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Development of a Smart Device Utilization Education Program for Senior Citizens

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Abstract

Purpose: This study is based on the results of the National Information Society Agency's the Report on the Digital Divide in 2022. This study sought to develop digital literacy education programs for senior citizens, a digitally disadvantaged group, and to utilize smart devices to enhance their digital capabilities. **Research design, data and methodology:** Based on Gagné's nine events of instruction, a total of 7-session educational programs using smart devices were developed, and teaching-learning goals were set at a level that older learners can realistically perform. In preparation for the era of digital transformation, AI utilization methods are introduced and utilized in some sessions of the educational program. **Results:** Among a total of 7 sessions of the educational program, 5 sessions using KakaoTalk and Naver App, and 2 sessions using other apps were developed. There are a total of three sessions using AI. **Conclusions:** This study presented a digital literacy education program that combined AI, addressing the insufficiency of AI-based education programs targeting senior citizens. It is expected that this educational program will be able to improve the digital literacy skills and provide a basis for fulfilling their responsibilities as digital citizens by suggesting a direction for AI utilization education for senior citizens.

Keywords : Digital Literacy Education, Digital divide, AI Utilization, Smart Devices, Gagné's Nine Events of Instruction

JEL Classification Code : I21, I24, I29

1. Introduction

Literacy means the ability to read and write. In the past, it was limited to the ability to read and write, but now it refers to the basic capabilities that a citizen must have in reading social, economic, and democratic trends. In this way, literacy refers to the most basic ability for human life and a right that all citizens should have (National Center for Adult Literacy Education, n.d.). Lifelong Education Act defines literacy education as an organized education program that includes literacy skills necessary for daily life and provides basic life skills required socially and culturally (National Legal Information Center, n.d.).

As we enter the era of digital transformation, it signals significant changes in all aspects of life. In literacy education for adults, there is a movement to expand the scope of literacy education by going beyond reading and writing skills and conducting digital literacy education programs using AI, big data, and the Internet of Things. Digital literacy is expected to be an essential competency in a changing future (Lee, 2018). However, there are concerns that these changes may lead to problems of inequality,

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discrimination, and alienation and that the information gap may deepen these problems.

In 2022 The Report on the Digital Divide, the digitally disadvantaged groups are designated as the disabled, senior citizens, low-income groups, farmers, fishermen, North Korean defectors, and marriage immigrants. Among the digitally disadvantaged groups, senior citizens in Korea have the lowest level of comprehensive digital information technology, the lowest level of digital information competency, and the lowest level of digital information utilization, and are the group with the most severe digital divide.

In terms of the current use of digital devices by senior citizens in Korea, it appears that they are not properly adapting to the changes of the times. Due to the weak level of digital literacy among senior citizens, it can lead to digital alienation. Additionally, the level of digital literacy among senior citizens has a significant impact on participation in social activities and satisfaction, and education is necessary to bridge the digital divide (Kim & Shim, 2020).

As for digital devices owned by senior citizens, the smartphone ownership rate was the highest at 83.6%. However, compared to the ownership rate, the mobile utilization ability is 47.0%, indicating that the utilization ability is significantly lower (National Information Society Agency, 2022). In previous studies, the effectiveness of smartphone education programs for senior citizens has been proven in many studies. It had a positive effect on the self-efficacy of senior citizens (Seo, 2019) smartphone education is effective in improving the life satisfaction and happiness of senior citizens (Seo et al., 2023). In addition, it was found that through smartphone education, changes such as providing convenience in real life, improving confidence, improving the desire for learning, and forming strengthened social networks were experienced (Yoon et al., 2023).

Accordingly, this study seeks to propose a digital literacy education program using smart devices targeting senior citizens as a digitally disadvantaged group. Considering the level of learners with low levels of digital information competency and setting goals at a level that older learners can perform, the educational program is composed of a total of 7 sessions. In some sessions, teaching-learning methods using AI are presented to introduce AI to older learners and provide opportunities for learners to directly utilize AI in the era of great digital transformation.

