IJIBC 23-4-35

Study on Current Status and Cause Analysis of Digital Divide for Low-Income Class in Korea

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Abstract

With the development of information and communication technology, modern people are receiving various benefits, and knowledge and use of information and communication technology are becoming essential qualities in modern people's lives. There are people who do not enjoy the rich benefits of this information and communication society, and the so-called 'digital divide' acts as an obstacle that prevents the information and communication from enjoying a rich life. Currently, there are four major information underprivileged classes in Korea, the disabled, the elderly, low-income class and farmers and fishermen, respectively. The purpose of this study is to identify the current status of the digital divide for the low-income class and to analyze the causes of the digital divide. To this end, in this study, we analyze statistics on digital divide at the national level and analyzed the digital divide of low-income class from three perspectives: information access, information capability, and information use. As a result of the analysis, it was found that the lack of information capability was the biggest cause of the digital divide, and in particular, information management ability was the most insufficient among information capabilities.

Keywords: Digital divide, Low-income class, Information underprivileged class, Information technology

1. Introduction

In the current information society, modern people benefit a lot from the rapid development of information and communication technology. The rapid development of technology currently offers various benefits not only to individuals but also to countries and society. Therefore, knowledge and use of information and communication technology is becoming an essential quality for modern people, and this quality is often called information literacy, which not only improves individual competitiveness but also contributes greatly to improving the competitiveness of the country [1-3]. Therefore, all countries are making great efforts to improve information literacy.

However, not all citizens have equal information literacy in a country, and the level of information literacy can vary depending on the class. This inequality of information literacy is called the digital divide and can cause conflicts between members in a country or society[4, 5]. In other words, those who lack information

literacy due to various reasons cannot benefit from various benefits in the information society compared to those with high information literacy, and this digital divide can lead to conflict between members of society and further reduce the country's competitiveness.

The class whose level of information literacy is lower than that of the general public is called the information-vulnerable class [6]. These information vulnerable groups do not enjoy the benefits of informatization compared to the general public and require national level informatization support. Currently, according to National Information Society Agency(http://www.nia.or.kr), there are four information-vulnerable groups in Korea, each with the elderly, the disabled, farmers and fishermen, and low-income class. According to statistics from the last four years(2019-2022), those with the largest digital divide to those with the smallest digital divide are in the order of the elderly, farmers and fishermen, the disabled, and low-income class, respectively[7-10].

The purpose of this study is to investigate and analyze the causes of the digital divide for low-income class in Korea, and to propose various measures to improve the digital divide among low-income class based on this statistical result. To this end, we analyzed the national-level digital divide statistics conducted by National Information Society Agency over the past four years from 2019 to 2022[7-10].

The rest of this paper consists of the following. In chapter 2, we present related studies. In other words, we introduce the concept of digital divide, introduces how to measure it, and also introduces existing research works on the digital divide of low-income class. In chapter 3, we introduce the current status of the digital divide among low-income class. In chapter 4, we present various analysis results on the causes of the digital divide for the low-income class. Finally, in Chapter 5, we present conclusions.

2. Related Works

2.1. Definition of Digital Divide

The definition of digital divide varies as follows.

The United Nations defines the digital divide as "the gap between people who have access to and use Information and Communications Technologies (ICTs), including Internet connectivity, Internet-enabled devices, and digital literacy skills, and those who do not"[11].
According to National Digital Inclusion Alliance, the digital divide is "the gap between those who have affordable access, skills, and support to effectively engage online and those who do not"[12].
In the meanwhile, according to Merriam-Webster Dictionary, the digital divide is defined as "the economic, educational, and social inequalities between those who have computers and online access and those who do not"[13].

2.2. Measurement of Digital Divide

Since 2002, the Korean government has conducted an annual digital divide statistical survey in order to resolve the digital divide in our society. For nation-wide survey on digital divide, National Information Society Agency has been in charge of conducting the statistical survey.
In the statistical survey of the digital divide, the unit of measurement of the digital divide is 'the digital informatization level', which is a quantitative, objective and comprehensive indicator of the digital divide. In the survey, the digital informatization level of the general public was set to be 100, and the digital informatization level of the information-vulnerable class was measured to calculate the digital informatization level difference between the general public and the information-vulnerable class.

The level of digital informatization consists of three elements:

a) Information access level
   Indicators for measuring computer and mobile device retention and Internet availability
b) Information capability level
   Indicators for measuring basic ability to use computers and mobile devices
c) Information use Levels
   Indicators for measuring the degree of quantitative and qualitative utilization of computers and mobile devices.

   Specifically, the three elements of the digital informatization level are measured in detail as follows: The numbers in parentheses represent relative ratios to 1.

   Digital Informatization Level = Information access level(0.2) + Information capability level(0.4) + Information use level(0.4)
.
a) Information access level
   Whether to have wired/wireless information devices (0.5) + whether to be able to access the Internet (0.5).
b) Information capability level
   PC use ability (0.5) + mobile device use ability (0.5).
c) Information use level
   Whether to use wired and mobile internet (0.4) + diversity of internet use(0.4) + degree of high-end internet use(0.2)

2.3. Literature Review

   There are very few studies on the digital divide for low-income class. The recent representative related research is as follows.

