Equilibrium or Studying Attractors to Upgrade Educational Suitability, Teaching Presence, Social Presence and Learning Results in MOOCs

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Abstract

The purpose of this research is to find the equilibrium or studying attractors to upgrade educational suitability, instructional existing, social existing and learning results in Korean Massive Open Online Courses (K-MOOCs). To conduct this study, learners who had taken K-MOOC were selected for the study; data were collected from 369 K-MOOC learners. The data were studied using the SPSS 26.0 and AMOS 26.0 platforms. About the methodology of analysis, descriptive statistics analysis was carried out first, followed by an examination of the correlation. The measurement model was then confirmed using confirmatory factor analysis (CFA), and structural equation modeling (SEM) was used to validate the structural links and mediating effects between the variables. Further, to verify a mediating effect on educational performance, the numerical importance of the mediating result was verified using bootstrapping. Analysis outcomes are as the following: First, this study discovered that K-MOOC educational appropriateness positively impacted learning results. Second, this study discovered that K-teaching MOOC's presence meaningfully and statistically significantly moderated the association between educational appropriateness and learning outcomes. Lastly, this research discovered that K-social MOOC's presence had a statistically significant impact on moderating the link between educational appropriateness and learning results. The conclusions that can be derived from the analyses' findings are the following: To improve the learning performance of K-MOOC, which is operated through the national budget, education authorities must first deeply understand the learning needs of learners in accordance with social changes. It is also important to secure educational suitability by preparing and providing a variety of educational courses in consideration of learners' learning motives and learning goals. Lastly, it is important to increase the satisfaction and immersion in education by expanding the components of teaching existence and social existence to derive actual learning results. This study is meaningful in that it examines the direct and indirect effects of the state-led K-MOOC's educational suitability on learning outcomes, and in that it confirms the influence of teaching existence and social existence in that they enhance education outcomes.

Keywords: Korean Open Online Course (K-MOOC), equilibrium, attractor, educational, suitability, presence

1. Introduction

The higher education system is currently in the stage of universalization (Trow, 1973). In South Korea, the average high school graduation rate was 11.4% in 1980, then increased rapidly after 1999 and remained in the popularization stage before settling in the generalization stage; it has exceeded 70% annually for the past 10 years (Yang, 2015). The expansion of higher education is a global development, although the rates of college admissions have not been high in the United States or Europe, the long-term unemployment crisis acts as a signaling effect through the expectation that a university degree will provide higher wages and better working conditions. As a result, the demand for education has steadily increased. However, the high interest and demand for admission to higher education institutions has had a direct impact on higher education institutions, which have in turn raised tuition to develop the standard of education and expand their facilities. A burden of the increase in tuition was passed on to the students themselves. These tuition increases have naturally led to student loans, and many graduates have faced difficulties in repaying their loans while experiencing long-term unemployment amid the severe economic downturn. This is an

unexpected result compared to when these students' entered college, and contrary to expectations. It is sometimes pointed out as a problem that college life seriously lowers the quality of life of individuals (Kim, 2018). This burden of expensive tuition is pointed out as a 'kicking away the ladder' problem that limits higher education opportunities among low-income learners.

E-learning, which emerged because of the growth of information technology, is considered a way to solve the problems of high cost and low efficiency of higher education. Online education started based on the Internet in the early 1990s, and educational services have been provided online in various ways for about 20 years. The scope and target of online education has been steadily expanding by combining various educational contents with the latest information technology. For example, podcasts, technology entertainment design (TED), Open Course Ware (OCW), Massive Online Open Courses (MOOCs). are rapidly evolving. Among them, the most recent MOOC takes the form of providing regular courses from world-renowned universities almost free of charge to anyone in the world. As the name suggests, MOOC provides online courses that are open to the public. Such a program is expected to lower the entry barrier to higher education, which was previously limited to certain classes, as much as possible, because anyone can use lectures from any university for almost free (Kassabian, 2014).

It has been more than 10 years since the establishment of the first MOOCs, which permits everyone to experience speeches and free admission to prestigious colleges and specialized schools. Korea government recognized MOOC (K-MOOC) in 2015, and it has come up with several courses with the participation of various higher education institutions over the past seven years. After the service started in 2015, the scale has continued to expand, offering 1879 courses as of January 2023. In the meantime, the number of Kmook users has continued to increase along with the expansion of educational content, with 1.16 million registered learners and 2.81 million course applicants (Kim, 2018).

Unlike other countries, K-MOOC has a government-led character, and as a part of online higher education, the government's strong management system provides learners with educational practices which is unavailable in the present education. K-MOOC has the advantages of growing the consistency of education accomplishment and that the government controls education quality severely. However, there are other issues, such as emphasizing the rigidity of the curriculum more than learner achievement, concentrating on quantitative expansionary than enhancing the quality of the subjects, and promoting government performance management efficiency. These problems serve as limitations in K-MOOC's goal of satisfying the learner's educational suitability, and adult learners leave the equation due to an unmet educational fit. MOOCs operated in foreign countries are also pointed out for their low completion rates, but K-MOOCs are being operated with the national budget and are criticized for their even lower completion rates (Kim, 2018).

Accordingly, K-MOOC should provide a program that imitates the learning essentials of several learners and support learners attain their learning objectives by increasing educational appropriateness. In addition, it is important to increase the usefulness of education by increasing the sense of presence provided to learners during the learning process, as learners experience isolation and loneliness in online K-MOOC classes, which hinders learning motivation. To achieve learners' learning outcomes through K-MOOC, it is necessary to effectively support design and composition throughout the learning process and actively promote learning by increasing the teaching presence in online classes. Through this, learners can enhance the learning effect by having the perception that they are performing learning activities together with the instructor.

