Analysis of e-Learning Style Based on Learner Characteristics

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Abstract

Purpose: While most studies focus on learning styles in face-to-face education, research on online learning environments, especially by age in lifelong education, is limited. This study aims to propose a direction for online learning by analyzing digital literacy and e-Learning learning styles by age in lifelong education. **Research design, data and methodology:** The study surveyed 100 online learners from an open university in Seoul. Using an e-Learning learning styles test, frequency analysis was conducted by gender, age, and digital literacy. A learning plan was then proposed based on the results. **Results:** The study found no age-related differences in digital literacy. Both men and women shared similar ratios of Environment-dependent and self-directed learning styles, reflecting the characteristics of online learners using digital devices. **Conclusions:** In lifelong education, e-Learning design should accommodate diverse learning styles: web/app designs for Environment-independent and self-directed learners, short/long formats for Passive learners, real-time (LMS)/non-real-time (ZOOM) systems for Positive and cooperative learners, and AI/human tutors for Environment-dependent and self-directed learners.

Keywords : Lifelong education, e-Learning learning style, online learning, digital literacy

JEL Classification Code: M10, M31

1. Introduction[1]

Lifelong education is a process and activity of continuous learning from birth to the end of life, and refers to comprehensive social education carried out in all places throughout a person's entire life (The dictionary of educational studies, 2000). Based on the philosophy of seeking to improve the quality of human life, it is a general term for vertically integrated education starting from prenatal education to early childhood education, youth education, adult education, and senior education, and horizontally integrated education ranging from home education, social education, and school education. do. This refers to education in a broad sense that aims to foster each learner's maximum self-realization and social development abilities (Kim, 1987). Lifelong education in the narrow sense also refers to education excluding formal school education among organized educational activities that promote personal and social development by guaranteeing educational opportunities to all citizens throughout their lives (Lee et al. 2017). Younger people need lifelong education for career transition or job retraining, and older people need it to acquire new hobbies or knowledge after retirement. Therefore, lifelong education is important in that it provides learning opportunities that promote continuous vocational skill development, growth and development, and social participation and integration for learners of all ages

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(Kim, 2009). This suggests that lifelong education is no longer an optional education, but an essential re-education and improvement education policy, and a means to prepare for future uncertainty (Lifelong Education Promotion Plan, 2023-2027).

Considering the characteristics of online learning through Internet-based computers and smart devices, online learners who have difficulty dealing with or using digital tools are very likely to have difficulty in effective learning (Kim, 2009). Along with the diversification of teaching and learning methods due to the spread of online learning, the importance of digital literacy education for the elderly with low ability to use computers is emerging (Statistics of Lifelong Education, 2023). Digital literacy refers to the ability to properly explore, properly understand, evaluate, and create information by combining it with new information to suit the purpose of online learners using digital technology. It also refers to the ability to communicate with the ethical awareness of the digital society and use it for the purposes of online learning. It is a comprehensive concept that includes not only the use of digital technology but also the ability to judge critically about information, communication ability, compliance with norms, and problem-solving ability (UNESCO, 2018). According to the 2023 digital information gap survey, the digital information utilization score was 57.6 points for the general public and 43.0 points for the elderly, which indicates that the level of digital literacy among the elderly is relatively low (The Report on the Digital Divide, 2023).

Learning style refers to each individual's unique way of using knowledge in the process of learning new principles and concepts and refers to the preferred method that varies depending on the learner's characteristics (Pungente et al., 2002). This can be seen as having an impact on stimulating an individual's learning motivation and improving academic achievement through preferred teaching and learning methods (Lee, 2005). The large digital gap among older people can be seen as having very different learning preferences in online learning. Analyzing digital literacy and learning styles by age can be said to be important in various aspects (Lee, 2022).

In conclusion, identifying learning styles by age according to the level of digital literacy plays an important role in maximizing the learning effect, achieving the goals of lifelong education, and promoting equality in a digital society. This can contribute to promoting individual growth and social development at the same time. Existing research was mainly focused on analyzing learning styles in face-to-face education. Not only is there insufficient research to identify learning styles in non-face-to-face online learning environments, but it is also difficult to find studies that focus on the age group of learners from the perspective of lifelong education. The purpose of this study is to propose a direction for online learning by analyzing the level of digital literacy and learning styles by age in the context of lifelong education.