2. Literature Review

2.1. Senior Citizens as a Digitally DisadvantAged Group

In 2024, the proportion of the senior citizen population aged 65 or older in Korea will be 19.2%, and the proportion of the senior citizen population is expected to exceed 20% in 2025 (Korean Statistical Information Service, n.d.). Act-on Prohibition of Age Discrimination in Employment and Elderly Employment Promotion defines senior citizens in Korea as people aged 55 or older. Considering that the proportion of the older adult population continues to increase every year, it can be seen that there is an urgent need for systems and education policies targeting senior citizens as a digitally disadvantaged group. senior citizens in Korea are the generation that has been exposed to a variety of electronic media, from newspapers, radio, and television to smartphones, and can be said to be the generation that has experienced the most changes in the digital age. Despite being a generation that has experienced numerous digital changes, the average level of digital informatization among senior citizens was found to be 69.9%, which was lower than that of the low-income group (95.6%), the disabled (82.2%), and farmers and fishermen (78.9%). Even among senior citizens, the level of digital informatization was found to be lower for women than for men, the older they were, the lower their monthly household income. A gap was also found among senior citizens (National Information Society Agency, 2022). These results were also confirmed in previous studies. The information gap was found to be higher among female seniors than male seniors, older age, lower education level, lower economic level, poorer health, and non-office workers compared to office workers (Jang, 2019). These results mean that when developing educational programs for senior citizens, an information-disadvantaged group, the demographic and socioeconomic characteristics of senior citizens must be taken into consideration.

2.2. Digital Literacy Education for Senior Citizens

UNESCO defines digital literacy as the ability to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately through digital technologies (UNESCO Institute for Statistics, 2018). This is not limited to acquiring and using digital technology but also encompasses a variety of areas, such as effectively utilizing digital technology to communicate and create. Digital literacy is considered an essential skill in modern society and is an essential competency for adapting to the digital age. Therefore, to improve the level of digital literacy, it is necessary to develop not only an understanding of digital technology, but also creative thinking, problem-solving skills, and communication skills.

To provide digital literacy education to senior citizens, who are an information-disadvantaged group, differentiated educational support considering diversity, increasing need

for customized education by level, aiming to realize basic rights to learning, sustainable effectiveness of education, and basic foundation for improving quality of life are necessary (Lee & Kim, 2023). Therefore, to develop a successful digital literacy education program for senior citizens, the focus should be on empowering them to use digital technologies, create digital content, and communicate effectively in a digital environment.

In the era of great digital transformation, the government is implementing policies such as developing curricula and operating digital learning centers at the national level to eliminate the digital divide and strengthen the digital capabilities of all citizens. According to the Development of Differentiated Curriculum of Digital Competency Education For all, digital competency strengthening was divided into basic courses, life courses, and advanced courses. Through this curriculum, the ultimate goal is to become a person who can enjoy innovative digital services while living together in a digital environment based on digital capabilities (National Information Society Agency, 2020). While detailed digital literacy education programs have been developed for all citizens, AI utilization education for senior citizens is still in its early stages AI utilization education for senior citizens is mainly conducted at senior welfare centers and lifelong education facilities. The effectiveness of education using digital devices for senior citizens has been proven several times through previous studies, but research on education using AI, which is an extension of digital education, is insufficient. Considering this social background, it is necessary to provide education using mobile devices that are most familiar to senior citizens, lower the barriers to participation in education for senior citizens as an information-disadvantaged group, and create a digital information environment.