Social presence, in contrast to teaching reality, is a feature that improves learning outcomes by minimizing detrimental psychological impacts, such as loneliness or isolation, which can be easily felt in an online learning environment. This factor discusses to how much a learner communicates and interacts with another learners. This judged that the sense of real education and social existence would act as major factors in the educational effect of K-MOOC and verified the effect.

This study looked at how learners in a K-MOOC, which differs from offline academy lectures or generic e-learning lectures, evaluated the structural linkages among educational suitability, teaching presence, and social presence. The research questions are the following:

1. What is the structural relationship among educational suitability, teaching existence, social existence, and learning results in K-MOOC?

2. How does educational suitability in K-MOOC affect learning outcomes?

3. How do teaching presence and social presence facilitate the relationship among K-MOOC educational suitability and learning results?

2. Related Studies

2.1 Korean Massive Open Online Courses

In February 2015, the South Korean government established and announced the "Basic Plan for K-MOOC pilot operation", which designated the Ministry of Education as the service provider of K-MOOC, and which allowed lectures to be given by world-renowned scholars across time and space (Kim, 2018). They began with the pilot operation of K-MOOC, where anyone can take classes without restrictions, and which allows for discussions and materials to be shared with students and experts around the world. It is intended to actively respond to the international spread of MOOC and the modifications in the paradigm of higher education, and to secure a global educational competitiveness of Korean universities. After its introduction in 2015, K-MOOC went through a settling period until 2017, and it was quantitatively expanded from 2018 to 2020 with the goal of globalization and added value creation; it has a policy goal of establishing a complete open higher education system after 2021.

Due to these attempts, the number of students in K-MOOC is increasing every year. The number of courses increased from 7 in 2015 to over 900 as of 2021, and the number of K-MOOC participants increased from 55,559 to 1,690,118. The total number of participating colleges has also steadily augmented, from only 10 in 2015 to more than 400 universities and institutions at present. The fact that there are about 130,000 K-MOOC members and 520,000 class participants as of 2020 indicates that each learner is registering for an average of four lectures. However, the completion rate is still not officially announced, implying that there are still many learners who drop out without completing each class.

MOOC has continuously achieved quantitative and qualitative growth by diversifying the educational programs offered and increasing learning interest in response to the changing demands for lifelong education. As a result, as of 2021, various lectures are available on the themes of humanities, society, education, engineering, nature, medicine, art, sports, and convergence. There is a lot of participation in learning in such fields. In addition, long-term courses of 13 weeks or longer have the most participation, followed in order by mid-term courses that run from 7 to 12 weeks and short courses that run from 1 to 6 weeks. Most of the lectures are taught in Korean, while some English courses are also offered. Recently, due to COVID-19, many lectures (classes that are taken while staying at home) have been provided to reflect the needs and atmosphere of the times. For example, if a program was structured around subjects in the past, it has recently become possible to learn and complete the linked courses for a specific field or qualification in a 'bundled course' method that considers the learner's continuing learning and connection.

Nevertheless, as K-MOOC's course completion rate remains low, the administration has been doing hard work to increase the learning effect of learners by providing various measures to raise the course completion rate. Among these efforts and attempts, the most important factor is educational suitability and teaching and social presence. Since most K-MOOC learners are adult learners, it is significant to fully comprehend andragogy, which is the basis of continuing education or lifelong education for adult learners, and to pursue policies (Kim. 2018). Adult learners are very sensitive to the suitability of their desired educational goals or content because they seek K-MOOC for additional education after completing regular education. Therefore, K-MOOC needs to sensitively reflect changes in social change and education demand. In addition, as adult learners have growing expectations of online education due to the expansion of online education, having a sense of presence in class participation acts as a major factor influencing educational performance. Therefore, it is necessary for K-MOOC to seek ways to secure educational outcomes by understanding and identifying adult learners as well as increasing educational suitability and presence. Therefore, the next step is to apply andragogy to K-MOOC.

2.2 Application of Andragogy to K-MOOC Considering Personality Prediction

K-MOOC website provides all lectures free of charge with the vision of offering "Innovating university education through an open higher education system". Thereby easing the constraints caused by the educational competency gap between universities and balancing practical opportunities in higher education. It declares that it will ultimately contribute to national human resource development by laying the foundation for lifelong learning for higher education. Some MOOCs, which started a few years earlier than the establishment of K-MOOCs, are expanding their scope to children and adolescents; however, in the case of Korea, the main learners are adults, because it is a state-led higher education program.

Knowles (1980) uses the characteristics of the learner as the basis for understanding andragogy. He explains the reality of the comprehensive andragogy learning process in a total of seven stages, and he examines the difference in terms of pedagogy. This is a process model that is completed sequentially according to each process, and an in-depth understanding of the structure and function of each of the following stages is required to apply the theory to

educational practice (Knowles, 1980). The seven steps consist of learning environment creation, learning plan, analysis of learning needs, setting educational program goals, types of learning experiences, implementation of learning activities, and learning evaluation. Here, an analysis is attempted in terms of K-MOOC and the applicability of the theory was verified.

Since this thesis proposes that K-MOOC shift to learner-centered education, the application of andragogian adult learning theory to K-MOOC will secure the identity of K-MOOC and help it be operated as a more effective state-led policy. In addition, K-MOOC intends to secure educational suitability by reflecting the diverse learning needs of adult learners living in the fourth industrial revolution, and to improve learning outcomes.