2. Literature Review

2.1. Learning Style Research

Learning styles, which began to be developed as a teaching and learning theory by cognitivists, do not have a unified definition of the concept, so learning styles and cognitive styles are sometimes used as synonyms. The word cognitive style was first used to describe adaptation problems, while learning style was first used to describe group dynamics. Since then, learning styles have been studied in various ways by scholars in connection with specific learning situations (Dunn, 1984; Kolb, 1984; Allport, 1961; Gregorc, 1979). The characteristic of this learning style is that first, the learning style is an external expression of mental action, which is a unique behavioral characteristic that the learner interacts with the learning environment in the learning process, and can be seen through the learner's behavior or reaction. In particular, it is said that in an environment that fits well with the learning style preferred by the learner, not only academic achievement but also problem-solving ability increases (Lim, 1999). Second, learning styles are said to be distinct from learning ability, IQ, and cognitive style (Woolfolk, 1995). Third, it is said that by identifying and classifying learning styles, various individual differences of learners can be identified, and by predicting learners' behavior, it is possible to provide classes suitable for learners, thereby increasing the efficiency of instruction (Cheong, 2015). Fourth, it has a certain degree of continuity and stability even when the environment or situation changes, and learning behavior due to temporary external pressure cannot be included in the meaning of learning style (Lim, 1999). Individual learning characteristics are classified by several factors such as gender, age, learning style, and digital literacy (Kolb, 1985).

Research related to learning styles in non-face-to-face online learning is very insufficient. In fact, studies related to learning styles related to non-face-to-face online learners focused on the general characteristics of face-to-face learners rather than the characteristics of non-face-to-face online, and then classified and judged them, and investigated the differences in learning attitudes and academic achievement by style. As a result, there was a problem that it was impossible to accurately measure because the special circumstances of non-face-to-face online learners were not taken into account at all. Since online learning styles of online learners are more closely

related to individual characteristics as well as environmental factors of non-face-to-face online learners, it is very important to understand various learning styles and utilize them appropriately in online learning.

2.2. E-Learning Learning Styles

The e-Learning learning style is a process in which online learners take the initiative in learning under an online learning environment and learn new concepts and principles while interacting with other students and instructors, and it has very continuous and stable characteristics (Kim, 2006). The principle of classifying online learners' e-Learning learning styles is based on the degree to which the online learners who are the subjects of the study think that each question best describes themselves on a 5-point scale: <strongly disagree>, <disagree>, <neutral>, <agree>, or <strongly agree>.

In the order in which you responded to each answer, you will be scored as (1 point), (2 points), (3 points), (4 points), (5 points), and the scores for each area are added. The total for one area can range from a minimum of 5 points to a maximum of 25 points. The highest score corresponds to your style. For example, if the <positive and cooperative learning style> section is 10 points, the <passive learning style> section is 15 points, the <environment-independent and self-directed learning style> section is 15 points, and the <environment-dependent and self-directed learning style> section is 25 points, As shown in [Figure 1], it corresponds to <environment-dependent and self-directed learning style>. E-Learning learning styles that appear in online learning environments can be classified into four styles as shown in [Figure 1] (Ahn, 2005; Choi et al., 2005).

The explanations for the four styles of e-Learning learning styles are as follows. First, it is a <positive and cooperative learning style> that learns autonomously through discussion and interaction. They form an open community in an online learning environment, learning autonomously and forming close relationships through active interaction between learners and between learners and instructors. And they like to learn together with fellow learners by clarifying their thoughts through discussion. For these people, an online learning program should be designed so that they can voluntarily participate in learning by designing an online learning environment where they can freely create communities so that they can learn by subject and group (Ahn, 2005; Choi et al., 2005).

Second, it is a <passive learning style> that has a very weak learning motivation and is reluctant to actively interact. Although very passive in learning, they also actively participate in online learning of essential courses such as obtaining credits and registering for promotion. It is a passive and obligatory learner that does not have meaning.

