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The Influence of Discussion-based Teaching Method of Online Education on the Effectiveness of Adult Learning

Kwon-Seob So[1], Hye-Jeong Hwang[2]

[1]Dept. of Healthcare & Welfare, Konyang Cyber University, Korea (sks@kycu.ac.kr), First Author
[2]Dept. of Healthcare & Welfare, Konyang Cyber University, Korea (hhj@kycu.ac.kr), Corresponding Author

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ABSTRACT

This study was conducted to understand the effect of discussion-type online education on the learning effect of 696 people who took the discussion-type learning at K Cyber University. The collected data were analyzed using ANOVA. As a result of the study, the learning effect increased in all items in 2020 compared to 2019. In the analysis by grade level, there was no significant difference in 2019, but in 2020, the Freshman significantly decreased in learning motivation, interaction and cognitive participation, satisfaction, perceived usefulness, and learning achievement. In the analysis by age, in 2019, learning motivation, cognitive participation, perceived usefulness, interaction, and immersion were significantly higher in the age group over 60 years old. In 2020, the motivation for learning was higher in the age group over 60 years old, and in interaction and cognitive participation, under 39 years old and over 60 years old were higher, academic achievement was under 39 years old, and loyalty was under 39 years old and 50-59 years old were higher. As a result, discussion-based learning can be said to be a learning method to improve the learner's class satisfaction. As a measure to improve learner satisfaction in the future, it is necessary to prepare a basic approach to improve the learning effect for first graders, who have poor learning effects in all items, and to develop various customized learning programs to improve the learning effect by age group.

1. Introduction

With the development of information and communication technologies, rapid changes are taking place throughout our society, including economy, politics, and culture. These changes are spreading to the field of education as well (Lee & Lee, 2013). Visible changes are taking place among the traditional educational methods, including from teacher-centered top-down education to learner-centered self-directed learning, from face-to-face learning to non-face-to-face, from classroom to online, and from review-centered to preparation-centered. Trilling & Fadel (2009) presented critical thinking

and problem-solving skills, creativity and innovation, cooperation, teamwork and leadership, multi-cultural understanding, communication, information and media utilization skills, computer use and information and communication technology utilization, and vocational and self-directed learning as key competencies for the 21st century. In light of this, discussion-based flipped learning is of interest as a new method of educational innovation (Hong, 2016). In particular, due to the outbreak of COVID-19, which began in earnest in the spring of 2020, online learning was activated, and the public's attention to online learning was heightened. Nevertheless, there are not many studies on the importance of online learning. Most of the research related to flipped learning is on discussion classes in classrooms according to online prior learning at general universities, and research on online discussion classes according to prior learning at online universities is lacking. Learning motivation is a factor that allows learners to develop certain learning activities with a desire for learning and is to engage in learning with a clear sense of goal (Min, 2012). This can be said to be a psychological and behavioral factor that arouses learners' desire to learn and affects the learning process and outcome (Yeon, 2013). Flipped learning used in university lectures is effective in inducing the learning motivation of college students and has a positive effect on convenience, satisfaction, interaction, concentration, and self-confidence (Son, 2017). There are also research results that show that the learning motivation of college students who have experienced flipped learning continues and improves until the end of the semester (So & Hwang, 2021). However, some argue that if only cognitive activities such as simple memorization or content presentation are performed in flipped learning, it will not help learners' learning motivation as much as in traditional classes (Park & Kim, 2016). All education aims to improve learning outcomes based on learning achievement. Learning achievement refers to the degree to which learners have acquired knowledge or skills, mainly indicating changes in cognitive status, and variables representing important results in all learning environments where teaching-learning occurs (Kang, Um, & Lee, 2010). Academic achievement can be said to be the degree to which learners perceive their level of achievement after conducting online discussion learning. Academic achievement through flipped learning appears to have a positive effect on class concentration and academic achievement (Jeong, 2015). However, if only low-level cognitive activities such as simple memorization or content presentation are performed, it is confirmed that it does not help learners improve their learning motivation and academic achievement as much as in traditional classes (Shin et al., 2016).