2.2.1 Setting a Climate for Learning Considering Personality Prediction

The first step is to create an atmosphere conducive to learning. Adult learning requires learners to actively participate in learning so they can achieve their individual goals. Knowles (1980) divides the methods for creating a learning atmosphere into two categories: the physical environment and the psychological environment. The physical environment discusses to the conditions with actual learning environment, such as lighting and sound; an environment where learners feel comfortable while learning is ideal. However, more important is the psychological environment, which involves the instructor and other factors; the goal is an environment wherein learners feel accepted, respected, and supported. In K-MOOC, the physical environment refers to the audiovisual smoothness and appropriate application of the video and sound of the website composition and lecture videos to help learners feel comfortable in their actual learning participation. Meanwhile, psychological stability means that K-MOOC instructors should guide and support learners' smooth participation in learning and should also provide a sense of presence and comfort making the students feel as if they were sharing in a lecture in an actual university classroom. It is also necessary to establish and expand sufficient guidance and communication channels in the entire learning process to create a comfortable atmosphere for Q&A, task performance, and participation in evaluation. Finally, the feeling that adult learners are respected and supported in K-MOOC is greatly influenced not only by the instructor who conducts the course, but also by the teaching assistant or administrator who corresponds with the learner. Even though it is a form of online education, learners fully participate in learning. It is important to secure a means of communication that allows one to feel as if they are progressing. This can secure social presence by enabling active communication between instructors and learners as well as between learners within K-MOOC.

2.2.2 Establishing a Structure for Mutual Planning

The difference between pedagogy and andragogy can be seen in the study plan. In pedagogy, the responsibility of the learning plan rests with the teacher, whereas the subject of the learning plan in andragogy is the learner, while the instructor is merely a facilitator. Further, Knowles (1980) states that the starting point of andragogy is always the interest and desire of the learner, and that the instructor should provide various supports so that adult learners can make their own learning plans and guide their own learning planning process. As a result, the learner can establish their own learning goal, and they can actively participate in learning more independently. Even in K-MOOC, learners participate in learning while guided through their own interest in learning. There is no form of coercion, as it is not formal education. When a learner participates in a course, they can review the proposed learning plan of the course, but they autonomously make decisions about their learning time and access method according to their personal learning motivations and goals. In addition, the instructor supports learners in making their own learning plans by presenting various types of learning information and materials. Sometimes, individual learners establish common learning goals through communication among learners with similar interests, but above all, individual learning goals take precedence. This is because the composition of the learning method, the method of participation in the course, and the evaluation method are centered on individual learners. In summary, K-MOOC learners participate in learning based on their personal interest, that is, their individual educational purposes, while the instructor helps learners as a facilitator to take control of their own learning. Learners actively learn to achieve their self-established learning plan. As noted in Knowles (1980), this process allows all learners to truly take responsibility and make decisions in a free and open learning environment based on trust.

2.2.3 Establishing a Structure for Mutual Planning

To plan learning activities and increase adult learners' participation and effectiveness in education, it is very important for learners to clarify what they want to achieve through learning online and to satisfy their learning needs. Therefore, the instructor should identify and actively accept what learners want to learn, then provide an opportunity for learners to self-diagnose to motivate them to become more aware of their learning and actively take part in their learning. The self-diagnosis process in andragogy consists of three stages in total: The first stage is the creation of desirable behaviors or required aptitude models that meet the needs of the civilization or individuals. The next stage

is to provide a diagnostic experience for learners to evaluate their own learning level. The third stage is that the learner should recognize the difference between their current level and the desired position to be reached. K-MOOC's implementation period was rather short to establish a proper learning system, and it appears that the analysis of learners' learning needs is insufficient in that it has focused on 'education the provider wants' rather than 'education that learners want'. It appears that the understanding of learners' needs and interests has been somewhat insufficient thus far in that they have focused on system construction and quantitative expansion of the curriculum. As a result, there is no device that allows learners to self-evaluate themselves. Among the problems of K-MOOC as well as MOOC, the low completion rate can be compensated for by this self-evaluation method. Therefore, from the view of this study, the learning goal of K-MOOC is to satisfy learning needs rather than completing the course, and it is necessary for learners to understand their own educational needs through K-MOOC, find an appropriate curriculum, and achieve practical educational outcomes.

2.2.4 Designing a Pattern of Learning Experiences

The learning goal is important in selecting the type of learning in adult learning, and there is individual, group, and community types of learning (Knowles, 1980). First, the individual learning type denotes to the form of individual teaching courses in which an apprenticeship or practice is conducted under a specific leader under a mutual contract for a certain period, counseling, private tutoring for self-study, media education, management learning. Next, the group learning type refers to group courses with the purpose of learning (clinical practice, joint practice, group discussion) and where the group setting is a by-product rather than the purpose of the education itself. Knowles suggested appropriate methods for learning activities according to the types of learning objectives. This type of education appears to be applicable to some of the various types of learning goals, even in K-MOOC. K-MOOC learners are basically participating in learning to obtain relevant information in the field of interest, and the learning goal is to understand the learning content or related context (Kim, 2018). Further, the goal of learning is the formation or establishment of human relationships, specific attitudes, and value judgments, and the learning goal is based on generating interest through learning. However, the contents of suitable learning activities according to the learning type suggested by Knowles are judged in some cases to be outdated, and they have been supplemented using social networking activities (SNS) in recent years.

2.2.5 Managing the Execution of the Learning Experiences

In this stage, the learning goals established by the learner's learning needs are implemented in a specific manner. Knowles (1980) has pointed to this stage as the most neglected part of andragogy. The study plan should contain effective methods for achieving the learning goals, and it is recommended that learners be included in the selection of textbooks to share responsibility for their learning. Further, the instructor, as a person who helps adult learners actively participate in the learning method and contribute their experiences, respects the learner's individuality, grants freedom of expression, and shares mutual responsibility in the progress and evaluation of learning. At this stage, the importance of human values such as self-respect and love should be considered and emphasized. The learning plan of K-MOOC presents various methods and related materials for enhancing the learning effect. However, the learner's participation in selecting educational materials or adopting a better education method is not reflected in the learning activity process, nor are the learner's needs. This represents a very high-level stage in the theory of andragogy, and the learner does not yet have responsibility or authority for their own learning progress and evaluation. However, there is a possibility that it can gradually be applied in the future. Recently, the online education format has introduced a mutual evaluation method between learners to strengthen learners' authority, and there is currently a trend of expanding education content in a manner that emphasizes human dignity and value compared to the past in macro dimensions such as universal educational welfare. For K-MOOC to function as higher education for all, it is necessary to explore more in-depth specific activities to best achieve learners' educational goals.