2.3. The Ability of Senior Citizens to Use Mobile Devices

According to the 2022 Report on the Digital Divide, the mobile usage ability of senior citizens was assessed by investigating basic environmental settings, wireless network configurations, transferring files to computers, sending files to others, installing and managing necessary apps, scanning for and removing malware, and creating documents and materials. As a result, the ability to transfer files to others was the highest at 62.4%, and the ability to scan and repair malware was the lowest at 27.5%. This shows that although older people can transmit files, they are somewhat less skilled in managing and protecting files. Also, the usage rate of social relationship services among senior citizens was in the following order: messenger 79.1%, SNS 28.3%, personal blog 18.7%, community 18.1%, and cloud service 14.7%. Looking at these results, it can be seen that senior citizens are the most active users of messengers using mobile devices. When conducting digital literacy education for senior citizens, it is necessary to develop it concerning services that senior citizens can effectively utilize. In terms of information production or sharing activity rates, the senior citizens group also showed a large divide from the general public. Assuming that the information or sharing activity, rate is 100%, the senior citizens population was found to be 66.7% compared to the general public. As for the sharing type, 28.8% posted information created by themselves, and 34.9% posted other people's content and shared links, showing that there is some lack of digital literacy in terms of creating and sharing digital information. As shown in <Table 1>, 2022 The Report on the Digital Divide also found that COVID-19 related internet/mobile services differ from the general population.

Table 1: Internet/mobile services related to COVID-19

Internet/mobile services related to COVID-19		General Public	Senior citizens
Internet/mobile application service	Recognition	89.6%	77.7%
	Experience in use	66.6%	45.6%
	Usefulness	98.3%	97.0%
Internet/mobile information service	Recognition	89.6%	78.1%
	Experience in use	73.6%	52.2%
	Usefulness	95.3%	94.6%
Internet/mobile delivery service	Recognition	89.1%	74.4%
	Experience in use	70.9%	36.7%
	Usefulness	97.7%	96.0%
Internet/mobile subscription service	Recognition	81.2%	57.0%
	Experience in use	59.9%	23.4%
	Usefulness	96.6%	93.4%

In <Table 1>, all listed items show usability scores exceeding 90%. However, only a fraction of respondents reported experience with various Internet/mobile services: 45.6% with applications, 52.5% with general usage, 36.7% with delivery services, and 23.4% with subscription services. The predominant reasons for this lack of engagement include a perceived absence of need and challenges related to usage or understanding. These findings imply that while most seniors acknowledge the value of Internet/mobile services, their practical experience remains limited. Consequently, there's a clear gap in effective usage among seniors. To bridge this gap, it's imperative to offer targeted educational programs that enhance seniors' familiarity with and ability to utilize these services.

3. Methodology: Development Strategy for Digital Literacy Education Program Based on Smart Devices

This study developed an educational program based on Gagné's Nine Events of Instruction theory. Gagné's Nine Events of Instruction focuses on promoting diverse learning outcomes by facilitating the learner's internal learning process through carefully designed external teaching activities (Park et al., 2021). Nine Events of Instruction of Instruction are comprised of 1. Gaining Attention, 2. Informing the Learner of the Object, 3. Stimulating Recall of Prior Learning, 4. Presenting the Stimulus, 5. Providing Learning Guidance, 6. Eliciting Performance, 7. Provide Feedback, 8. Assessing Performance, 9. Enhancing Retention and Transfer. In this study, integrate these learning instructions to construct an educational program as shown in <Fig. 1> so that older learners can acquire digital literacy skills and use them in their daily lives.

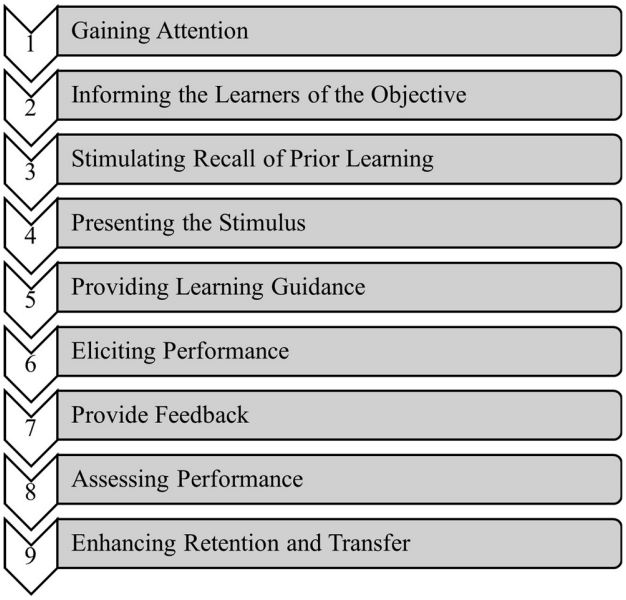

Figure 1: Digital Literacy Education Program Design Model for Smart Devices for senior citizens

Since this is an educational program targeting senior citizens, it presents a lesson design model based on traditional instructor-centered teaching methods rather than learner-centered teaching methods. The purpose is to provide familiar teaching and learning methods to senior citizens, who are a digitally disadvantaged group, and to enable them to learn effectively through direct interaction and feedback with instructors.