Satisfaction and loyalty are very close variables to learning outcomes. Learning satisfaction is a concept that represents the learner's positive and satisfying state for the overall learning process, such as learning experience or achievement (Elliott & Healy, 2001). Learning satisfaction refers to the satisfaction determined by the overall educational program process after learning and includes not only feelings or emotions but also judgmental beliefs (Lee & Lee, 2010). This is suggested as a factor that positively affects learners' continuous learning (Roca et al., 2006). Online discussions have identified general satisfaction with discussion and benefits related to learning, and it has been revealed that the quality and satisfaction of educational services provided by universities are closely related to learner loyalty (Jeong, 2018).

If satisfaction is continuously repeated, it leads to loyalty. In the field of education, the terms loyalty and satisfaction have been mainly used (Alves & Raposo, 2010). As the concept of educational

service gradually expands, the term loyalty is being used to encompass the intention, binding force, and word of mouth for a specific educational service (Clemes et al., 2013). In particular, this is gradually expanding to refer to learners' attachment or dedication to online education services, continuous access, and participation, and satisfaction with flipped learning has a positive effect on loyalty (Jeong, 2018).

Discussion-based flipped learning showed significant effects of flipped learning, which are several variables related to learning outcomes (Cho & Lee, 2018), and it is revealed that the size of the effects is large in the order of cognitive, definitional, and interpersonal areas. This suggests that a new learner-centered teaching and learning method may be possible, away from the traditional instructor-centered teaching and learning method. In the background, there are unexpected changes in the social environment, such as the development of science and technology and the outbreak of COVID-19, and these changes are asking the way to a new educational environment. However, it is too early to give a definite answer to this.

This study aims to explore how discussion-based online learning affects learning motivation, interaction, cognitive participation, immersion, perceived usefulness, learning achievement, satisfaction, and loyalty. Through this search, we will analyze the online learning effect of discussion-based flipped learning and use it as basic data to improve the learning effect of adult learners of the middle-age and elderly.

2. Research method

2.1 Research subjects

This study was conducted on those who took discussion-based classes at K Cyber University. Among them, an online survey was conducted on the effect of discussion-based online education on the learning effect on a total of 696 people, 190 in the second semester of 2019 and 506 in the second semester of 2020.

2.2 Research tools

Technical analysis and chi-square tests were performed on the general characteristics of the analysis results, learning effect items by year, and detailed items. For the learning effects by school year and age group, after ANOVA analysis, Duncan and Scheffe were performed for post-analysis of significant items.

The research tools are as follows: tools of perceived usefulness, learning achievement, satisfaction, interaction, and immersion from research by Lee & Lee (2013); tools of learning motivation, cognitive participation, and learning achievement from research by Lee et al. (2015). They were modified, supplemented, and reconstructed to suit the purpose of this study. The questionnaire consisted of a total of 31 questions, including 3 questions on general characteristics questions, 5 questions on learning motivation, 4 questions on interaction, 4 questions on cognitive participation, 3 questions

on immersion, 4 questions on perceived usefulness, 3 questions on learning achievement, 2 questions on satisfaction, and 3 questions on loyalty. This is a self-reported online questionnaire, which was conducted after being announced on the class bulletin board. Each question consists of a 5-point Likert scale: “Very much so” for 5 points and “Not at all” for 1 point, and the higher the average score, the higher the learning effect.

3. Research result

3.1 General characteristics of the research subjects

Most of the subjects of this study were women (81.6%), those in their 50s (35.6%), and those in the 3rd year of college (27.7%) ($p<0.001$) (Table 1).

Table 1. General characteristics of the research subjects

Characteristics	2019		2020		Total		*p**
	n	%	n	%	n	%	
Sex							
Male	43	22.6	85	16.8	128	18.4	0.077
Female	147	77.4	421	83.2	568	81.6	
Age (yr)							0.385
≤ 39	60	31.6	137	27.1	197	28.3	
40-49	59	31.1	147	29.1	206	29.6	
50-59	62	32.6	186	36.8	248	35.6	
≥ 60	9	4.7	36	7.1	45	6.5	
Grade							0.000
Freshman	49	25.8	135	26.7	184	26.4	
Sophomore	16	8.4	123	24.3	139	20.0	
Junior	64	33.7	129	25.5	193	27.7	
Senior	61	32.1	119	23.5	180	25.9	
Total	190	27.3	506	72.7	696	100.0	

**p-value calculated by x2-test.*

3.2 Analysis by item of learning effect by year

As a result of annual item analysis of learning effects, the scores of all items in 2020 increased compared to 2019.