2.2.6 Evaluating Results and Rediagnosing Learning Needs

This stage is the final stage, where it is possible to evaluate and review whether the learner has reached their learning goal. This result evaluation is done by the learner themselves, and the instructor applies the process of discovering the gap between the desired model and the present state mentioned in the diagnosis of learning needs in the third step. It is used as evidence to evaluate the educational effectiveness and feasibility by assessing the learners' current ability level and underachievement of their goals, and to improve the learning process. This can be said to be the most important stage of andragogi. Knowles (1980) stated that "the fundamental purpose of evaluation is to promote growth and development, and evaluation without improvement of failure is meaningless". While it is possible to complete each course in K-MOOC, most learners do not set completion as one of their learning goals. The average completion rate of MOOC, including K-MOOC, is around 10%, as many learners instead aim to satisfy their

intellectual needs. From this point of view, it appears to be necessary to focus more on the educational effects of andragogy-based K-MOOC while following the learner's self-judgment method and devising measures to promote personal growth and development (Kim, 2018). The following is a summary of what has been done so far: By applying the andragogy adult learning theory to K-MOOC and applying it to the actual learning process of K-MOOC, it was possible to explore different ways to improve learning outcomes. As a result, it was possible to confirm the importance of reflecting the elements of educational suitability, teaching existence, and social existence to understand the characteristics of learners and changing learning needs and to increase learning outcomes, given that most K-MOOC learners are adults.

2.3 Educational Suitability

Educational suitability refers to whether education meets the learner's educational aims or objectives and is categorized as either social suitability or personal suitability. First, social suitability denotes to the benefits obtained through education satisfy social necessities, and the term "personal appropriateness" relates to whether the instructional material sparks individual motivation or interest and accomplishes learning objectives (Chevallard, 1992). In the past, more highlighting was sited on external standards of education, emphasizing the social suitability of education. However, recently more attention has been paid to personal suitability as an internal criterion of education. Adult learners tend to have higher levels of self-regulated skills than children and adolescents and are highly motivated and spontaneous in their learning. But, without force, education is characterized by a high dropout rate because it is not an immediate task for adults. The major objective of learning for K-MOOC learners is not the accomplishment of the course, but rather special suitability as part of educational suitability, while the effect of recognising completion of K-MOOC courses remains low socially. In other words, if the course is beneficial to them and if the educational fit for individual necessities is strong, K-MOOC learners can encourage their involvement and continue studying (Murray, 2014). As a result, by expanding the educational applicability of K-MOOC by gratifying learners' intellectual curiosities, developing expertise, and fostering better social relationships, it is possible to encourage continuous engagement in learners and assist them in achieving their learning goals.

2.4 Teaching Presence

The effect of the instructor's sense of presence that occurs within classes in an offline learning environment has been in progress for a very long time (Kim, 2010). The sense of teaching presence has been dealt with as a major factor influencing the learning method. A sense of teaching presence in the learning process experienced by learners differs from person to person, which causes differences in the effect on the quality of education (Joo et al., 2010). K-MOOC is not the same from general e-learning in terms of learning goals and contents however, an entire learning process will be done online. Therefore, it is necessary to clearly design learning using the instructor's sense of presence, and to have a significant impact on learning outcomes by appropriately facilitating learning (Kim, 2010). In other words, the instructor's sense of presence in the K-MOOC learning process is crucial to reaching the learning goals each learner sets for themselves. Studies in the past have demonstrated that the presence of teachers improves learning results (Kang et al, 2011; Park et al., 2018; Shea et al., 2006). It is known that teaching presence is classified into the strategy and composition in teaching and learning, learning promotion, and instructor's direct intervention (Watson et al., 2016). It consists of two major parts: organization of learning and promotion of learning. First, organization of learning includes setting learning goals, designing learning activities, and presentation of learning contents. Facilitation of learning includes advancement of acceptance, encouragement of response, and contribution (Yuan, Powell, 2013; Swan et al., 2008; Watson et al., 2016). To confirm the significant effect of K-MOOC on learning outcomes, this study considered the sense of real teaching as a design factor in the teaching-learning process (Swan et al., 2008).

2.5 Social Presence

Social presence was presented by Short (Short et al., 1976), who developed the concept of effectiveness of face-to-face communication. Short says that social presence is such as a certain perspective on people and interpersonal ties (Kim & Im, 2010). K-MOOC has the advantage that learners can participate in lectures autonomously at their chosen period further than the limitations of time and space. But the physical distance among the teacher and the learner restricts the communication necessary for knowledge, which frequently leaves learners feeling alone and isolated (Rovai, Wighting, 2005). Therefore, isolation experienced in the learning method has a negative effect on learners and is closely related to the dropout problem in which learning is stopped in the middle (Chung, Kim, 2018; Lee et al., 2006; Dascalu et al., 2014).

In online learning, social presence resolves several difficulties of learners' solitude and learning uniqueness and has an optimistic result on learning results (Hackman & Walker, 1990). As a type of online higher education, K-MOOC

differs from normal e-learning in that it significantly encourages both ddropout and learning motivation among its students. From this vantage point, the K-sense MOOCs of social presence may interact with students in a comparable setting and serves as an important and appropriate aspect for learning outcomes. This study assumes that there is an adjacent relationship among the social presence that is recognized by K-MOOC learners and educational suitability. Based on these hypotheses, this study examines the influence of social presence and learning outcomes on educational appropriateness as experienced and perceived by K-MOOC participants. Finally, the researcher will study the part that social presence plays in mediating the link among educational appropriateness and academic success.