At the beginning of class, students acquire basic instructor-centered knowledge and go through a process of practice to utilize the newly acquired skills. Through this, learners acquire digital literacy skills and can develop their digital literacy skills by applying these skills broadly in their daily lives. Select smart devices that are the center of class activities and use the smart devices most owned by senior citizens to provide easy access to learning.

The composition of the learning content gradually expands the scope of learning from familiar content to unfamiliar content such as AI by using social relationship services that older people can relatively easily utilize.

2022 The Report on the Digital Divide, the 'social relationship service usage rate' among senior citizens was relatively high at 90.4% of the general public. In comparison, the 'information production or sharing activity rate' was low at 66.7% of the general public (National Information Society Agency, 2022). These results show that senior citizens use social relations services, but information production and sharing activities using social relations services are relatively insufficient. Considering this situation, social networking services (SNS) that are familiar to senior citizens should be used as learning tools.

In some sessions, learners experience AI technology using apps that are familiar to them. Using the AI function of the existing app, use various services such as search, shopping, and finding directions, and experience AI technology seamlessly. The education program provides older learners with opportunities to naturally improve their digital literacy and integrate new technologies into their daily lives.

This teaching and learning method is linked to the purpose and learning goals of the education program. The learning objectives of the education program are to utilize smart devices to transmit information, search for information, and create information through the use of the Naver and KakaoTalk apps This learning objective was set to help older learners become independent users in the digital society. AI utilization sessions act as an auxiliary supporting element for learners to effectively achieve these goals.

4. Results

4.1. Proposed Education Program

The digital literacy education program designed for senior citizens is detailed in <Table 2>. While this program targets individuals aged 65 and above, it recognizes that digital literacy levels can vary widely within this group. Therefore, participants are selected based on their ability to meet the specific learning objectives of each session. To ensure the effectiveness of each class, it's crucial to assess learners' pre-existing skills and readiness. Additionally, to facilitate a

more personalized and engaging learning experience, the class size is kept to a manageable 5-6 participants. The program blends lectures with hands-on training, requiring the classroom to be equipped with essential resources such as large monitors, mirroring cables, and class progression guides. Given the constrained study time, all necessary equipment and materials should be prepared beforehand to maximize the use of class time.

Table 2: Instructional plan of digital literacy education program for senior citizens

Selecting Learning Topics	Digital Literacy Education Program Based on Smart Devices for senior citizens
Learning Participants and Class Size	Senior citizens aged 65 or older who have smart devices and can send messages using smart devices (small 5-6 people)
Learning Objective	To be able to transmit information, search for information, and create information using the Naver app and KakaoTalk app through smart devices.
Learning Activities	Consists of lectures and practical training
Total Instructional Time	A total of 7 sessions (70 minutes of class time per session, 10 minutes of break time)
Equipment and supplies	Checklist, instructor learning progress log, learner learning log, learner smart device, instructor smart device, large monitor, mirroring cable, PPT, guide, learner use account information

