israelashvili, Kim, & Bukobza, 2012; Valkenburg & Peter, 2011). The harmony of digital technology environment and the establishment of identity and self-consciousness, which are psychosocial desires for various human relations, which youth experience, should be integrated into digital citizenship (Davis, 2012; Lee, Aiken, & Hung, 2012). The fact that adolescents live in a digital environment cannot be confirmed to have achieved digital citizenship. In other words, integrated education needed as a digital citizen should be provided. The framework of education for digital citizenship should include various activities for the formation of human relations and social context based on digital literacy and ethical dimension in the digital environment (Jones & Mitchell, 2015; Nosko & Wood, 2011; Ribble, 2014). Standards for students for digital citizenship presented by ISTE (2016), is one of the major important efforts to highlight this perspective. As a result, it is now necessary to elaborate and provide a more specific common language that can include a change from traditional society to the digital age, the formation of youth societies, cultural human relationships underlined in its social context, and identity of adolescents.

New framework for adolescent digital citizenship scale

As mentioned before, there have been various studies to construct components and frameworks of digital citizenship (Brichacek, 2014; Ribble, 2011; Searson et al., 2015). There have been various ways to classify the elements of digital citizenship according to the purpose of research and researchers. For example, Ribble (2011) divided the components of digital citizenship into nine items and classifies them into three categories; respect, education, and protect. This study aimed to develop a digital citizenship scale for adolescents perceived by teachers. The digital citizenship of this study is a target for adolescents, so it is necessary to set up the identity, which is the emotional and positive domain in the development stage of adolescents, as a factor (Adams & Marshall, 1996; Berzonsky, 2003; Erikson, 1968; Giddens, 1991). Although there were items that corresponded to the concept of self-identity by several researchers, but there were no studies that separated the self-identity of adolescents as an independent factor for digital citizenship. Therefore, for the purpose of this study, new SAFE framework with four categories (Self-identity, Activity in online, Fluency for Digital environment, and Ethics for Digital environment) for the digital citizen was developed with reference to ISTE's standards for students (ISTE, 2016). Table 2 shows the classification for Framework of Digital Citizenship Scale, which is presented in the previous section, and classifies the items according to the SAFE framework. The conceptual definition of each of the four categories for classification is as follows.

- *Self-identity* : Building personal values and beliefs in the digital environment and to protect themselves from potential risks
- *Activity in online*: Engaging in positive and reasonable activity and interact with others through rational decision-making
- *Fluency for digital environment* : Using software and hardware to achieve a variety of goals and keep up with changing digital environment
- *Ethics for digital environment* : Demonstrating an understanding of and respect for the rights and obligations of others in digital environment

Table 2. Classification for framework of digital citizenship scale for youth

	S	A	F	E
The Nine Elements of Digital Citizenship (Ribble, 2011)		•	•	
Digital Access: full electronic participation in society.		•		
Digital Commerce: electronic buying and selling of goods.		•		
Digital Communication: electronic exchange of information.			•	
Digital Literacy: teaching and learning about technology and it's use.				•
Digital Etiquette: electronic standards of conduct or procedure.				•
Digital Law: electronic responsibility for actions and deeds				•
Digital Rights & Responsibilities: freedoms extended to everyone in a digital world.	•			
Digital Health & Wellness: physical and psychological well-being in a digital world.	•			
Digital Security (self-protection): electronic precautions to guarantee safety.				
Model by the International Society for Technology in Education (ISTE)				•
Equal digital rights and access for all.				•
Treating others with respect in online environments, no cyber-bullying.		•		
No stealing or damaging others' digital work, identity or property.		•		
Appropriate decisions when communicating through digital channels.			•	
Using and Keeping up with digital tools to advance learning		•	•	
Responsible online purchasing decisions while protecting payment information.	•	•		
Upholding basic digital rights in digital forums.	•			
Protecting personal information from forces that might cause harm.	•			
Limiting physical and psychological health risks of technology				
The iKeepSafe Bsix pillar model (http://www.ikeepsafe.org/be-a-pro/info/)	•			
Balance: Balancing Digital Usage				•
Ethics: Practicing Ethical Digital Usage	•			
Privacy: Protecting Personal Information		•		
Relationships: Maintaining Healthy & Safe Relationships	•	•		
Reputation: Building a Positive Reputation			•	
Online Security: Achieving Digital Security				
The digital citizenship scale factors (Choi, Glassman, & Cristol, 2017)		•		
Internet Political Activism (IPA)			•	
Technical Skills (TS)		•		
Local/Global Awareness (LGA)		•		
Critical Perspective (CP)		•		
Networking Agency (NA)		•	•	

Note. S = Self-identity, A = Activity in online, F = Fluency for Digital environment, and E = Ethics for Digital environment.