In particular, the item that increased the most in 2020 was satisfaction (3.70±0.88). Among the detailed items, the item with the high score was “discussion-based learning was a valuable teaching method for me.” (3.84±0.93)

The item with the lowest score among the 2020 items was immersion (3.48±0.91 points). Among the detailed items, the item with the low score was “I enjoyed the lecture and learning more because I could participate in the discussion.” (3.42±0.94 points) (Table 2) (Figure 1).

Table 2. Analysis by item of learning effect by year

unit:mean±SD

Variables	2019	2020	Total
1. learning motivation			
1-1. Discussion learning aroused my curiosity.	3.58 ± 0.95	3.54 ±0.94	3.56 ± 0.94
1-2. Discussion learning raised expectations for learning goals.	3.53 ± 0.91	3.54 ±0.92	3.54 ± 0.92
1-3. Discussion learning allowed me to focus more on lectures	3.58 ± 0.99	3.57 ±0.94	3.58 ± 0.97
1-4. Discussion learning was related to the learning contents for each week.	3.65 ± 0.83	3.69 ±0.85	3.67 ± 0.84
1-5. I actively participated in discussion learning.	3.46 ± 0.94	3.61 ±0.87	3.54 ± 0.90
Subtotal	3.56 ± 0.92	3.59 ±0.91	3.58 ± 0.91
2. Interaction			
2-1. Students frequently asked questions related to learning in discussion learning.	3.37 ± 0.89	3.49 ±0.88	3.43 ± 0.88
2-2. Students answered frequently in discussion learning.	3.41 ± 0.86	3.6 ±0.82	3.51 ± 0.84
2-3. Students provided appropriate answers to the content in discussion learning.	3.47 ± 0.83	3.68 ±0.79	3.58 ± 0.81
2-4. The atmosphere was well established to enable good discussion learning.	3.49 ± 0.91	3.65 ±0.84	3.57 ± 0.88
Subtotal	3.44 ± 0.87	3.61 ±0.83	3.52 ± 0.85
3. Cognitive participation			
3-1. I asked a question of interest related to learning by week during the discussion.	3.47 ± 0.85	3.61 ±0.84	3.54 ± 0.84
3-2. I participated with sufficient consideration of the answer to the discussion.	3.68 ± 0.81	3.75 ±0.83	3.72 ± 0.82
3-3. I spent extra time to get more information about the discussion.	3.52 ± 0.88	3.56 ±0.89	3.54 ± 0.89
3-4. I looked for references to participate in the discussion.	3.42 ± 0.93	3.56 ±0.94	3.49 ± 0.93
Subtotal	3.52 ± 0.87	3.62 ±0.87	3.57 ± 0.87
4. immersion			
4-1. The discussion lessons were not boring.	3.45 ± 0.88	3.57 ±0.87	3.51 ± 0.87
4-2. I was focused on learning discussions because the teaching method and content were fun.	3.34 ± 0.93	3.44 ±0.92	3.39 ± 0.92
4-3. Lecture learning was more enjoyable because I could do discussion activities.	3.34 ± 0.97	3.42 ±0.94	3.38 ± 0.95
Subtotal	3.38 ± 0.93	3.48 ±0.91	3.43 ± 0.92
5. perceived usefulness			
5-1. The discussion class helped me to improve my learning ability.	3.49 ± 0.92	3.55 ±0.91	3.52 ± 0.92
5-2. Discussion learning made students more confident in taking lectures.	3.41 ± 0.94	3.48 ±0.92	3.45 ± 0.93
5-3. Discussion learning could increase the learning effect.	3.47 ± 0.89	3.55 ±0.90	3.51 ± 0.90
5-4. Discussion learning enabled creative thinking.	3.49 ± 0.94	3.56 ±0.92	3.53 ± 0.93
Subtotal	3.47 ± 0.92	3.54 ±0.91	3.50 ± 0.92
6. learning achievement			
6-1. Because of discussion learning, I was able to acquire sufficient knowledge even in an online university.	3.46 ± 0.91	3.55 ±0.91	3.51 ± 0.91
6-2. I was able to increase my overall major knowledge competency through discussion learning.	3.44 ± 0.87	3.49 ±0.92	3.47 ± 0.90
6-3. Through discussion and learning, I was able to do field work better.	3.39 ± 0.95	3.45 ±0.91	3.42 ± 0.93
Subtotal	3.43 ± 0.91	3.50 ±0.92	3.46 ± 0.91
7. satisfaction			
7-1. I am satisfied with the discussion learning.	3.42 ± 0.96	3.56 ±0.91	3.49 ± 0.93
7-2. Discussion learning was a valuable teaching method for me.	3.51 ± 0.95	3.84 ±0.93	3.68 ± 0.94
Subtotal	3.47 ± 0.95	3.70 ±0.88	3.59 ± 0.92
8. loyalty			
8-1. I think discussion learning is the best teaching methods among all.	3.42 ± 0.92	3.52 ±0.96	3.47 ± 0.94
8-2. I will speak favorably about the merits of discussion learning to those around me.	3.44 ± 0.91	3.57 ±0.91	3.51 ± 0.91
8-3. I would like to recommend discussion learning to other subjects as well.	3.33 ± 1.00	3.36 ±1.00	3.35 ± 1.00
Subtotal	3.40 ± 0.94	3.48 ±0.96	3.44 ± 0.95
Total	3.46 ± 0.91	3.56 ±0.90	3.51 ± 0.91