Session	**Learning Content**
1	1) Learning Topics: Using the Kakao Talk app 1 2) Learning Objectives ① Can create KakaoTalk group chat rooms and open chat rooms. ② Can register announcements and votes in the KakaoTalk group chat room. ③ Can hide or block KakaoTalk friends. ④ Can use KakaoTalk AI chatbot service. 3) Detailed Learning Content ① Create a KakaoTalk group chat room open chat room and send messages ② Use of group chat rooms and open chat rooms ③ Hide/block unnecessary friends and advertising channels ④ Utilizing KakaoTalk AI chatbot service
2	1) Learning Topics: Using the Kakao Talk app 2 2) Learning Objectives ① Can link an account to Kakao Pay. ② Can send money using Kakao Pay. ③ Can give gifts using Kakao Pay. 3) Detailed Learning Content ① Kakao Pay's main functions and easy payment usage ② Kakao Pay account connection ③ Kakao Pay payment
3	1) Learning Topics: Using the Naver app 1 2) Learning Objectives ① Can perform voice search using Naver Green Dot. ② Can search nearby areas using Naver Green Dot. ③ Can translate using Naver's, Green Dot. ④ Can edit the Naver home screen. 3) Detailed Learning Content ① Utilize Naver Green Dot's main functions and AI search function ② Naver Search and Delete Search History ③ Edit Naver Home Screen
4	1) Learning Topics: Using the Naver app 2 2) Learning Objectives ① Can register your home address using the Naver Map app. ② Can use the Naver Map app to explain the public transportation route from home to the educational center. ③ Can use the Naver Map app to explain the bus arrival time at a bus stop near the classroom. ④ Can view the street view of the classroom using the Naver Map app 3) Detailed Learning Content ① Key features of the Naver Map app ② Search Naver Maps and Delete Search History ③ Utilization of Naver Map Features
5	1) Learning Topics: Using the Naver app 3 2) Learning Objectives ① Can make Christmas cards using the Naver app. ② Can send Christmas cards using the Kakao Talk app. 3) Detailed Learning Content ① Search for Naver app card creation ② Creating and Sending Cards
6	1) Learning Topics: Utilization of Baedal Minjok Food Delivery App 2) Learning Objectives ① Can order delivery food using the Baedal Minjok app. ② Can place an order at B Mart using the Baedal Minjok app. 3) Detailed Learning Content ① Key features of the Baedal Minjok app ② Social Login and Social Pay ③ Use real-time chat consultation

7	1) Learning Topics: Introduction to other apps 2) Learning Objectives ① Can take and correct photos and videos using AI photo-related apps. ② Can update posts using SNS apps. 3) Detailed Learning Content ① Introduction to AI photo-related app types and functions ② Introduction to SNS app types and functions

The program comprises seven sessions, with two focused on KakaoTalk, three on Naver, and the remaining two on utilizing smart device functions. It aims to familiarize senior citizens learners with diverse uses of SNS and messenger apps, which are predominantly used by this demographic. By centering lessons on apps well-known to senior citizens, the program introduces both basic functionalities and advanced features, enabling active digital information utilization.

For instance, the KakaoTalk sessions incorporate mobile payment features, allowing senior citizen learners to experiment with new technologies confidently. This approach not only teaches them about the apps' primary functions but also encourages them to embrace additional technological advancements without apprehension.

4.2. AI Convergence Sessions

In the education program, which consists of seven sessions, three are dedicated to integrating AI technologies. These AI convergence sessions leverage the KakaoTalk and Naver apps, which are already familiar to senior citizens learners, to introduce them to AI functionalities.

Table 3: Example of an AI Convergence Lesson Plan for the Teaching and Learning Process 1

Learning Topics	Using the Kakao Talk app 1	
Learning Objectives	① Can create KakaoTalk group chat rooms and open chat rooms. ② Can register announcements and votes in the KakaoTalk group chat room. ③ Can hide or block KakaoTalk friends. ④ Can use KakaoTalk AI chatbot service.	
Instructional events	**Class Hours(min)**	**Teaching and Learning Activities**
Gaining attention + Informing learner of objective + Stimulate recall of prior learning	10	1. Greeting and Introduction - Instructor Introduction and Learner Self-Introduction - Guidance on Consent and Use of Personal Information - Overview of the Entire Course Schedule 2. Presentation of Learning Objectives and Stimulating Recall of Prior Learning - Check for Wi-Fi is connected - Check that the Kakao Talk app is updated - Watch videos related to the use cases of KakaoTalk
Present distinctive stimulus features + Provide learning guidance	15	3. Kakao app open chat room - Create and join an open chat room Say hello in the open chat room - Press "Like" for conversation - Voting in the open chat room
	15	4. Kakao app management and AI chatbot utilization - Hide and block Kakao app friends - Learn about AI chatbot service concept - Add AsukUp channel friends
Elicit Performance	20	5. AI chatbot usage details shared in the open chat room - Upload an image created by AsukUp to open the chat room - Share health information in the chat room with AsukUp - Press 'Like' on content you like
Provide feedback + Assess performance	10	6. Lesson Summary and Introduction to Next Session - Review the Learning Objectives for the Session - Presentation of Class Reflections - Preview of Next Session's Content 7. Assignment, Reinforcement, and Transfer of Learning - Talk to AsukUp more than twice - Share the conversation with AsukUp in the open chat room - 'Like' what fellow learners share