Present study

As mentioned so far, existing Digital Citizenship scales have applied the concept of traditional citizenship for general adults to the online setting, which leads to contain too broad ranges and do not precisely focus on the target students. In addition, there is a limitation in that they do not explicitly include psychological factors such as adolescents' self-identity. For these reasons, teachers do not have clear criteria for facilitating young people to have digital citizenship, which leads to problems in the direction and goals of Digital Citizenship education. This study aims to clearly identify the Digital Citizenship Scale for adolescents perceived by teachers who are responsible for their students' digital citizenship education and to present the needs and direction of school-based education to satisfy the identified Digital Citizenship Scales. The research questions for this study are addressed below: (1) What are the categories and factors of Digital Citizen Scale for adolescents from the teacher's perspective? (2) What are the guidelines for proper digital citizenship education for adolescents?

The limitations of this study are as follows. In this study, convenience sampling method was used. Therefore, due to the nature of convenience sampling, the background information of the sample is unevenly distributed, particularly gender and nationality. First, the subjects of this study were pre and in service teachers in Korea. Considering the appropriate number of samples for the structural equation model (150-400) (Hair et al., 1998), the number of subjects in this study is an appropriate sample. However, since the proportion of women is higher than that of men, it is not possible to exclude differences in recognition of Digital Citizenship Scale by gender. Second, although Korea has the highest score in the ICT development index in the world, as data are collected in one country, a little attention needs to be paid to the generalization of this study. Third, in order to derive the

overall Digital Citizenship Scale framework, we conducted a study through concept analysis based on the research presented in English in. For this reason, there may be some studies that are missing. Given that there are some limitations in terms of methodology, we have tried to maintain maximum objectivity and universality using the ISTE Standard for the overall analysis process.

Method

Participants

There were 200 participants consisting of 97 pre-service teachers (48.5%) who are currently enrolled in Teachers' College and 103 in-service teachers (51.5%) in Korea as of 2017 for this study. These participants were recruited through convenience sampling. A total of 200 questionnaires were analyzed. The mean age was 29.93 ($SD = 11.50$), and female (138, 69%) was more than male (62, 31%). The average Internet usage time per day of participants was 2.96 hours ($SD = 2.06$), including the time to access the Internet through a mobile phone. In the case of current teachers, the average year of career experience was 13.37 years ($SD = 9.77$), while the pre-service teachers had the highest percentage of students in 2nd grade ($n = 34$, 35.1%) overall. The demographic characteristics of the samples used in this study are presented in Table 3.

Table 3. Demographics of the participants

Respondents characteristics	%(N)
Gender	
Male	31%(62)
Female	69%(138)
Age	
19-20 years old	21%(42)
21-25 years old	35%(70)
26-30 years old	5.5%(11)
Over 30 years	38.5%(77)
Average Internet usage time per day	
Less than 1 hour	21.5%(43)
2-3 hours	54%(108)
4-5 hours	14.5%(29)
More than 6 hours	10%(20)
Years of teaching experience	
Less than 5 years	31.1%(32)
6-10 years	9.7%(10)
11-15 years	13.6%(14)
More than 16 years	45.6%(47)
Grade (pre-service teacher)	
Freshman	15.5%(15)
Sophomore	35.1%(34)
Junior	21.6%(21)
Senior	27.8%(27)

When it comes to participants in this study, Korea is one of the leading countries in the ICT sector. Particularly, in the ICT Development Index, which is evaluated annually by the Information Technology Union (ITU), Korea has been ranked first place for 9 consecutive years since 2008. The digital age connected in various ways is a period of learning and collaborating with other nations and at the same time a period of accountability. In this context, ISTE elaborates and provides the skills teachers need to integrate for learning and teaching. ISTE standards are being adopted by ICT frameworks in their school environment in various countries, mainly in the United States (ISTE, 2016). Korea also adopts the ISTE standard as the standard of school learning and education for the digital age (Heider & Jalongo, 2014). Standards or competencies provide a common language for skills, goals, and anticipated outcomes. In this context, the Digital Citizenship Scale derived from Korean teachers is consisted with the ISTE standard and will have universal impact on various countries.

Procedure

We tried to use the procedures as useful and valid as we could in developing items for digital citizenship scale for Adolescents. The elements for digital citizenship scale presented in this study were derived from concept analysis using the term digital citizenship. As Meyer, Becker, and Vandenberghe (2004) pointed out, conceptual analysis provides a plausibility to develop measurement tools by classifying, clarifying, comparing, and redefining meaning. Based on the researches on the components of digital citizenship that have already been published and released, we derived the categories that constitute digital citizenship concept for adolescents. This study was conducted in four steps to create a reliable and valid tool for measuring the digital citizenship for adolescents perceived by teachers. For the procedure of this study, the most recently composed digital citizenship scale study (Choi, Glassman, & Cristol, 2017) was referenced to and revised.