   The impact of the digital divide on the Internet-based participation activities of the low-income class was analyzed in the study of [14], and based on this, the moderating effect of economic income in the relationship between the digital divide and the Internet-based participation activities of the low-income class was analyzed. As a result of the analysis, it was argued that factors affecting Internet-based social participation and economic activities vary depending on IT utilization ability, and that these factors, when combined with economic income, can affect social participation and economic participation.

3. Current Status of Digital Divide for Low-Income Class

   The following Table 1 shows the digital informatization level of the low-income class in three factors: information access, information competency, and information use. The digital informatization level of the low-income class refers to the level when the digital informatization level of the general public is set to be 100.

Table 1. Digital informatization level of low-income class

	2019	2020	2021	2022
Information Access	95.2	98.3	98.7	99.5
Information Capacity	86.5	92.5	92.9	92.9
Information Use	85.4	96.1	96.3	96.4

Information capability consists of two elements: 'PC use ability' and 'mobile device use ability'. Each consists of seven items as follows.

- PC Use Ability

①Installing and deleting software

②Connecting and Using the Internet

③Web browser configuration settings

④Connecting and using various external devices

⑤Transferring files over the Internet

⑥Malicious code inspection and treatment

⑦Creating documents and materials

- Mobile Device Ability

①Basic configuration settings

②Wireless Network Settings

③Moving files to computer

④Sending files to someone else

⑤Installing and using the app needed

⑥Malicious code inspection and treatment

⑦Creating documents and materials

In this study, for convenience, 7 items of PC use ability and mobile device use ability are grouped into four categories: "installation," "utilization," "management," and "production," respectively, and categorized as follows.

·PC ability

Installation: ①, ②, ③, Utilization: ④, ⑤, Management: ⑥, Production: ⑦

· Mobile Device Use Ability

Installation: ①, ②, Utilization: ③, ④, ⑤, Management: ⑥, Production: ⑦

The following Table 2 shows the digital divide on the information capability of the low-income class. Note that GP and LIC stand for general public and low-income class, respectively.

Table 2. Digital divide in the information capability of low-income class

	Item	Class	2019	2020	2021	2022
PC use ability	Installation	GP	2.66	2.64	2.66	2.64
		LIC	2.34	2.31	2.46	2.44
	Utilization	GP	2.68	2.66	2.65	2.65
		LIC	2.32	2.44	2.43	2.44
	Management	GP	2.47	2.45	2.47	2.4
		LIC	2.19	2.25	2.27	2.31
	Production	GP	2.54	2.51	2.54	2.53
		LIC	2.18	2.26	2.3	2.37
Mobile device use ability	Installation	GP	3.01	3.05	3.04	3.04
		LIC	2.8	2.85	2.87	2.86
	Utilization	GP	2.95	2.96	2.97	2.96
		LIC	2.71	2.8	2.87	2.79
	Management	GP	2.6	2.58	2.62	2.54
		LIC	2.37	2.4	2.47	2.51
	Production	GP	2.71	2.68	2.75	2.75
		LIC	2.41	2.47	2.57	2.61

(scaled out of 4 points)

4. Analysis and Resolution of Digital Divide for Low-Income Class

4.1. Analysis of Digital Divide for Low-Income Class

Table 3 shows the results of analyzing the digital informatization level over four years(2019~2022).

Table 3. Analysis results of the digital informatization level

Elements	Mean	SD	F	P
Information Access	97.93	1.88		
Information Capability	91.20	3.14	13.70***	0.006
Information Use	93.55	5.43		

*** $p < 0.001$

In terms of the digital informatization level of low-income class, the average out of 100 points was the highest with information access at 97.93, followed by information use at 93.55 and information capability at 91.20, showing a statistically significant difference (F=13.70, p<0.01). Therefore, it can be said that the low-income class has the highest information access and the lowest information capability among the digital informatization level.

In the meanwhile, Table 4 shows analysis results of PC use ability of low-income class.

Table 4. Analysis results of PC use ability

Elements	Mean	SD	F	P
Installation	2.39	0.07		
Utilization	2.41	0.06	18.05**	0.000
Management	2.26	0.05		
Production	2.28	0.08		

*** p<0.001

In terms of PC use ability of low-income class, the average out of 4 points was the highest with utilization at 2.41, followed by installation 2.39, production 2.28, and management 2.26, showing a statistically significant difference (F=18.05, p<.001). Therefore, it can be said that the low-income class has the PC utilization ability and the lowest management ability among PC use ability.

On the other hand, Table 5 shows analysis results of mobile device use ability of low-income class.