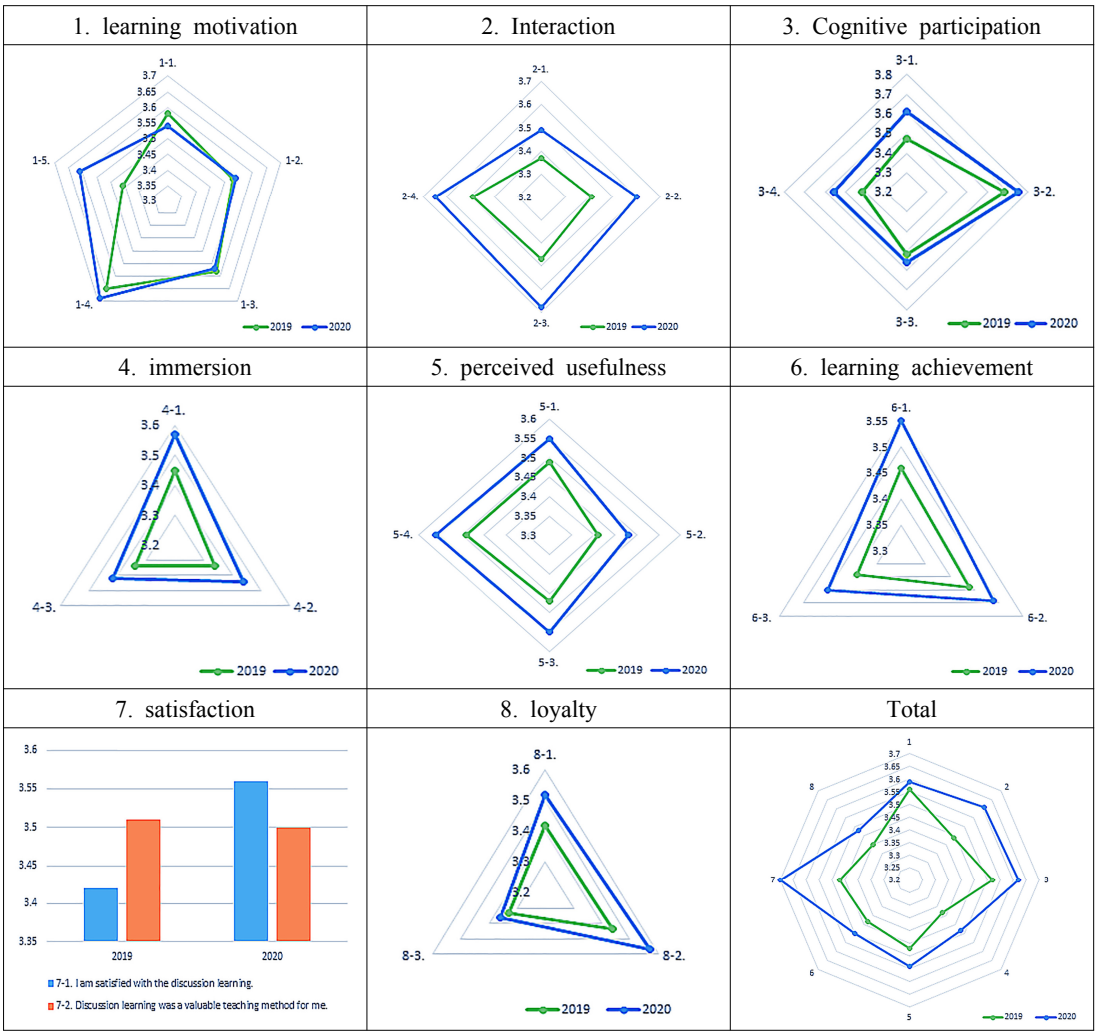

Fig. 1. Analysis by item of learning effect by year

3.3 Analysis of learning effects by grade

In the case of analysis by school year, there was no significant difference in 2019, but there was a significant difference in all items in 2020. The motivation for learning was lower in the first-year students than in the second and third-year ones. In the case of interaction, cognitive participation, and satisfaction, the first-year students were lower than that of the third-year students. In the case of perceived usefulness and learning achievement, the first-year students were lower compared to the second, third, and fourth-year students. Immersion dropped significantly in the first-year students compared to the third and fourth-year students (Table 3) (Figure 2).

Table 3. Analysis of learning effects by grade

unit:mean±SD

Variables	2019(n=190) grade				Total	2020(n=506) grade				Total	Duncan
	Freshman (n=49)	Sophomore (n=16)	Junior (n=64)	Senior (n=61)		Freshman1) (n=135)	Sophomore2) (n=123)	Junior3) (n=129)	Senior4) (n=119)		
					p=0.650					p=0.002	
1.	3.53±0.82	3.39±0.97	3.65±0.78	3.53±0.83	3.56±0.82	3.37±0.81	3.66±0.83	3.71±0.78	3.63±0.74	3.59±0.80	1)<2),3)
					p=0.726					p=0.012	