Step one: Concept analysis for item generation

A preliminary part of the study to create a digital citizenship scale for adolescents began with deriving an understanding of the relevant items. In order to check what items have been set up in previous researches and to identify the meaning, characteristics, and attributes of abstract components, conceptual analysis was conducted through three online databases (i.e., Google Scholar, ERIC, and EBSCO) and 16 related studies were confirmed. The researchers identified items for digital citizenship scale commonly used in these studies. At the same time, the emotional aspect of adolescents, which was an important research subject of this study, was added and confirmed. Through this step one, we identified the categories that make up digital citizenship for adolescents, and have classified them into four categories (Self-identity, Activity in online, Fluency for Digital environment, and Ethics for Digital environment) using ISTE's standards for students for digital citizenship (Figure 1).

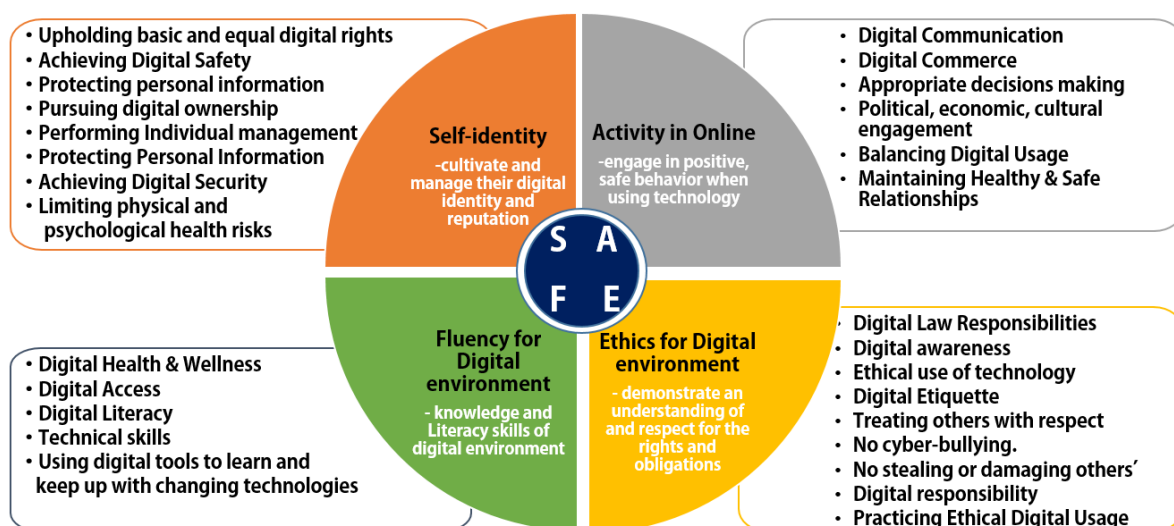


Figure 1. SAFE framework for digital citizenship scale of youth

Step two: Generating scale items and expert review for revision

Based on the four categories derived from step one, scale items appropriate for each category were constructed. At this stage, the scale items used in the previous research were constructed as much as possible, rather than being constructed arbitrarily by the researchers. After creating the scale items, cross-checked and double-check were conducted to determine if the generated scale items for digital citizenship scale was appropriate by both survey composition specialist and education specialist. The objective of this was to minimize the ambiguity, misunderstanding or other nonconformity of the items constituted by the researchers. The key questions used at this stage were: (1) Are the questions proper for adolescents' digital citizenship? (2) Are there questions that are not related to digital citizenship? (3) Are there any parts that are difficult to interpret or interpreted in a poly-semantic way? (4) Are there any questions that need to be repeated or added? Through this process, we finally made corrections, inclusion and elimination of digital citizenship scale for adolescents.

Step three: Executing EFA and CFA

For conducting Exploratory Factor Analysis (EFA) for the digital citizenship scale questionnaire which was composed and revised clearly through two stages, the convenience sample of current serving teachers and per-service teachers was used. The survey was conducted anonymously, and the questionnaire was briefly described before putting into survey. In the case of the preliminary teacher, the permission was obtained from the school and all participants volunteered to participate in the survey as well. After that, for the purpose of verifying a proposed factor structure derived from EFA, Confirmatory Factor Analysis (CFA) was performed.

Step four: Measuring concurrent validity for final scale

Through the process of Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), the final digital citizenship scale for adolescent was derived. Researchers confirmed the validity of final digital citizenship scale for adolescent through correlation with internet self-efficacy scale.