You should design an online learning program that gives you a clear reason to participate and gives you appropriate motivation (Ahn, 2005; Choi et al., 2005).
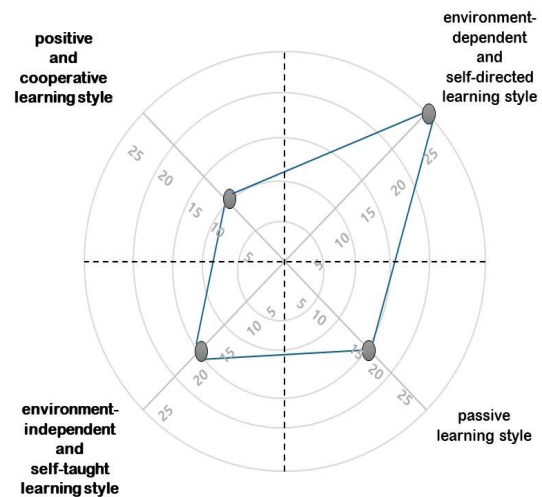

Figure 1: E-Learning learning styles identification chart

Third, it is an <environment-independent and self-directed learning style> that represents self-direction and aggressiveness in tasks. Since they want to learn on their own without receiving specific instructions from the instructor, it is very important to create an online learning environment in which the instructor can take the initiative and learn on their own. Therefore, it is necessary to design an online learning program so that online learners with learning initiative are active in learning by presenting in detail the learning goals to be achieved (Ahn, 2005; Choi et al., 2005).

Fourth, it is an <environment-dependent and self-directed learning style> that represents the interaction and self-directed learning between learners and instructors. These are learners who receive advice and feedback from instructors only on learning content that they do not understand while doing self-directed learning, and the learning effect is very high when the appropriate interaction with the instructor is in considerable harmony. Therefore, only the necessary parts should be selectively learned, and an online learning program should be designed to always interact with the instructor (Ahn, 2005; Choi et al., 2005).

3. Methodology

3.1. Research Subject

The subject of this study was online learners of remote universities in Seoul who are currently taking online learning. The survey was conducted online from May 6 to May 16, 2024. As a result of the survey, a total of 116 people was collected, and the results of a total of 100 responses were analyzed, excluding those that were double-checked or unfaithful. A detailed look at the background characteristics of this study is shown in <Table 1> below.

As shown in <Table 1>, the gender of the subjects of this study was 49 men (49%) and 51 women (51%), with two women (2%) more. The age of the study subjects was the most common with 39 people (39%) in their 40`s, followed by 35 people (35%) in their 50`s, 11 people (11.0%) in their 30`s, 8 people (8%) in their 20`s, and 7 people (7%) over the age of 60.

Table 1: Study Subject Background Characteristics (n=100)

Division		Frequency	%
Gender	Men	49	49%
	Women	51	51%
Age	20's	8	8%
	30's	11	11%
	40's	39	39%
	50's	35	35%
	60+	7	7%
Entire		100	100%

3.2. Research Procedure

This research procedure consisted of four major steps as follows. First, through prior research, the characteristics of face-to-face learners and the overall learning style of online learners were analyzed. Second, an e-Learning learning style test was conducted as an online survey. Third, frequency analysis was conducted on the collected questionnaires by dividing them into three groups by gender, age, and computer literacy. Conclusions and recommendations were drawn from the analysis results. Fourth, a learning plan according to learner style was presented in an online learning environment.

3.3. Test tool

The test tool used was an e-Learning learning style test. The e-Learning learning style test is a test that evaluates various characteristics of online learners and various factors that affect learning for online learners aged 20 or older. It consists of a total of 20 questions, 5 for each style of survey

(Ahn, 2005; Choi et al., 2005).

The factors, number of questions, and reliability for each learning style area of the e-Learning learning style test used in this study are shown in <Table 2> below.

Table 2: Questions and reliability by e-Learning learning style area

Learning style Area	Questions (number of questions)	Cronbach α
Positive and cooperative learning style	1, 2, 3, 4, 5 (5)	.840
Environment-independent and self-directed learning style	6, 7, 8, 9, 10 (5)	.707
Environment-dependent and self-directed learning style	11, 12, 13, 14, 15 (5)	.781
Passive learning style	16, 17, 18, 19, 20 (5)	.760

3.4. Analysis method

The main purpose of identifying online learners' styles is to confirm that learners learn in different ways and that optimal learning results and effectiveness can be achieved when a specific online learning environment matches the learners' learning activities. Unlike traditional face-to-face classes, online learners' styles can appear very different in the unique learning environment of virtual space (Hwang, 2005; Jeong, 2016). In addition, the existing e-Learning learning style test tool has the disadvantage that it is very difficult to compare and analyze each area, unlike the schematized face-to-face learning style because the four learning styles are marked only in sentences. Therefore, in this study, some of the contents were revised so that the gap between the four areas of e-Learning learning styles can be seen at a glance.