2.	3.44±0.76	3.22±1.10	3.47±0.72	3.46±0.85	3.44±0.80	3.46±0.75	3.63±0.79	3.76±0.72	3.56±0.69	3.60±0.75	1)<3)
					p=0.628					p=0.049	
3.	3.54±0.72	3.28±0.88	3.54±0.75	3.55±0.80	3.52±0.77	3.51±0.70	3.60±0.84	3.77±0.77	3.59±0.72	3.62±0.76	1)<3)
					p=0.427					p=0.000	
4.	3.40±0.81	3.04±1.02	3.45±0.79	3.37±0.98	3.38±0.88	3.22±0.84	3.49±0.91	3.65±0.85	3.56±0.73	3.48±0.85	1)<3),4)
					p=0.268					p=0.001	
5.	3.41±0.88	3.11±0.94	3.57±0.79	3.49±0.90	3.47±0.87	3.29±0.82	3.59±0.90	3.67±0.93	3.60±0.75	3.53±0.87	1)<2),3),4)
					p=0.226					p=0.000	
6.	3.48±0.91	3.00±1.00	3.47±0.79	3.47±0.86	3.43±0.87	3.22±0.85	3.53±0.93	3.68±0.86	3.57±0.73	3.50±0.86	1)<2),3),4)
					p=0.389					p=0.002	
7.	3.51±0.77	3.13±1.04	3.55±0.88	3.43±0.97	3.47±0.90	3.30±0.92	3.56±0.89	3.71±0.88	3.55±0.79	3.53±0.88	1)<3)
					p=0.590					p=0.001	
8.	3.42±0.75	3.10±1.05	3.43±0.85	3.42±0.98	3.40±0.88	3.23±0.93	3.48±0.93	3.66±0.89	3.59±0.81	3.49±0.90	1)<3),4)
Total	3.47±0.80	3.16±1.00	3.52±0.79	3.47±0.90	3.46±0.85	3.33±0.83	3.57±0.88	3.70±0.83	3.58±0.75	3.54±0.83	

1. learning motivation, 2. Interaction, 3. cognitive engagement., 4. immersion, 5. perceived usefulness, 6. learning achievement, 7. satisfaction, 8. loyalty

p-value calculated by ANOVA analysis.