In the first session, the AI chatbot service will be introduced to older learners through a class on using a chat room using KakaoTalk, and they will learn how to use it. Through this learning process, learners can increase their understanding of AI and develop their ability to utilize it. Also, you can think about ways to use AI chatbots to solve various problems in daily life. Instructors can observe learners' learning activities and use programs such as Google Jamboard and Padlet in the process of completing and inspecting the learning process. This presents visual stimulation to learners once again so that the learning content can be stored in the learner's long-term memory.

Table 4: Example of an AI Convergence Lesson Plan for the Teaching and Learning Process 2

Learning Topics	Using the Naver app 1	
Learning Objectives	① Can perform voice search using Naver Green Dot. ② Can search nearby areas using Naver Green Dot. ③ Can translate using Naver's Green Dot. ④ Can edit the Naver home screen.	
Instructional events	**Class Hours(min)**	**Teaching and Learning Activities**
Gaining attention + Informing learner of objective + Stimulate recall of prior learning	10	1. Greetings and Review of the Previous Lesson - Greetings - Review of the Previous Session's Assignment 2. Presentation of Learning Objectives and Stimulating Recall of Prior Learning - Check for Wi-Fi is connected - Check for the Naver app is updated - Check whether the Naver app is searchable - Watch videos related to the use cases of the Naver app
Present distinctive stimulus features + Provide learning guidance	15	3. Naver app 'Green Dot' - Check out the Naver app Green Dot feature - Learn about AI recognition search tools Learn about the voice search function - Learn about the song search function - Explore Nearby Places in the Naver App
	15	4. Using Naver App 'Green Dot' - Learn about AI Shopping Lens features - Learn about character recognition features 5. Edit Naver Home Screen - Learn about edit the Naver Home Screen
Elicit Performance	20	6. AI search with Naver app 'Green Dot' - Find the lowest price using Shopping Lens - Translate to English using character recognition - Find restaurants using Nearby Places in the Naver App
Provide feedback + Assess performance	10	7. Lesson Summary and Introduction to Next Session - Review the Learning Objectives for the Session - Presentation of Class Reflections - Preview of Next Session's Content 8. Assignment, Reinforcement, and Transfer of Learning - Find and translate English sentences or poems - Share what you learned by searching with the Naver app in an open chat room. - 'Like' what fellow learners share

Naver App Green Dot's AI recognition search tool can capture images of objects and items using the camera of a smart device and check search results for the captured images. Photographing letters described in a foreign language provides a function of translation and makes it easy to understand the contents described in a foreign language. Using the voice recognition function, can search for keywords and music using your voice. Using these functions, even older learners can more easily search for the information they want. Emphasizing that AI technology is more familiar to older learners' lives, it allows older learners to utilize the technology more actively It is important to recognize that the features of the Green Dot service are subject to change as technology advances and as user needs evolve. Some services may also be discontinued. As a result, older learners should stay informed about these changes during their learning process, taking advantage of any updates to new features and being proactive in exploring them.