Measures

Internet self-efficacy scale

We measured the Internet efficacy for the concurrent validity of this study based on the precedent studies (De Marco et al., 2014) that the internet efficacy has a positive correlation with digital citizenship. Kim and Glassman (2013) defines the internet efficacy as an individual's competence and beliefs related to internet use and developed a self - report scale to measure it. In order to measure the internet efficacy, we used self-report scale of Kim and Glassman (2013) which defined internet use with individual competence and belief. Originally, the Internet Efficacy Scale developed by them, is composed of 17 items including information search, communication, differentiation, and information organization. Researchers used 15 questions for this study after eliminating the ambiguous questions considering the content validity. The Cronbach's alpha of the Internet efficacy used in this study was 0.916. A 5-point Likert type of scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used.

Data analyses

In order to examine the sub-factor structure of DCS consisting of 42 items, we conducted Exploratory Factor Analysis (EFA) using the total sample ($n = 200$). Factor analysis does not presuppose linear independence between factors and it is desirable to conduct the principal axis factoring in examining the structure between factors (Reinard, 2006), so maximum likelihood factoring was used for this study to produce more accurate results. As for a rotation method, the direct Oblimin method is more accurate than the Varimax rotation in social science assuming a correlation between factors (Osborne & Costello, 2009), so direct Oblimin method was applied. Next, to verify the reliability of the digital citizenship scale, the Cronbach's alpha coefficient was calculated to evaluate the internal consistency of the total and sub-categories of the digital citizen scale. Also, to test the scale's construct validity, correlation between digital citizenship and Internet self-efficacy was analyzed. Finally, Confirmatory Factor Analysis (CFA) was performed using AMOS 23.0 to verify a proposed factor structure derived from EFA.

Result

The demographic characteristics of the entire sample used in exploratory factor analysis and confirmatory factor analysis are presented in the table 2. Results of exploratory factor analysis using maximum likelihood factoring and direct Oblimin method, reliability and validity of scale, and confirmatory factor analysis using structural equation modeling are presented below.

Exploratory factor analysis

To determine whether exploratory factor analysis was adequate for the samples, KMO (Keiser-Meyer-Olkin) measures, Bartlett's test, and correlation matrix table were confirmed. The KMO measure of this measurement

was 0.79 and the Bartlett's test score was 4389.636 ($df = 496, p = .00$), which indicated that the sample was acceptable. If the correlation between the items is high ($r > 0.80$), those items should be removed from the scale due to the problem of multi-collinearity (Field, 2013). After we analyzing the correlation matrix table of scale items for this study, the items (1, 4, 13, 16, 17, 28, 29, 33, 38, 42) that high correlation between inter-correlation between variables were removed from scale items, to prevent the problem of multi-collinearity.

As a result of exploratory factor analysis for 32 items by way of maximum likelihood analysis and direct Oblimin method, factor rotation was converged by 15 iterations. Considering the point where eigenvalue greater than one and elbow of the curve in scree test (accepting factors above it and rejecting those below it), seven factors were found initially. However, the five items (23, 5, 7, 25, 27, and 37) with factor loadings less than 0.40 and five items (22, 35, 30, 37, 40, 41, and 26), which were not consistent with the results of the conceptual analysis of digital citizenship, were eliminated in later analysis. So, 18 out of the 32 items were used for reliability analysis. The factors including individual items retained in the final scale and their factor loadings are provided in Table 4.

Finally, an 18-item measure with five-factors was found from EFA (Table 3). The first factor consists of 3 items (24, 8, and 20) and was associated with the demonstration and respect for rights, responsibilities, obligations, and etiquette in online. The second factor was composed of 3 items (3, 15, and 11) and mainly dealt with knowledge and literacy skills of digital environment. When it comes to the third factor (items 6, 2, 14) and the fifth factor (items 39, 31, 18, 36, 19, 10), both factors were related to the positive and safe behavioral aspect in the digital environment. Regarding the fourth factor (21, 34, 9), it mainly related to the establishment and management of adolescents' digital identity and reputation. Descriptive statistics for the five factors are also presented in Table 4. The first factor had the highest mean ($M = 4.42, SD = .79$) while the fifth factor had the lowest means ($M = 3.13, SD = .68$).

Reliabilities of digital citizenship scale

The Cronbach's alpha coefficient for entire 18 items on the Digital Citizenship Scale was 0.75. In detail, the Cronbach's alpha coefficients for verifying the internal consistency of each sub-factor extracted from the exploratory factor analysis were 0.92 for the first factor, 0.74 for second factor, 0.83 for the third factor, 0.91 for the fourth factor, and 0.76 for the fifth factor. In summary, the homogeneity between the items constituting each sub-factor of digital citizenship was good between 0.74 and 0.92.