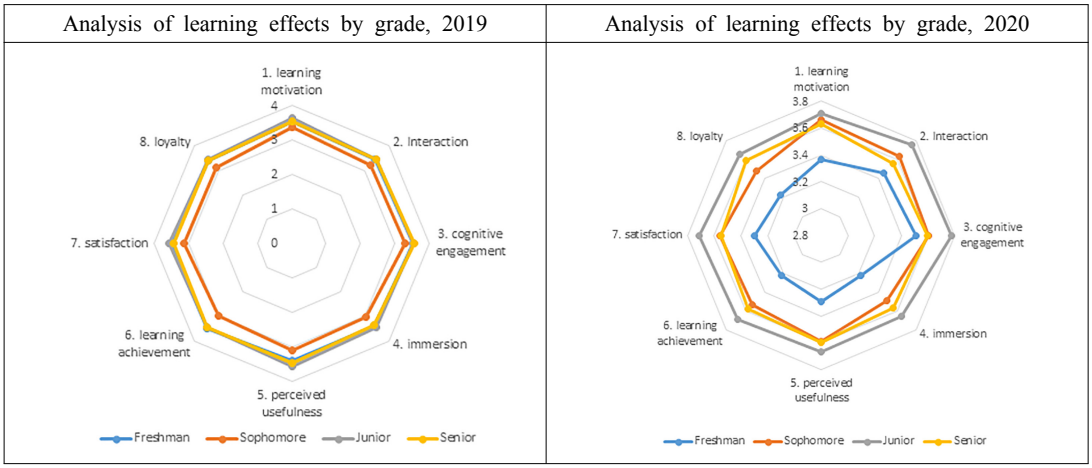

Fig. 2. Analysis of learning effects by grade

3.4 Analysis of learning effects by age

As a result of analysis by age groups, in 2019, 60 years of age or older was higher than 39 years or younger, 40-49 years of age, and 50-59 years of age in terms of learning motivation, cognitive participation, and perceived usefulness. In the interaction, 60 years of age or older was higher than 39 years or younger and 50-59 years of age. In terms of immersion, those aged 60

or older were significantly higher than those aged 50-59.

In 2020, in the case of learning motivation, those aged 60 or older were higher than those aged 50-59. In terms of interaction and cognitive participation, those under 39 and over 60 were higher than those among 50-59. In the case of academic achievement, those under the age of 39 were higher than those among 50-59. In the case of loyalty, those under 39 and those aged 50-59 were higher than those aged 40-49 (Table 4) (Figure 3).

Table 4. Analysis of learning effects by age group

unit:mean±SD

Variables	2019(n=190) age				Total	Duncan	2020(n=506) age				Total	Duncan
	≤ 39a (n=60)	40-49b (n=59)	50-59c (n=62)	≥ 60d (n=9)			≤ 39a (n=137)	40-49b (n=147)	50-59c (n=186)	≥ 60d (n=36)		
					p=0.001						p=0.036	
1.	3.40±0.97	3.68±0.70	3.47±0.71	4.49±0.55	3.56±0.82	a,b,c<d	3.68±0.84	3.54±0.85	3.52±0.74	3.88±0.55	3.59±0.80	c<d
					p=0.031						p=0.002	
2.	3.31±0.99	3.56±0.73	3.35±0.58	4.06±0.91	3.44±0.80	a,c<d	3.77±0.79	3.56±0.80	3.48±0.67	3.77±0.60	3.60±0.75	c<a,d
					p=0.013						p=0.001	
3.	3.43±0.92	3.60±0.65	3.43±0.61	4.25±0.89	3.52±0.77	a,b,c<d	3.77±0.81	3.63±0.77	3.46±0.72	3.83±0.67	3.62±0.76	c<a,d
					p=0.009						p=0.061	
4.	3.36±0.98	3.56±0.78	3.13±0.77	3.96±1.05	3.38±0.88	c<d	3.60±0.92	3.46±0.86	3.37±0.80	3.64±0.73	3.48±0.85	
					p=0.008						p=0.214	
5.	3.34±1.02	3.58±0.77	3.36±0.72	4.31±0.83	3.47±0.87	a,b,c<d	3.61±0.95	3.53±0.91	3.45±0.80	3.72±0.66	3.53±0.87	
					p=0.077						p=0.039	
6.	3.38±1.05	3.53±0.80	3.30±0.70	4.04±0.79	3.43±0.87		3.66±0.89	3.46±0.90	3.39±0.82	3.58±0.73	3.50±0.86	a>c
					p=0.055						p=0.144	
7.	3.45±0.95	3.56±0.85	3.30±0.85	4.11±0.89	3.47±0.90		3.66±0.93	3.50±0.92	3.44±0.84	3.60±0.67	3.53±0.88	
					p=0.224						p=0.016	
8.	3.39±0.97	3.46±0.88	3.27±0.78	3.89±0.93	3.40±0.88		3.69±0.92	3.39±0.90	3.40±0.89	3.53±0.79	3.49±0.90	b<a,c
Total	3.38±0.98	3.57±0.77	3.33±0.71	4.14±0.85	3.46±0.85		3.68±0.88	3.51±0.86	3.44±0.79	3.69±0.68	3.54±0.83	

1. learning motivation, 2. Interaction, 3. cognitive engagement., 4. immersion,
5. perceived usefulness, 6. learning achievement, 7. satisfaction, 8. loyalty
p-value calculated by ANOVA analysis.