2.6 Research Model

This study's goal is to investigate the structural relationship among the educational applicability of K-MOOCs and educational presentation among learners who participated in K-MOOC at least once. Specifically, it is to examine and verify the direct effect of educational suitability on learning outcomes and the indirect outcome mediated by teaching presence and social presence. Through this method, we intend to identify implications for improving the learning outcomes of K-MOOC, which has national-led characteristics. To this end, the relevant theories and previous studies were reviewed, major variables suitable for this study were derived, and the structure of the influence relationship was established as follows. This study established the research model illustrated in Figure 2 below to investigate the effect of education provided by K-MOOC on educational performance through educational relevance, which refers to how well the education provided by K-MOOC satisfies the learner's educational needs from the learner's point of view.

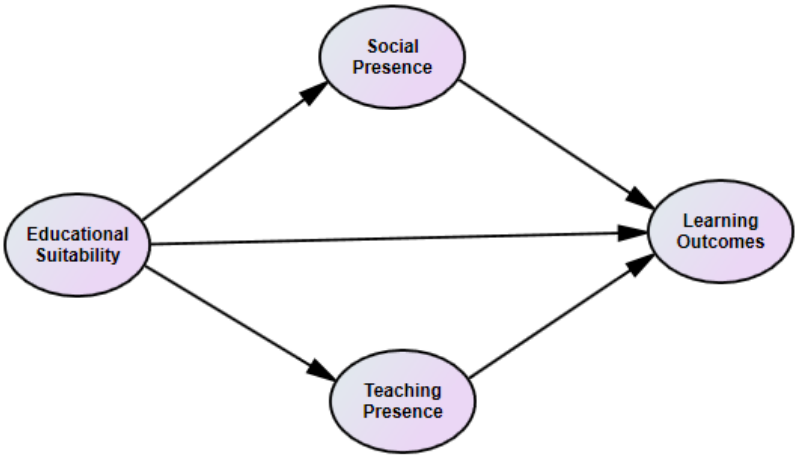

Figure 1. Research Model

3. Research Method

3.1 Research Target

3.1.1 Research Participants

To analyze the structural relationship among educational suitability and learning outcomes of K-MOOC, the subject of this study was set as learners who have taken K-MOOC at least once. Specifically, considering that K-MOOC is not a curriculum for a specific age or target group, but is instead for anyone who wishes, this study adopted an online survey method that can be used to conduct nationwide surveys.

First, the number of study subjects was calculated prior to conducting the survey. To increase the reliability of the results, the rationale for the selection of research subjects must be presented. Therefore, the structural equation model (SEM), the main analysis method adopted in this study, requires an appropriate sample size for smooth analysis. Hair et al. (2006) stated five factors that can affect the sample size. In particular, the maximum likelihood method (ML), the most used estimation method in structural equation models, is suitable for a sample of 150 to 400, because when the sample size exceeds 400, the ML method becomes sensitive and the model fit may deteriorate; in general, it has been suggested that 200 is ideal. Several other scholars have said that at least 150 samples are required for this structural equation model, and that it is desirable to have a sample size in the range from 200 to 400 (Loehlin, 2004; Hoyle, 1995; Kline, 2005). Table 1 presents the standard for the sample size suggested by each scholar.

Table 1. Criteria for an Appropriate Sample Size

year	scholar	sample size
1988	Bentler & Chou	5 times the free parameter
1989	Joreskog & Sorbom	q<12: 200, q>12: 1.5q(q+1)
1993	Mitchell	10-20 times per variables
1996	Stevens	15 times per variables

In this study, to measure the sample size more clearly, the number of study subjects was calculated based on the statistical data provided by the K-MOOC promotion organization. First, the number of K-MOOC homepage members 227,844 listed in the policy information published on the Ministry of Education and K-MOOC homepage was set as the population. The reason for this is that membership registration is required to learn in K-MOOC, and self-information is required for credit recognition and the issuance of certificates after learning. For this reason, the population size was 227,844, and the study subjects were calculated by setting the margin of error to 5% at a 95% Confidence Level. As a result, the target sample size was calculated to be 384. However, due to the nature of K-MOOC's completely free lectures, it was judged that there would be people who only signed up for the website and did not actually participate in the lectures. Finally, the subjects of this study were set to be more than 350 and less than 400. In total, 369 learners were surveyed. The specific calculation formula is as follows. N is the Population Size, n is the Sample Size (the total sum of completed responses in the survey), e is the Margin of error or confidence interval, and Z is the z-score corresponding to the Confidence Level. P is the observed percentage, and the sample The $p<0.5$ criterion was applied to calculate the error.

3.1.2 Data Collection

The researcher explained the purpose of the research, research procedures, confidentiality of responses, and the right to withdraw from the research to the research subjects before starting the data collection. Also, surveys were disseminated to research subjects who wanted to join willingly, and data were gathered online. The survey never contains subtle data that can recognize the research subject's personal information, and the collected data was stored separately in a place where no one else is allowed to enter to maintain confidentiality. The research subjects participating in this study were learners who had participated in K-MOOC at least once, and a total of 369 response results were used for analysis.

3.1.3 General Characterization of Research Participants

The purpose of this study was to define how learners observed educational suitability, teaching presence, and social presence during K-MOOC classes affected learning outcomes. To this goal, learners who had taken the K-MOOC more than once had their educational suitability, teaching presence, social presence, and learning outcomes evaluated. The survey period was from March 1st to 7th, 2018, and the surveys were administered online. The participants were learners who had contributed to K-MOOC at least once within the last year, and a total of 369 people participated. Among them, 179 (48.5%) were male and 190 (51.5%) were female. Regarding the age range, 79 (21.4%) were in their 20s, 109 (29.5%) were in their 30s, 105 (28.5%) were in their 40s, 54 (14.6%) were in their 50s, and 22 (6.0%) were in their 60s and older; respondents in their 30s made up the largest group. In terms of the academic backgrounds of the respondents, there were 30 high school graduates (8.1%), 37 junior college (2-3 years) graduates (10.0%), 255 four-year college graduates (69.1%), and 47 graduate school graduates (12.7%). Regarding majors, 112 students (30.4%) were in humanities, 84 (22.8%) were in social science, 65 (17.6%) were in natural science, 79 (21.4%) were in engineering, 24 (6.5%) were in arts and physical sciences, and five (1.4%) were in other fields; respondents who majored in humanities made up the largest group. Finally, for the jobs of the respondents, 34 (9.2%) were students, 35 (9.5%) were professionals, 200 (54.2%) were office workers, five (1.4%) were public officials, 36 (9.3%) were self-employed, 38 (10.3%) were housewives, and 21 (5.7%) were unemployed; office workers made up the largest group of respondents.