Table 4. The digital citizenship scale for adolescent items and the respective factor loadings

Items	F1	F2	F3	F4	F5
Factor 1					
24. Students should respect other people in the online environment and not engage in bullying behavior.	0.959	0.038	0.075	-0.013	-0.035
8. Students should be responsible for their own online activities.	0.819	0.04	0.027	-0.037	0.029
20. Students should be aware of the order of others in the online digital environment and should obey the order.	0.752	-0.102	-0.122	0.211	0.01
Factor 2					
3. Students should use digital technology to achieve various goals.	-0.002	0.935	0.068	0.061	-0.105
15. Students should immediately manage unnecessary files and programs on their computers.	-0.01	0.697	-0.016	0.1	0.035
11. Students should use the Internet to access more information about domestic and international issues.	-0.088	0.512	-0.182	0.016	0.059
Factor 3					
6. Students should express their emotions reasonably through communication when problems or inconveniences arise in the online digital environment.	0.047	-0.061	0.909	0.049	-0.08
2. Students should express their opinions online and learn and share their expertise.	0.051	0.013	0.754	-0.02	-0.059
14. Students should purchase legitimate goods during e-commerce activities.	0.045	-0.029	0.662	-0.008	0.059
Factor 4					
21. Students should be aware of their own health problems	0.147	0.15		0.026	0.881

caused by the abuse of digital devices, such as addiction and stress.

34. Students should establish their own beliefs and values about the digital environment. 0.026 -0.042 -0.025 0.879 0.058

9. Students should immediately delete emails from suspicious senders. -0.084 -0.056 -0.011 0.868 -0.019

Factor 5

39. Students should present their feelings, thoughts and opinions while posting text, photos, music, or videos online. 0.009 -0.049 -0.046 0.038 0.779

31. Students should belong to an online community related to social or political issues. -0.032 0.022 -0.108 0.056 0.667

18. Students should always check the price on the Internet when purchasing goods. -0.044 -0.045 0.099 -0.051 0.57

36. Students should work with others online to solve regional or school problems. 0.073 0.038 0.036 -0.008 0.547

19. Students should take care of the computer immediately if something goes wrong. 0.02 0.006 0.107 0.011 0.473

10. Students should be active in SNS such as KakaoTalk and Facebook. 0.035 -0.058 -0.16 -0.095 0.466

Table 5. Mean and standard deviation of DCS

Factor	N	Mean(SD)
Factor 1	3	4.42(0.79)
Factor 2	3	3.82(0.59)
Factor 3	3	4.00(0.66)
Factor 4	3	4.40(0.69)
Factor 5	6	3.13(0.68)

Confirmatory factor analysis

Based on the five-factor structure with 18 items extracted by Exploratory Factor Analysis, Confirmatory factor analysis was performed on the five-factor model. The path model used for CFA is shown in the following Figure 2, and the model fit index obtained from the verification is presented in Table 6. Model fit indexes such as GFI (Goodness of Fit Index), CFI (Comparative Fit Index), TLI (Tucker-Lewis Index), and RMSEA(Root Mean Square Error of Approximation), which were sensitive to the size of the sample and reflected the model's interrelation (Lomax & Schumacker, 2012), were taken into account as to evaluate how well the model matched the actual data. Since the initial model did not meet the criteria, researchers detected covariance paths between the error of items 31 and 10, 18 and 19, 11 and 12 using modification indices and then the model was rerun. The results of the five-factor structural model fit obtained in this study were GFI = .876, CFI = .924, TLI = .915, and RMSEA = .076. Considering that GFI, CFI, and TLI are moderate when close to 1, and RMSEA is between .05 and .08, the final 5 factor model assumed in this study considered to be moderate to good fit (Table 6).

Table 6. The model fits of CFA model of the Digital Citizenship Scale

	X ²	df	GFI	CFI	TLI	RMSEA
Original model	318.900	125	.859	.898	.875	.088
Second model	306.249	124	.864	.904	.881	.086
Final model	265.516	122	.876	.924	.915	.077

The first factor was named Ethics for Digital environment because it was associated with the demonstration and respect for rights, responsibilities, obligations, and etiquette in online. The second factor was called Fluency for Digital environment because it mainly dealt with knowledge and literacy skills of digital environment. Both the third factor and the fifth factor were related to the positive and safe behavioural aspect of the concept analysis for developing the scale of this study, so we decided to classify them into so called Activity in Online in large (together). The former was named Reasonable activity and the latter was Social/cultural engagement. When it comes to the fourth factor, we decided to name it Self-identity in digital world.