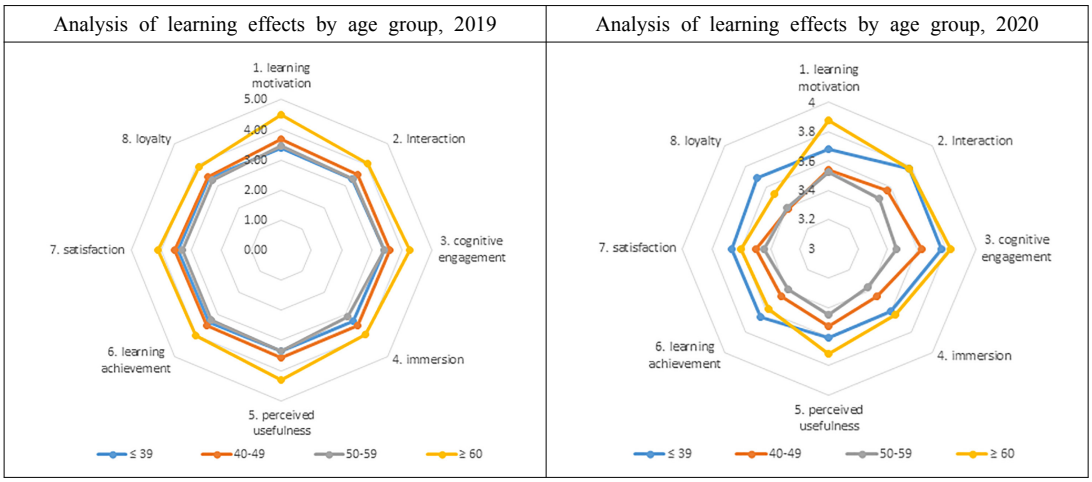

Fig. 3. Analysis of learning effects by age group

4. Summary and suggestion

The purpose of this study is to analyze the online learning effect of discussion-based flipped learning and use it as basic data to improve the learning effect of adult learners.

The results of the presented research questions are as follows.

First, in all items on the online learning effect of discussion-based flip learning, it increased in 2020 compared to 2019. Through this, it can be seen that the experience in the previous year affects the learning effect.

Second, it was found that the freshmen (1st year students) in 2020 were significantly lower in all items ($p<0.05$). This is considered to have shown low results in all items due to the period of adaptation to college life. Therefore, for a smooth transition to college life, it is necessary to develop and provide well-crafted programs including guidelines for improving understanding of online learning in pre-class discussion flipped learning.

Third, a study by Kim and Kim (2013) targeting second-year students (in their 20's) at general universities showed that the level of behavioral and cognitive participation had a positive effect on academic achievement. In addition, emotional participation was found to be a factor that promotes career decision-making, prevents students from leaving school, including transferring to other departments, and supports a stable school life. In this study, those aged 60 or older showed significantly higher learning motivation, perceived usefulness, and cognitive participation ($p<0.05$). Therefore, efforts are needed to prevent students from leaving school and support their stable school life by providing customized programs to improve loyalty, satisfaction, and learning achievement. In addition, middle-aged and elderly people, who account for the largest enrollment rate in cyber universities, have a low understanding of college life adaptation and online learning, so it is required to develop programs to improve overall learning ability.

In conclusion, discussion-based learning can be said to be a learning method to improve learners' satisfaction. However, as seen in this study, it is necessary to develop discussion-based classes with various online learning methods that can improve immersion because satisfaction was high but immersion was low.

This study was conducted on a small group of students enrolled in a cyber university, and it is difficult to generalize the results. In the online learning method to improve the academic satisfaction of middle-aged and elderly learners from admission to graduation in the future, research is needed to develop carefully customized programs by school year and age group and verify their effectiveness.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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