3.2 Research Tools

3.2.1 Educational Suitability

This study was constructed by referring to the educational suitability assessment tool verified in previous studies Lim (2013), Oh & Kim (2006), and then revised and improved to meet the purpose of this study. The detailed items of the questionnaire consisted of 'I was properly provided with the contents I wanted to learn through the lecture', 'The contents of the lecture were appropriate for my level', and 'The pace of the lecture was appropriate for my learning'.

There are a total of 7 questions, and all responses were measured on a 5-point Likert scale. Cronbach's α value, the reliability of this survey tool, was analyzed as 0.885.

3.2.2 Teaching Presence

This study was composed by referring to the previous study Kang et al., (2011) as a measurement tool for teaching presence, and then revised and improved to suit the purpose of this research. Contents of each item included 'I received help from the instructor for understanding the class', 'I was comfortable with the instructor's teaching method', and 'I accepted the instructor's feedback'. There are a total of 7 questions, and all items are measured on a 5-point Likert scale. Cronbach's α value, the reliability of this tool, was analyzed to be 0.831.

3.2.3 Social Presence

This study was constructed by referring to the tools of previous studies Roh (2015) for measuring social presence and was revised and improved to meet the purpose of this research. The contents of the survey items were 'responded to the views of other learners during class', 'exchanged essential information with other learners during class', and 'interaction with other learners motivated my learning'. There are a total of 9 items, and all items are composed of a 5-point Likert scale. Cronbach's α, the reliability of the research tool, was analyzed as 0.941.

3.2.4 Learning Outcome

In this study, a questionnaire was constructed by referring to previous studies Choi (2008), Park (2010) to measure learning outcomes and was revised and improved to meet the purpose of this research. Specific items of the survey were 'I learned about my expertise in study (or work)', 'It gave me a new perception on my study (or work)', and 'It gave me a new perspective on my study (or work)', etc. There are a total of 7 items that are measured on a 5-point Likert scale. Cronbach's α value, which is the reliability of the tool, was analyzed to be 0.892.

3.3 Analysis Procedure

The data gathered were analyzed with SPSS 26.0 and AMOS 26.0. First, the general characteristics of the subjects were examined by means of SPSS 24.0. Next, exploratory factor analysis and reliability analysis were controled to examine the validity and reliability of the research tools. Next, correlation analysis was conducted to examine the correlation coefficient among the measured variables, and the mean and standard deviation of each measured variable were calculated. Next, confirmatory factor analysis was implemented to determine whether the measured variables properly measured each latent variable through AMOS 24.0, then the structural model was verified. For the verification of the model, the maximum likelihood (ML) technique was applied to estimate the model fit and the path coefficient, and statistical significance was verified within the range of $p<.05$.

4. Results

4.1 Descriptive Statistics and Correlation Analysis

Table 2. Descriptive Statistics and Correlation Analysis Result

	educational suitability	teaching presence	social presence	learning outcome
educational suitability	1			
teaching presence	.79***	1		
social presence	.60***	.71***	1	
learning outcome	.78***	.79***	.66***	1
mean	3.81	3.67	3.27	3.73
standard deviation	.606	.687	.889	.648
skewness	-.872	-.447	-.355	-.620
kurtosis	1.941	.150	-.564	1.203

***$p<.001$

To see if the collected data supported the normal distribution assumption, the mean, standard deviation, skewness, and kurtosis were first examined. An analysis's findings revealed that the standard deviation fell between the ranges of.756 and.781, while the mean of each variable ranged from 3.16 to 3.93. The skewness was determined to be

between -.355 and -.872 and the kurtosis to be between -.564 and 1.941. It is determined that there is a major issue with the acquired data if either the absolute value of kurtosis or skewness is larger than 3 or 10 (Markus, 2012; Moon, 2009). Yet, it was discovered after data analysis that the variables in this study adhere to the fundamental tenet of normal dissemination. The correlation between variables, mean, and standard deviation are provided in Table 2 below. Also, it was proven that there was an important correlation (p.05) among all variables anticipated in the research model.

4.2 Verification of the Measurement Model

To verify the theoretical measurement model, CFA were performed using a maximum likelihood method. Results showed that the significance probability was calculated as p=0.000, the degree of freedom(df) was 399, and χ^2 =1140.965. However, there is a problem in that the value responds sensitively to the size of the sample, so it is not suitable to assess the model fit when the sample size is huge. It is also necessary to examine the fit of other models. Since an index imitates a specific aspect of the model fit, it should not be concluded that the fit itself is good just because the index value is good (Markus, 2012). The types and numbers of fitness indices reported in papers vary by researcher, and it is necessary to select, present, and comprehensively evaluate various fitness indices according to the specific research purpose.

Among these, the absolute fit index is an estimate that is made by comparing the ratio that the research model set by the researcher can explain the covariance existing in the sample covariance matrix with the explanatory amount in the case of no model. RMSEA, GFI, and AGFI are used as indices (Moon, 2009). In addition, the relative fit index indicates how high the explanatory power of the theoretical model set by the researcher is compared to a model in which there is no correlation between observed variables; that is, a baseline model in which the covariance among variables is set to 0. This index is referred to as' comparative fit indexes' or 'incremental fit indexes' (Moon, 2009; Hu & Bentler, 1999). Among them, CFI (comparative fit index) is widely used because normed fit index (NFI), which was developed to compensate for the shortcomings of non-normed fit index (NNFI), was developed to compensate for the influence of the sample.