Traditionally, citizenship has been divided into “duty-based citizenship” which focused on formal duties, responsibilities, and management and “engaged citizenship” which emphasized on moral and empathic roles (Dalton, 2013). The results of this study showed that the digital citizen scale for adolescents was not only a

mandatory citizen as a passive participant but also an active personality that can be cultivated by interactive and horizontal network communication such as internet and social media at the same time. In addition, the issues of autonomy, importance of identity issues, and desire to establish self-consciousness, which represent the characteristics of adolescents at the developmental stage (Barth, 2015; Harold et al., 2007) were reflected in the digital citizen scale. The characteristics of digital citizenship scale for adolescent derived from this study are as follows.

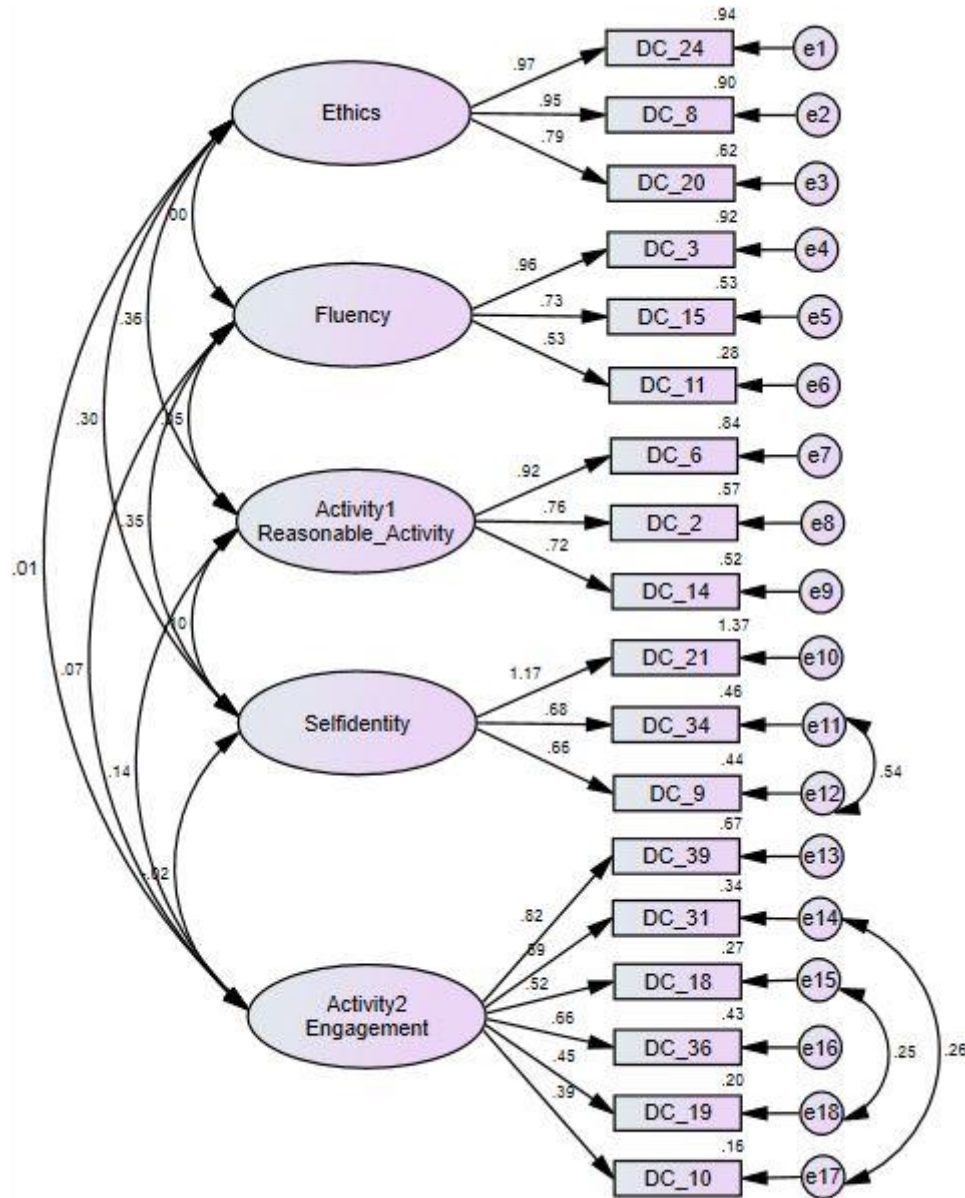


Figure 2. CFA model of the Digital Citizenship Scale

First, the factors related to the ethics and literacy in the digital environment, which have been frequently emphasized in digital citizenship, were found to be the most important factors in this study as well. Above all, the items emphasized in digital ethics were interpreted as showing the duality of duty-based citizenship and engaged citizenship. Specifically, the teacher recognizes that youth should be equipped with respecting other people in the online environment and not engage in bullying behaviour, being responsible for their own online activities, and knowing of the order of others in the online digital environment and should obey the order. These results are consistent with the discussion of netiquette or etiquette that has traditionally been emphasized under the name digital citizenship (Farmer, 2011; ISTE, 2016; Ribble, 2011; Ribble, 2015; Ribble, Bailey, & Ross, 2004). In addition, the competence related to digital literacy is derived as the second factor in this study. In detail, using digital technology to achieve various goals, managing unnecessary files and programs on their computers, and using the internet to access more information about domestic and international issues are presented as important items. These results have shown that beyond the simple technical skills (Dede, 2009;