Table 5: Example of an AI Convergence Lesson Plan for the Teaching and Learning Process 3

Learning Topics	Using the Naver app 3	
Learning Objectives	① Can make Christmas cards using the Naver app. ② Can send Christmas cards using the Kakao Talk app.	
Instructional events	**Class Hours(min)**	**Teaching and Learning Activities**
Gaining attention + Informing learner of objective + Stimulate recall of prior learning	10	1. Greetings and Review of the Previous Lesson - Greetings - Review of the Previous Session's Assignment 2. Presentation of Learning Objectives and Stimulating Recall of Prior Learning - Check for Wi-Fi is connected - Check whether Naver App Green Dot is searchable Watch a video of card-making using AI
Present distinctive stimulus features + Provide learning	15	3. Making Christmas Cards - Learn about the Naver app's Christmas card features - Check AI-recommended phrases Check the function - Get stationery recommendations using Asukup

guidance	15	4. Using AI to make Christmas cards - Learn about AI image creation - Check out AI-generated Christmas images
Elicit Performance	20	5. Make your own Christmas card using AI - Create a card by searching for Christmas cards on the Naver app - Add AI recommendation text to Christmas cards - Add English phrases to Christmas cards using the translation function - Send a Christmas card to an open chat room 6. Create Christmas cards using other apps - Create Christmas AI Photos with the Carat App
Provide feedback + Assess performance	10	7. Assignment, Reinforcement, and Transfer of Learning - Send Christmas cards to friends and family - Receive message recommendations from AI and share favorite messages in an open chat room

In this session, learners are guided to produce content directly using AI, building upon the learning material already covered. They are introduced to AI content creation tools, empowering them to craft their creations. This enables learners to focus on areas of interest, fostering confidence through the creation process and the exchange of feedback with peers.

5. Conclusions

This study tackles the issues of the digital divide and information alienation among senior citizens, who frequently face digital disadvantages, by creating a digital literacy education program specifically designed for this demographic. The program, consisting of seven sessions, focuses on the usage of apps and AI. It leverages smart devices and apps that are well-known to older learners, highlighting their practical use in everyday life and promoting the active application of acquired skills. Moreover, selected sessions aim to provide senior citizens with the essential knowledge required to thrive in the era of digital transformation, featuring educational content that integrates AI technology.

In a survey related to the desire for digital transformation among senior citizens, the satisfaction survey of daily life turned into digital transformation was relatively lower than that of the general public. However, In the category of 'willingness to take a course when supporting education related to digital transformation', 46.7% responded that they were not, compared to 18.7%. When asked about the efficacy of using digital devices, such as ‘I am confident in learning,’ ‘I am confident in using them,’ and ‘I can figure out how to use them quickly,’ the overall response rate was low compared to the general public (National Information Society Agency, 2022). These responses show that satisfaction with daily life is lower due to digital transformation and that the will to solve the problem through education is passive.

Observing our surroundings, we can easily see examples of senior citizens struggling with modern technology—be it using kiosks in franchise stores, shopping online, or Internet banking. For many senior citizens, the digital transformation era does not herald the bright future they anticipated. It is somewhat anticipated that they may feel less capable as they confront these swift changes. However, these observations should not lead us to hastily conclude a lack of demand for digital literacy education among senior citizens. On the contrary, there's a continuous need for providing education and support.

Currently, the implementation of digital literacy programs for senior citizens faces challenges. Education focused on smart devices and AI utilization is predominantly available in metropolitan city centers, leaving accessibility significantly lower in local, smaller areas. Notably, low-income seniors in rural areas are arguably the most disadvantaged within the digital divide. Efforts to provide digital literacy education must expanded and adapted to meet the needs of these marginalized groups more effectively.

In 2014, Lifelong Education Act was partially amended to expand the scope of literacy education from mere literacy acquisition to encompass a broader concept of literacy education. It means literacy education can receive support from the national and local governments to enable students to acquire basic life skills. Digital literacy is not a competency that an individual must develop, it is a universal right that the people should enjoy, and it's a basic human right that should be protected. Practical support and social awareness are needed to close the information divide and enable all citizens to utilize digital technology. Although the educational program presented in this study was limited to senior citizens, it ultimately suggests that digital literacy education is necessary for all digitally disadvantaged groups.