TLI, CFI, and RMSEA are evaluated as indices that consider simplicity without being sensitive to sample size (Browne & Cudeck, 1992). In general, the absolute goodness-of-fit index, RMSEA, is considered very good when it is lower .05. If the RMSEA is between .05 and .08, it can be judged as an appropriate value (Browne & Cudeck, 1992). TLI and CFI, which are relative fitness indices, are obtained within the range from 0 to 1.0, and an index of .90 or higher is evaluated as good (Moon, 2009; Hu & Bentler, 1999). In this study, the values of TLI, CFI, and RMSEA were presented as model fit, along with the significance test result of x^2 based on these previous studies. Results revealed that NFI=.859, CFI=903, TLI=.894, and RMSEA=.071, indicating that the measurement model of this study has acceptable suitability.

4.3 Validity Analysis

At this point, the validity of the measurement model was assessed. Convergent validity, discriminant validity, and nomological validity should be reviewed (Moon, 2009). Convergent validity states the degree of agreement among the observed variables that measure latent variables and the extent to which multiple scales measuring the same concept agree. If the indicators are examining the same concept, the correlation will be high, so this result can be judged to mean that the measurement index of the study measures the concept properly. This can be achieved through an analysis of standardized factor loading (λ, lambda), Construct reliability (CR), and Average Variance Extracted (AVE). First, the value of the factor load from the observed variable to the latent variable is called λ(lambda). If λ is at least 0.5 and the statistical significance (CR>1.965, p<.05) is also satisfied, then it is judged to have convergent validity. The confirmatory factor analysis confirmed that the standardized factor loading of all observed variables was 0.5 or more, and the CR value also exceeded the reference value of 1.965, thus satisfying the suggested criteria. Therefore, based on the analyzed λ, this measurement model was analyzed to have convergent validity.

Table 3. Confirmatory Factor Analysis (n=369)

latent variable		observed variable	B	S.E	C.R.	β	AVE	CR
educational suitability	→	educational suitability 1	1.000	-	-	.743	.635	.924
	→	educational suitability 2	1.034	.075	13.825	.725		
	→	educational suitability 3	.975	.070	13.945	.731		
	→	educational suitability 4	.912	.069	13.195	.694		
	→	educational suitability 5	.987	.070	14.006	.734		
	→	educational suitability 6	.975	.077	12.683	.669		
	→	educational suitability 7	.970	.068	14.172	.742		
teaching presence	→	teaching presence 1	1.000	-	-	.774	.641	.926
	→	teaching presence 2	.965	.061	15.696	.775		
	→	teaching presence 3	.968	.062	15.629	.772		
	→	teaching presence 4	.932	.063	14.852	.740		
	→	teaching presence 5	.970	.062	15.712	.776		
	→	teaching presence 6	.847	.058	14.582	.729		
	→	teaching presence 7	.863	.060	14.288	.716		
social presence	→	social presence 1	1.000	-	-	.626	.611	.934
	→	social presence 2	1.249	.097	12.927	.810		
	→	social presence 3	1.198	.092	13.078	.823		
	→	social presence 4	1.232	.092	13.332	.845		
	→	social presence 5	1.228	.095	12.865	.804		
	→	social presence 6	1.243	.093	13.291	.841		
	→	social presence 7	1.297	.099	13.108	.825		
	→	social presence 8	1.236	.094	13.134	.828		
	→	social presence 9	1.167	.089	13.084	.823		
learning outcome	→	learning outcome 1	1.000	-	-	.744	.631	.923
	→	learning outcome 2	1.022	.075	13.660	.717		
	→	learning outcome 3	1.029	.073	14.159	.741		
	→	learning outcome 4	1.094	.074	14.750	.770		
	→	learning outcome 5	1.007	.073	13.709	.719		
	→	learning outcome 6	1.109	.077	14.409	.753		
	→	learning outcome 7	.932	.071	13.084	.689		

The following discriminant validity is a degree with the difference between different latent variables are indicated (Moon, 2009). In other words, there must be a clear difference in the measure between the different concepts in the research model. The very high correlation between measures of different concepts may raise the question of whether the concepts are different (Moon, 2009). Although the criteria for judging differ between scholars, Moon (2009) stated that when the correlation among latent variables is less than .85, it can be confirmed as having discriminant validity, while Kline (2005) stated that discriminant validity for the variables is secured when the correlation coefficient between latent variables is less than .90. The correlation coefficient among the latent variables in this research model was from .60 to .79, and it was judged that there was no problem in all the latent variables being accurately and validly measured through the measurement model. There are several methods that can be used to validate the discriminant validity of the measurement model. This study applied the method of judging that there is discriminant validity when the square value of the correlation coefficient is less than the AVE. If the square value of a correlation coefficient is greater than the AVE, it is judged that there is no significant difference and no discriminant validity. Due to the analysis, all variable relationships in this confirmatory factor analysis model were analyzed to have discriminant validity. The results are presented in Table 4 below.

Table 4. Discriminant Validity

Latent Variable	educational suitability	Teaching presence	Social presence	Learning outcome	AVE
educational suitability	1	-	-	-	.635
teaching presence	.79*** (.62)	1		-	.641
social presence	.60*** (.36)	.71*** (.50)	1	-	.611
learning outcome	.78*** (.61)	.79*** (.62)	.66*** (.44)	1	.631

***p<.001

correlations, ( ) is the square of correlations

Nomological validity means that a concept must have a nomological net for other concepts according to the role it has in a theory or hypothesis (Moon, 2009). That is, it is checked whether the hypothetical direction between each latent variable coincides with the direction of the result obtained from the actual data, and if it is the same as the prediction direction, then it is judged that there is nomological validity. This can be determined from the results of correlation analysis between latent variables. Although no hypothesis was established in this study, it was predicted that all five set latent variables would form a positive correlation with each other, and due to the analysis, nomological validity was verified.