Mossberger, 2009; Simsek & Simsek, 2013), setting goals for their own, cultivating problem solving abilities, and demanding digital literacy or fluency are emphasized as comprehensive capabilities for digital environment. The most important aspect of the digital citizenship scale for adolescents perceived by teachers can be understood as significantly as the traditional perceptions.

Second, the active and participatory media use and activities were emphasized rather than the passive approach to media in the digital environment. The recognition of social issues in terms of the types and characteristics of digital environment to realize oneself leads to differentiation of participation in digital world (Besley, 2006), which can be interpreted that the debate about digital activities has been deepened. The third factor and the fifth factor, which were the category of activity in online derived from this study, were aspects of this active digital citizenship. The third factor emphasized active activity through rational and critical decisions (e.g., expressing their emotions reasonably through communication when problems or inconveniences arise in the online digital environment, delivering their opinions online and learn and share their expertise, purchasing legitimate goods during e-commerce activities based on rational decisions). The reason for reconsidering this critical and rational judgment is that the advent of diverse social media, including the internet, can be interpreted as creating more complex and multi-layered problem situations and conflicts than ever before (Bennett, Wells, & Rank, 2009). In other words, students who are able to participate in various activities by presenting their opinions clearly through reasonable decision-making are considered desirable as a digital citizen (Livingstone & Helsper, 2009). In the theoretical analysis of digital citizenship for adolescents, another factor that is classified as activity in online is the fifth element (social and cultural engagement). The items included in this factor were presenting feelings, thoughts and opinions while posting various materials in online, belonging to an online community, checking the price on the internet in purchasing goods, collaboration with others online to solve regional or school problems, and being active in SNS. As social media become more common, the relationship between society, digital media, and culture is becoming more complex and dynamic. People who are both members of the society and who use the media are more actively transforming and sharing the media in various forms and seeking information than in the past. And it can be interpreted that online participatory culture can be formed around the interaction based on the convergence (Jenkins, 2006).

Third, the digital citizenship of adolescents, based on their understanding of social media, was competency to present their opinions on social issues for the public goals in digital environment, to act in consideration of the position of others, and to make faith on their own in online. These items (e.g., being aware of their own health problems caused by the abuse of digital devices, establishing his or her own beliefs and values about the digital environment, and protecting themselves from suspicious third party in digital environment) are the fourth element of this study. Although many items for the factor of self-identity in the digital world have not been derived, these items can be interpreted as protecting themselves through sophisticated thinking in a dynamic digital world and capturing the psychological desire for new relationships (Berzonsky, 2003; Erikson, 1968; Giddens, 1991).

Prensky (2001) named the generation that is born and growing with the transition to the digital society as “digital native.” They are innovative generation that can learn, play, communicate, work, and create communities in a different way from the older generation that was born and grown in the industrial world. The factor related to the self-identity presented in this study can be interpreted as the valuable attempt of digital citizenship scale which reflects characteristics of adolescents who are more free and sincere than other generations and who are characterized by pursuing entertainment with an emphasis on collaboration and speed.

Concurrent validity of digital citizenship scale

In order to verify Construct validity of Digital Citizenship Scale, the correlation between the total scores of Digital Citizenship Scale and Internet Efficacy Scale was tested. As a result of the correlation analysis, the total score correlation of the digital citizenship scale showed positive correlations with internet efficacy scale ($= .21, p < .01$). This result indicated that the validity of the digital citizenship scale was statistically significant as mentioned in previous study (De Marco et al., 2014).

Discussion

The five-factor(Ethics for Digital environment, Fluency for Digital environment, Reasonable Activity, Self-identity in digital world, and Social/cultural engagement) digital citizenship scale for adolescents perceived by the teacher was extracted from exploratory factor analysis and reliability and validity of the scale were found to

be statistically significant. In addition, confirmatory factor analysis revealed that the construct validity of the five-factor structure model of the digital citizenship scale was also appropriate. Based on the results of this study, we can make a tentative conclusion that the digital citizenship scale consists of homogeneous items by factors and is valid and reliable for measuring the sense of digital citizenship of adolescents.