The e-Learning learning style diagram proposed in this paper is divided into two major axes and expressed into four learning styles, as shown in [Figure 2].

First, it was divided into lecture preference style and text preference style, and classified into independent self-study style and environment-dependent self-directed learning style. Second, it was divided into group learning preference style and independent learning preference style, and classified into active cooperative learning style and passive learning style. The four areas were marked along an axis starting from the center. The value of each axis increases as the distance from the center of the circle increases. Through this, it is easy to grasp how high and low the distribution of the four learning styles of e-Learning is compared to other areas.
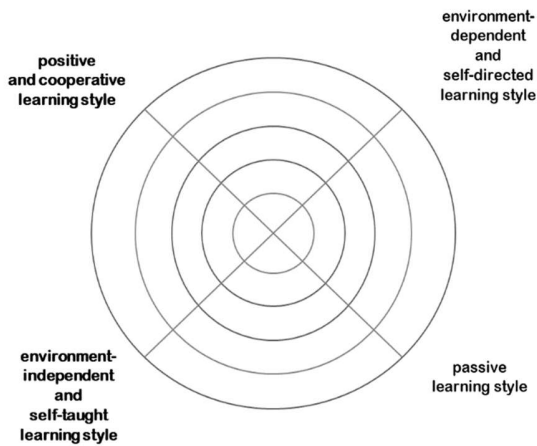
Figure 2: e-Learning learning styles diagram

4. Results

The e-Learning learning style of online learners was the environment-dependent and self-directed learning style (76%), followed by the passive learning style at 10%, the environment-independent and self-directed learning style at 8%, and the positive and cooperative learning style at 6%. According to <Table 3>, for men, the environment-dependent and self-directed learning style was the highest at 38%, followed by the environment-independent and self-directed learning style at 5%, the environment-dependent and self-directed learning style at 4%, and the passive learning style at 2%. Women appeared in the order of 38% of the environment-dependent and self-directed learning style, 9% of the passive learning style, 3% of the environment-independent and self-directed learning style, and 2% of the positive and cooperative learning style. In other words, women had a higher proportion of passive learning style than men, but men had a higher proportion of positive and cooperative learning style than women. In other words, there was a significant difference in the style of e-Learning learning according to gender. This suggests that women need more help from instructors than men. Therefore, it can be interpreted from an educational perspective that a tutor system for women is needed.

When specifically analyzed by age, as shown in <Table 3>, the environment-dependent and self-directed learning style was found to be the highest in all age groups, including the age group over 60, which had the fewest number of subjects. This indicates that learners of all ages may place greater importance on interaction with their learning environments in real life. Additionally, there is a trend

showing that the proportion of Environment-independent and self-directed learning styles increases with age.

Meanwhile, the computer usage skills of the study subjects were as follows: 35(35%) people were <Very good>, 33(33%) people were <Good>, 18(18%) people were <Average>, 12(12%) people were <Do a little>, and 2(2%) people were <Not do it at all>. More than 80% of learners had average or above ability. In other words, the ability to utilize digital literacy can be said to be excellent. When specifically analyzed by e-Learning learning style as shown in <Table 3>, 1% of both the environment-dependent and self-directed learning style and the passive learning style showed that they were <Not do it at all>. <Do a little> appeared at 1% only in the positive and cooperative learning style. <Average> was found in 1% only in the positive and cooperative learning style. <Good> appeared at 1% only in the environment-independent and self-directed learning style. <Very good> was found in 1% only in the positive and cooperative learning style. This can be interpreted as the fact that they voluntarily chose online learning because of their interest and attention, so they were prepared in advance for the class at least at a higher than average level in order to participate in the class.