Table 5. Analysis results of mobile device use ability

Elements	Mean	SD	F	P
Installation	2.85	0.08		
Utilization	2.79	0.07	118.72**	0.000
Management	2.44	0.06		
Production	2.52	0.09		

*** p<0.001

In terms of mobile device use ability of low-income class, the average out of 4 points was the highest with installation at 2.85, followed by utilization 2.79, production 2.52, and management 2.44 in order, and there was also a statistically significant difference (F=118.72, p<.001). Therefore, it can be said that the low-income class has the highest mobile device installation ability and the lowest management ability among mobile device use ability.

4.2. Resolution of Digital Divide for Low-Income Class

As discussed above, the digital divide of the low-income class can be interpreted as follows. First of all, the low-income class had a small digital divide with the general public in terms of information access, but there was a lot of difference in information capability as analysis results based on Table 3 are shown. This indicates that low-income class has many information devices such as PCs and smartphones but lack the ability to use these information devices properly in their daily lives. In addition, as a result of analyzing the information capabilities of the low-income class, it was found that the installation (or environment setting) and utilization ability were excellent, but the management ability was insufficient as analysis results based on Table 4 and Table 5 are shown.

5. Conclusions

In the modern knowledge and information society, information literacy is becoming an essential competency for modern people. In other words, people with high information literacy can live a richer life and contribute to society and the country. On the other hand, people or classes with low information literacy cannot benefit from informatization and will ultimately live a life without competitiveness. In a country, not all citizens can have the same information literacy, and digital divide is bound to occur due to economic poverty or physical disability. Therefore, resolving the digital divide

is becoming a very important task not only in resolving social conflicts but also in securing national competitiveness.

In this paper, the current status of digital divide for low-income Koreans was analyzed. The low-income class is not far behind the general public in the possession of information devices and the spread of the Internet, but there is a difference in in information capabilities.

6. References

[1]   Wookjoon Sung, "A Study on Digital Literacy and Digital Divide in the Smart Society", Korean Society and Public Administration, Vol. 25, No. 2, pp. 53-75, Aug 2014.

[2]   Youngae Jung, "A Study on the Education Model for Information Literacy Improvement of Multi-cultural Family Children", The Journal of Korea Convergence Society, Vol. 2, No. 1, pp. 15-20, Mar 2011.

[3]   Yongwan Cho and Soosang Lee, "Current Status of Information Literacy of Foreign Students in Korea", The Journal of the Korean Society for Library and Information Science, Vol. 44, No. 1, pp. 75-99, Feb 2010, DOI:http://dx.doi.org/10.4275/KSLIS.2010.44.1.075

[4]   Hyeonjeong Hwang and Yongsuk Hwang, "Gaps and Reasons of Digital Divide within the Elderly in Korea: Focusing on Household Composition, The Journal of Social Science, Vol. 24, No. 3, pp. 359-386, Sep 2017, DOI:http://dx.doi.org/10.46415/jss.2017.09.24.3.359

[5]   Hongjae Lee, "The Mobile Digital Divide and Assimilation of Marriage Immigrants in Korea: Focused on the Second-level Digital Divide", The Korea Association for Policy Studies, Vol. 28, No. 1, pp. 223-248, Mar 2019, DOI:http://dx.doi.org/10.33900/KAPS.2019.28.1.8

[6]   Hongryul Kim, "Analysis of Indicators for Information-Poor shown in Library Statistics", The Journal of the Korean Society for Library and Information Science, Vol. 50, No. 3, pp. 193-214, Aug 2016, DOI: http://dx.doi.org/10.4275/KSLIS.2016.50.3.193

[7]   National Information Society Agency, 2022 The Report on the Digital Divide, https://www.nia.or.kr/site/nia_kor/ex/bbs/View.do?cbIdx=81623&bcIdx=25353&parentSeq=25353

[8]   National Information Society Agency, 2021 The Report on the Digital Divide, https://www.nia.or.kr/site/nia_kor/ex/bbs/View.do?cbIdx=81623&bcIdx=24287&parentSeq=24287

[9]   National Information Society Agency, 2020 The Report on the Digital Divide, https://www.nia.or.kr/site/nia_kor/ex/bbs/View.do?cbIdx=81623&bcIdx=23112&parentSeq=23112

[10] National Information Society Agency, 2019 The Report on the Digital Divide, https://www.nia.or.kr/site/nia_kor/ex/bbs/View.do?cbIdx=81623&bcIdx=21837&parentSeq=21837

[11] UN Habitat, Addressing the Digital Divide, https://unhabitat.org/sites/default/files/2021/11/addressing_the_digital_divide.pdf

[12] National Digital Inclusion Alliance, Definition of Digital Divide, https://www.digitalinclusion.org/definitions/

[13] Merriam-Webster Dictionary, Definition of Digital Divide, https://www.merriam-webster.com/dictionary/digital%20divide

[14] Yena Choi, "The Empirical Study on factors influencing relations between digital divide and internet based participation : Focusing on Lower-Income Group", Korean Journal of Local Government & Administration Studies, Vol. 29, No. 4, pp. 235-256, Dec 2015, DOI: https://dx.doi.org/10.18398/kjlgas.2015.29.4.235