The purpose of digital literacy education for senior citizens is to help senior citizens become digital citizens. The educational program proposed in this study holds significance in presenting the potential for enhancing digital literacy capabilities and AI utilization among senior citizens. It also offers appropriate teaching and learning methods that

can be applied in conducting digital literacy education for senior citizens in practical settings. The hope is that continuous research and interest will continue for senior citizen learners to gradually expand the scope of their education and sustain their motivation to proactively embrace the forthcoming digital transformation era.

The limitations and recommendations of this study are as follows. This study has the limitation of not being able to apply the developed educational program to the actual educational field. To overcome this limitation, further research is needed to promote digital literacy education for older learners. In addition, older learners also need to pay attention to education as a subject of learning. Further research should expand the scope of digital literacy education by providing education on various digital devices other than smart devices. Second, it is necessary to update the content of the training program promptly, as the content of the training program includes digital literacy. Finally, careful consideration should be given to all teaching and learning activities so that older adults can naturally acquire digital literacy skills and gain confidence in their daily lives.

References

Yoon, H. J., Lim, J. A., Noh, E. B., Choi, E. Y., Jin, S. J., Lee G. J., Cha, J. H., Jeon, J.H., & Nam, E. W., (2023). Evaluation of the effectiveness of smartphone education for the elderly to improve digital literacy. *Korean Public Health Research, 49*(1), 87-98.

Shin, J. W., & Kwon, J. S. (2017). An evaluative study on communication enhancement program through social network service of older adults in the community. *Korean Journal of Family Social Work, 58*, 151-179.

Lim, J. H., Kim, E. K., & Kim, M. H. (2020). The effects of digital literacy on the quality of Life in elderly. *Journal of Lifelong Learning Society, 16*(2), 111-135.

Kim, H. S., & Shim, J. (2020). Digital literacy of elderly people and social activities. *Korean Journal Policy Analysis Evaluation, 30*(2), 153-180.

Lee, H. Y. (2018). The direction of program development of lifelong education in the era of the 4th industrial revolution. *The Journal of Humanities and Social Science, 9*(4), 1423-1438.

Lee, Y. J., & Kim N. S. (2023). Awareness of digital literacy education for the elderly: focusing on education practitioners of lifelong educational institutions. *Korean Journal of Educational Gerontology, 9*(1), 1-23,

Kim, M. Y. (2018). The effects of smartphone use on spouse relationship satisfaction, children relationship satisfaction, and satisfaction with social acquaintance relationship among older adults. *Journal of the Korea Academia-Industrial cooperation Society, 19*(3), 219-228.

Seo, S. M. (2019). The effect of smartphone education on the quality of life, self-efficacy, well-being for the elderly. *Journal of Convergence for Information Technology, 9*(5), 165-171.

Seo, J. S., Shin, Y. N., & Choi, W. W. (2023). The influence of smartphone education program on life satisfaction and happiness of the elderly. *Journal of Character Education and Research, 8*(1), 145-166.

Jang, Y. E. (2019). The influence of the digital divide in elderly`s traits. *Journal of the Korea Society of Computer and Information, 24*(2), 209-215.

National Information Society Agency. (2020). *Development of differentiated curriculum of digital competency education for all*. National Information Society Agency.

National Information Society Agency. (2022). *2022 the report on the digital divide*. National Information Society Agency.

UNESCO Institute for Statistics. (2018). *A global framework of reference on digital literacy skills for indicator 4.4.2*, (Information Paper No. 51), UNESCO Institute for Statistics.

Park, S. I., LIM, C. I., Lee, J. K., Choi, J. I., & Cho, Y. H. (2021), *Educational technology and instruction* (6th ed.). Paju, Korea: Kyoyookbook. ISBN 978-89-254-1599-4.

National Center for Adult Literacy Education. (n.d.). Retrieved from http://www.le.or.kr/. Accessed on January 28, 2024.

National Legal Information Center (n.d.). Retrieved from http://www.law.go.kr/. Accessed on January 28, 2024.

Korean Statistical Information Service. (n.d.). *Key Demographic Indicators*. Retrieved from https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_1BPA002&checkFlag=N. Accessed on January 28, 2024,