On the other hand, in terms of digital literacy, when analyzing the environment-independent and self-directed learning style with 0 in the three items of <Not do it at all>, <Do a little>, and <Average> from a lifelong education perspective, it is found that learning on one's own without receiving instructions from an instructor. It can be interpreted as a valid result that 100% reflects the independent self-learning type's tendency to want. For this reason, the survey questions on e-Learning learning styles were analyzed separately. Face-to-face education has higher learning satisfaction than online learning because immediate Q&A is possible through interaction with instructors. However, unfortunately, the utilization of these interactions with instructors in online learning is not high. This is because most learning management systems (LMS) only use the task submission function and do not use discussions or bulletin boards (Shin, 1998).

According to <Table 4>, 86% of respondents answered <Yes> or higher to question 11 of the survey, <I like that specific directions for assignments are given in e-learning>, and <I like being taught in detail what and how to study in e-learning. Regarding question 13 of the survey, which said, "I would like it if it were given to me," 78% of people answered "yes" or higher. This means that although they are familiar with online learning, they desperately need the help of instructors rather than self-directed learning alone. In other words, they may not be able to adapt well to the current online learning environment, which can lead to frustration, loss, depression, and learning maladjustment, so additional help may be needed to benefit from online learners (Kim &

Moon,2022). Therefore, it is thought that good learning effects can be obtained if a tutor system or a mentoring system is used for effective learning.

Table 3: Comparative analysis by area according to e-Learning learning style (n=100)

e-Learning learning style		Positive and cooperative learning style	Passive learning style	Environment-independent and self-directed learning style	Environment-dependent and self-directed learning style	Entire
Gender	Men	4 (8.16%)	2 (4.08%)	5 (10.20%)	38 (77.55%)	49 (100%)
	Women	2 (3.92%)	8 (15.69%)	3 (5.88%)	38 (74.51%)	51 (100%)
	Entire	6 (6%)	10 (10%)	8 (8%)	76 (76%)	100 (100%)
Age	20's	0 (0.00%)	1 (12.50%)	0 (0.00%)	7 (87.50%)	8 (100%)
	30's	1 (9.09%)	2 (18.18%)	0 (0.00%)	8 (72.73%)	11 (100%)
	40's	2 (5.13%)	1 (2.56%)	4 (10.26%)	32 (82.05%)	39 (100%)
	50's	3 (8.57%)	5 (14.29%)	3 (8.57%)	24 (68.57%)	35 (100%)
	60+	0 (0.00%)	1 (14.29%)	1 (14.29%)	5 (71.43%)	7 (100%)
	Entire	6 (6%)	10 (10%)	8 (8%)	76 (76%)	100 (100%)
Digital Literacy	Not do it at all	0 (0.00%)	1 (50.00%)	0 (0.00%)	1 (50.00%)	2 (100%)
	Do a little	1 (8.33%)	3 (25.00%)	0 (0.00%)	8 (66.67%)	12 (100%)
	Average	1 (5.56%)	0 (0.00%)	0 (0.00%)	17 (94.44%)	18 (100%)
	Good	3 (9.09%)	3 (9.09%)	1 (3.03%)	26 (78.79%)	33 (100%)
	Very good	1 (2.86%)	3 (8.57%)	7 (20.00%)	24 (68.57%)	35 (100%)
	Entire	6 (6%)	10 (10%)	8 (8%)	76 (76%)	100 (100%)

Table 4: Analysis of e-Learning learning style questionnaire items (n=100)

Questionnaire	No.11	No.12	No.13	No.14	No.15	Entire
Strongly Disagree	3 (50.00%)	0 (0.00%)	1 (16.67%)	2 (33.33%)	0 (0.00%)	6 (100%)
Disagree	1 (5.00%)	5 (25.00%)	3 (15.00%)	7 (35.00%)	4 (20.00%)	20 (100%)
Neutral	10 (11.63%)	19 (22.09%)	18 (20.93%)	24 (27.91%)	15 (17.44%)	86 (100%)
Agree	55 (20.60%)	49 (18.35%)	58 (21.72%)	39 (14.61%)	66 (24.72%)	267 (100%)
Strongly Agree	31 (25.62%)	27 (22.31%)	20 (16.53%)	28 (23.14%)	15 (12.40%)	121 (100%)
Entire	100 (20%)	100 (20%)	100 (20%)	100 (20%)	100 (20%)	500 (100%)

The positive and cooperative learning style recommends a cooperative learning method for a common purpose, the passive learning style recommends an active instructor's explanatory learning method, the environment-independent and self-directed learning style recommends a self-directed learning method according to one's own will for the entire curriculum, and the environment-dependent and self-directed learning style recommends an active inquiry learning method for learners(Ryu, 2001), but it seems difficult to adapt to current online learners equally. In other words, it is judged that online learners have a preferred learning environment or situation according to the e-Learning style.