Direction of digital citizenship education for digital age

Many researchers have argued that the concept of digital citizenship should be redefined in the current digital environment and that the direction of digital citizenship education should be newly established (Bennett & Fessenden, 2006). In fact, the concept of citizenship in school education emphasizes its role as active participant (Bennett, Wells, & Rank, 2009; Dalton, 2013). In addition, since digital networks as well as traditional educational institutions such as schools and homes have a strong connection to the citizenship development of youth generation called “digital native,” the need for a new citizenship education for them is suggested. The followings are a discussion of the direction and implication of the digital citizenship scale perceived by the teachers to the digital citizenship education.

First, as can be seen from the five-factor structure of the digital citizenship scale for adolescents perceived by the teacher, it can be inferred that the concept of digital citizenship consists of multidimensional rather than single dimension. This implies that various factors such as knowledge, attitude, and behaviour should be considered together when understanding digital citizenship. This provides important implications for exploring the direction of citizenship education in the digital age of the 21st century. The education of citizenship in the digital age should be done from a comprehensive point of view, moving away from existing citizenship education which emphasized only one factor such as digital literacy education or participation education (Jones & Mitchell, 2016). Therefore, it is important to cast doubt once again about the possibility of educating democratic digital citizens automatically through the use of internet-based instruction or software education.

Second, although the new features of internet development are attached to the concept of digital citizenship, the whole concept of digital citizenship education should be understood in a continuous line network of traditional citizenship concepts. This is because the concept of digital citizenship also includes various characteristics of traditional citizenship concepts such as social ethics, literacy ability, and participation through rational judgement (Choi, Glassman, & Cristol, 2017). In other words, it can be said that the concept of digital citizenship education exists not only in the linear developmental relationship of the existing concept of citizenship education, but also in the non-linear and indirect relationship rather than the opposite concept of the traditional concept of citizenship. Therefore, rather than replacing existing education contents with new ones for the purpose of digital citizenship education, if we emphasize the knowledge, ability, and behaviour related to development of digital world within existing citizenship education, it will help to foster sense of digital citizen without major changes in curriculum or textbook content.

Third, this study shows that there is a limit to growth as a digital citizen who actively expresses and acts in the digital age simply by technically using the internet without problems and by knowing information about politics, economy, society and culture of local, national and global society (Bennett, Wells, & Rank, 2009; Mossberger, Tolbert, & McNeal, 2007). Therefore, the direction of digital citizenship education should be set so that students can grow into a citizen who actively participates in active interaction with other citizens with various interests in the online community to solve various community and global problems.

Fourth, the participation of adolescents in the digital environment has raised educational interest to emphasize the importance of establishing self-identity in the concept of citizenship education (Bennett, Wells, & Rank, 2009). The concept of digital citizenship education has emerged from the foundation of more self-fulfilling, interactive, and network digital media environment, and it can be said that digital education is connected to diverse digital related experiences and activities of youth who grew up in this digital environment. Therefore, digital citizen education should be extended to the level of exercise of right to establish self-identity and belief, protect oneself, and maintain healthy digital use, beyond the dimension of duty and responsibility to others in online activities. More multi-layered and multi-faceted digital education for the identity of students who are influenced by the digital environment needs to be considered

Conclusion

The digital citizenship scale derived from this study measures the digital citizenship that the youth should have in terms of ethics for digital environment, fluency for digital environment, rational and active activities and establishing self-identity in digital world. In particular, this scale was derived from the teacher's perspective, so that it will provide implications for educating students to become active digital citizens. These implications are education from a comprehensive viewpoint, in harmony with traditional citizenship, with interaction from various perspectives, and for exercising rights to establish their own identity and beliefs. In a digital age, teachers play a very important role in innovative classroom activities related to the elements of digital citizenship. That is, in this digital age where abundant technology and traditional culture coexist, the role of teachers must go beyond the limit of being a mere knowledge propagator. Teachers should act as guides, counsellors, mentors and role models for various information activities. Above all, for this purpose, teachers need to understand the benefits and risks imposed by technology on students and the diverse cultures and knowledge of the current digital age. Based on these roles, teachers not only should hold a crucial role as a moral and ethical role model for safety and success in the students' offline and online environment activities, but they should also be facilitators through experience with many digital mediums of technology and communication.

Given the fact that the most active user of digital devices and digital information is youth generation, the future of our society will depend on how effectively the youth will cope with the changing social reality by maximizing the positive effects of digitization and minimizing the adverse effects. The digital citizenship scale presented in this study suggested the necessary competence and education to cultivate digital citizenship. In addition, it suggests that such education should be integrated not only in school but also in efforts to develop digital citizenship in a balanced way in both home and society.

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