5. Discussion

Focusing on the learner styles of online learners in the online learning environment, this study analyzes the differences in e-Learning styles, and analyzes the results to suggest directions for online learning by analyzing the level of digital literacy and learning styles by age in the context of lifelong education.

The results of analyzing the differences revealed in e-Learning non-face-to-face learning styles according to the general characteristics of online learners are as follows. First, it was found that there was no difference in the ability of online learners to use computers by age, that is, digital literacy. This can be interpreted as having prepared for classes above the average level in order to participate in class at least, since they voluntarily chose non-face-to-face online learning with interest and interest rather than compulsory face-to-face classes without interest and attention. However, as shown in many studies, digital literacy in the 60s and older group is very low. The reason for this is that cellular phones did not appear at a time when the 60s and older group received regular education. In addition, the Internet did not appear when attending college or high school even in the 40s and 59s. Therefore, it is believed that the above generations are bound to have weaker digital literacy compared to the current youth generation who are quite familiar with computers and

cellular phones as well as the Internet (Chung & Kim, 2018). Second, when compared according to the e-Learning learning style, the ratio of the environment-dependent and self-directed learning style of men and women was the same. In addition, the environment-dependent and self-directed learning style was the most common at all ages, and the positive and cooperative learning style did not appear at all in the 20s and 60s or older age groups. This is interpreted as being in line with the national tendency of online learners to rarely express free opinions from the cultural perspective of Korea (Shin, et al. 2015). In addition, in the case of the environment-independent and self-directed learning style, it is necessary to examine the point that 0% came out in the three items of <Not do it at all>, <Do a little>, and <Average> in terms of computer utilization ability. This is judged to be because it is consistent with the tendency of the learning style to learn on its own without receiving instructor's instructions from a lifelong education perspective.

When it is impossible to proceed with existing teaching methods, online learning has served as an accessible and convenient alternative, greatly helping to keep education going uninterrupted during the COVID-19 pandemic (Basem, 2022). In the meantime, new teaching and learning methods as well as new educational programs have been continuously developed so that online learners can achieve outstanding performance online. With the increasing use of online learning after the COVID-19 pandemic, it has become very important to evaluate efficiency from various perspectives, especially in the context of lifelong education.

As most of the existing studies have focused on face-to-face learning styles, online learning styles for non-face-to-face online learners have not been verified. Therefore, it suggests that in the context of lifelong education, the styles of non-face-to-face online learners suitable for online learners should be reinforced and provided. Therefore, I would like to propose the following directions for online learning based on characteristics in the context of lifelong education derived from existing studies according to the learning style.

First, it is necessary to consider the direction of learning by designing the web style and the app style for passive learning styles. With the increasing importance of the Internet as an educational tool, the learning environment today is very different from before the COVID-19 pandemic. With the development of ICT, non-face-to-face online learning, which utilizes cutting-edge educational technologies, is as efficient as face-to-face classes, and unlike traditional PC-based wired education, it is now possible to access the wireless Internet anytime, anywhere to do the desired learning through a cellular phone (Kim, 2016). At first glance, online learning may seem very simple unlike traditional classroom environments, but for learners who are not proficient in smart devices, especially passive learning styles, the use of smart tools such as laptops will cause many difficulties in terms of digital literacy during the learning process.

Second, in order to create an environment-independent and self-directed learning styles that actively studies by selecting the desired topic, the learning direction must be considered by strengthening the long and short form of learning style. In particular, considering that there are differences in learning time depending on age group, it is necessary to differentiate the length of video lectures. Those in their 20s and 30s who are accustomed to cellular phones may prefer short-form lectures, while those in their 50s or older who are accustomed to TV may prefer long-form lectures (Choi & Lee, 2024). These various tendencies must be reflected not only in re-learning but also in infinite repetitive learning.

Third, the learning direction for positive and cooperative learning styles should be classified into non-real-time (LMS) style and real-time (ZOOM) style and considered (Belanger & Jordan, 1999: Park, et al. 2020). The non-real-time style refers to the learning progress in which the learner does not access the same time zone as the instructor because the learning proceeds with learning materials produced anytime, anywhere and in advance. On the other hand, the real-time style refers to the real-time learning conducted by learners and instructors at the same time zone (Cho, 2020).

Fourth, the direction of learning for environment-dependent and self-directed learning styles should be considered by reinforcing artificial intelligence (AI) tutors and human tutors. 76% of online learners in this study said that they desperately need someone's help as an environment-dependent and self-directed learning style. Therefore, for effective learning, we need a tutor who can answer questions immediately to online learners, provide additional materials that help them better understand the material, and provide immediate feedback. It will be necessary to distinguish between an artificial intelligence (AI) tutor who knows everything, treats learners with infinite patience, and a human tutor whose role as a facilitator and guide has been strengthened, no matter how stupid questions are asked.

In the past, when measuring learning styles in an online learning environment, a face-to-face learning format developed on the premise of a traditional teaching and learning environment was applied, but this had the problem of making accurate measurement difficult because it did not take into account the special circumstances unique to online learning. Therefore, this study can be said to be meaningful in that it presents standards for the learning styles of online learners that appear in the special environment of online learning.

Online learners have different personalities, and the

styles of learning they need during the learning process are diverse. There is not necessarily just one style of online learner.

We acknowledge that each online learner has a variety of learner styles, and we believe that when education is provided for each learner's individual learner style, the efficiency and effectiveness of the education are maximized. It is expected that effective learning will be achieved by conducting a learning style test before taking the online course and finding a non-face-to-face online learner style that suits all online learners based on these results.

Because it was implemented on a limited basis for online learners, it is difficult to adapt it to face-to-face learners as well. In addition, due to the self-report questionnaire, reliable results can be expected in the case of objective and honest answers from the research subjects, but in the opposite case, there is a limitation that it may have had a negative effect on the survey analysis.

References

Ahn, K. S. (2005). *The development of the measuring tool of learning styles in an e-learning*. Daejeon, Korea: Doctorial dissertation, Chungnam national University.

Allport (1961). Pattern and growth in personality. *New York: Holt.*

Basem O. S. (2022). Al-hawamdeh and Sohaib Ala, Praxis and Effectiveness of Pedagogy during Pandemic: An Investigation of Learners' Perspective. *Hindawi Education Research International.*

Belanger, F., & Jordan, D. H. (1999). Evaluation and implementation of distance learning: technologies, tools and techniques: technologies, tools and techniques. *IGI Global.*

Cheong, Y. S. (2015). *A Study on types of self-regulated learning and change in the type over time.* Seoul, Korea: Doctorial dissertation, Kyung Hee University.

Cho, I. S. (2020). Issues and Improvement Challenges Related to Remote Classes in Universities, *the National Assembly Research Service.*

Choi, J. W. & Lee, S. E. (2024). Exploring Multidimensionality of Binge-Watching: User Clustering Based on Content Type, Format, and Viewing Style. *Korean Journal of Journalism & Communication Studies, 68*(1), 121-156.

Choi, W. S., Ahn, K. S., & Rho, T. C. (2005). Development of the Measuring Tool of Learning Behavioral Styles in an e-learning Environment in Korea. *The Journal of Vocational Education Research, 24*(1), 133-158. UCI: G704-000975.2005.24.1.004

Chung, Y. K., & Kim, J. R. (2018). Factors to Disturb Adult Learner's e-Learning Persistence: A Case Study of H-Cyber University in Seoul Korea. *Journal of Digital Convergence, 16*(12), 109-122. DOI: 10.14400/ JDC.2018.16.12.109

Dunn, R. (1984). Learning Style: state of the science. *Theory into Practice, 23*(1), 10-19.

Gregorc, A. F. (1979). Learning/Teaching styles: Potent forces behind them. *Educational Leadership, 36*(4), 234-236.

Hwang, S. M. (2005). A Study on the Behavioral Characteristics of Learning Activities and Learners in Cyber Space: Focusing on the Behavioral Characteristics of Users of Online Games and Mini-Hompee Sites. *KERIS.*

Jeong, B. (2016). Q-analsys on Attitue of E-learning Eser in Developing Countries. *International Development and Cooperation Review, 8*(1), 33-65. UCI: G704-SER000004222.2016.8.1.002

Kim, G. S. & Moon, Y. K. (2022). A Study on the Trend Analysis of Distance Education for Young Children. *The Society of Convergence Knowledge Transactions, 10*(4), 13-25. http://dx.doi.org/10.22716/sckt.2022.10.4.032

Kim, J. K. (2016). *The relationship between the ratio of mobile learning time to total learning time, number of connections, and learning regularity in the mobile linked learning environment of e-learning*, Seoul, Korea: master's thesis, Ewha Women's University.

Kim, J. S. (1987). The theory of lifelong education. Seoul: kyoyookbook.

Kim, J. S. (2009). Introduction to Lifelong Education. Seoul: kyoyookbook.

Kim, S. H. (2009). *The Effect of Usability and Easiness Perceived by e-learnerson the Flow and Satisfaction of Learning.* Seoul, Korea: master's thesis, Sookmyung Women's University

Kolb, D. A. (1984). Experiential Learning. *New Jersey:Prentice Hall*

Kolb, D. A. (1985). Learning-Style Inventory. *Boston: McBer & Company,*

Kolb, D. A. (1993). Learning Style Inventory. LSI-Ⅱ a.*Bolton :McBer & Company,*

Lee, A. (2022). *An Action Research on Development of Digital Literacy Program for Elderly Literacy Learners*. Seoul, Korea: Doctorial dissertation, Kyung Hee University.

Lee, H. J. Choi, W. S, Kwon, D. S. & Chang, W. W. (2017). Program Development for Lifelong Education. Seoul: KNOUPRESS.

Lee, S. D. (2005) The comparison of student preference of instructional methods according to Kolb's learning styles. *Asian Journal of Education, 6*(4), 125-144.

Lifelong Education Promotion Plan (2023-2027). Ministry of Education.

Lim, C. J. (1999). Educational Psychology. Seoul:HAKJISA,

Pungente M. D., Wasan, K. M., & Moffett C. (2002). Using learning styles to evaluate first-year pharmacy student's preferences toward different activities associated with the problem-based learning approach. *American Journal of Pharmaceutical Education, 66*, 119–124.

Kim, M. Y. (2006). A Study on the learning styles in an e-learning and Psychological Types in University Student. *Journal of Korean Institute of Industrial Educators, 31*(2), 332–349.

Park, S. H., KIM, E. H., Kim, T. W., & Yang, S. H. (2020). Distance education class implementation plan. *KERIS.*

Pask, G. (1976). Style and strategies of learning. *British Journal of Educational Psychology, 4*6, 128-148.

Porter, L. R. (1997). Creating the virtual classroom, *New York: Wiley Computer Publishing.*

Reichman, S. W. and Grasha, A. F. (1974). A rational Approach to Developing and Assessing the Construct Validity of a Study learning style scale inventory. *The Journal of Psychology, 87*, 213-223.

Ryu, I. C. (2001). Successful e-LEARNING Business Strategy. Seoul:ebeecomm.

Shin, J. H., Choi, J. W. & Koh W. (2015). A study on the Use of Learning Analytics in Higher Education: Focusing on the perspective of professors. *Journal of Educational Technology, 31*(2), 223-252. DOI : 10.17232/KSET.31.2.223.

Shin, M. H. (1998) Self-Regulated Learning Thoery: Meaning Components and Design Principles. *Journal of educational technology, 14*(1), 143 – 156.

Statistics of Lifelong Education (2023). *KEDI.*

The dictionary of educational studies, (2000). Education Research Institute. Seoul: Hawoo Publishing.

The Report on the Digital Divide (2023*). Ministry of Science and ICT.*

UNESCO (2018). A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2. UNESCO Institute for Statistics, Information Paper, No.51.

Woolfolk, A. E. (1995). Educational psychology (6th ed.). Boston: Allyn & Bacon