4.4 Verification of Structural Model

Table 5 shows the analysis results to evaluate whether this research model fits well with the collected data. As a result of analyzing the goodness of fit of the research model, all the goodness of fit standards of the measurement model were fulfilled. As for the results of analysis according to each goodness-of-fit criterion, the goodness-of-fit of each model were analyzed as NFI=.851, CFI=.895, TLI=.886, RMSEA=.074.

Table 5. Fits of Structural Model

(n=369)

goodness-of-fit index	χ^2	p	df	q	RMSEA	CFI	TLI	NFI
Model fit	1199.578	.000	400	2.999	.074	.895	.886	.851

Table 6 shows the results of verifying the path coefficient between each variable. As a result of analyzing the effect of educational suitability on learning results, teaching presence, and social presence, learning outcomes are β=.418 (p<.001), teaching presence β=.823 (p<.001), and social presence is β=.647 (p<.001). Next, looking at the results of validating the influences of the teaching presence and social presence on learning outcomes, teaching presence is β=.336 (p<.001) and the social presence is β=.171 (p<.001).

Table 6. Parameter Estimation Result of a Research Model

(n=369)

Paths between variables			β	B	S.E.	C.R.	p
learning outcome	←	educational suitability	.418***	.440	.099	4.442	<.001
teaching presence	←		.823***	1.025	.081	12.709	<.001
social presence	←		.647***	.965	.088	10.953	<.001
learning outcome	←	teaching presence	.336***	.284	.069	4.131	<.001
	←	social presence	.171***	.121	.036	3.314	<.001

***p<.001

The standardized path coefficients derived in this study correspond to the standardized regression coefficients in regression analysis, and this value can be used to compare the relative sizes of the paths between latent variables. The significance level of Critical Ratio (C.R.) in this study was set as p<.05 based on the path from educational relevance to educational outcomes. Due to the analysis, all pathways between latent variables were analyzed to be

significant within the significance level. In structural equation model analysis, it is necessary to carefully examine the C.R. of the analyzed results to find out the significance of each path. C.R. is the value obtained by dividing the causal coefficient by the standard error, and the criterion for judging this is the C.R. at the 95% confidence level. The absolute value must be larger than 1.96 (C.R.>±1.96). Since this rejects the null hypothesis that 'the causal coefficient is 0', it can be interpreted to mean that 'the analyzed causal coefficient is significant' (Moon. 2009).

In addition, since the results of statistical verification on path coefficients reflect not only the absolute size of the path coefficients, but also other factors such as the size of sampling and the degree of cross-correlation between variables, it is important to understand that the effects of standardized path coefficients are large and small. As a result, it is difficult to determine the standard for interpretation (Moon. 2009). In this regard, Cohen (1988) found that when the absolute value of the standardized path coefficient is .10 or less, the size of the effect can be interpreted as 'small', a level ranging from .30 to .49 can be interpreted as 'moderate', and a level of .50 and above can be interpreted as 'great', and that there is a problem in interpreting the results by applying this criterion too rigidly.

The analysis results of this research are the following: It was detemined that K-MOOC education suitability has a statistically important effect on learning results. Through the mediating effect of the teaching presence, the indirect outcome was analyzed as β=.277(p<.05) on the path from educational suitability to learning outcomes. And the indirect effect on the path from educational suitability to learning outcomes by teaching presence was analyzed as β=.111 (p <.05). Therefore, the total effect of educational suitability on learning outcomes is β=.806 (p<.05), and the method for calculating it is as follows. First, the effect of educational suitability on learning outcomes (β=.418, p<.05), and second, the indirect effect of educational suitability on learning outcomes through the mediating effect of teaching presence (β=.277, p<. 05), and third, the indirect effects of educational suitability on learning results through the mediating effect of social presence (β=.111, p <.05) is the total outcome.

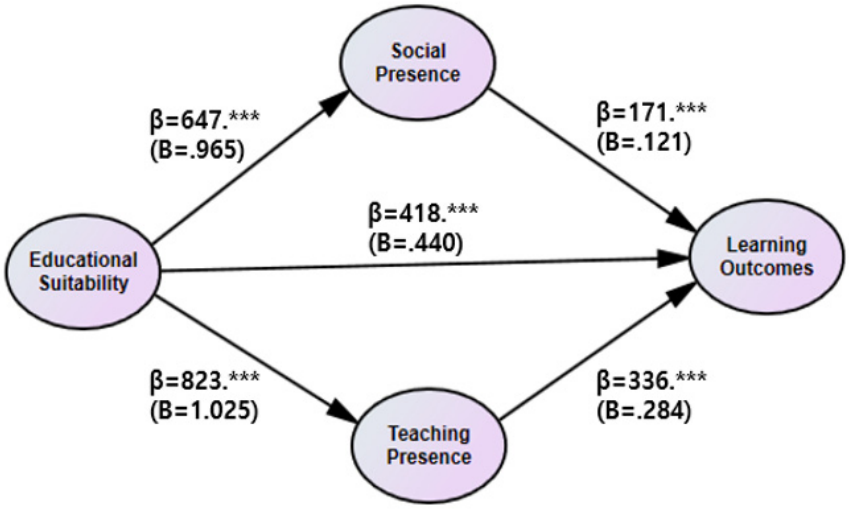

Figure 2. Result of Estimating Parameter Values of Structural Model

$^{***}p$<.001

Table 7. Direct and Indirect Effects Decomposition

(n=369)

Relational variable			B			β		
			Total effect	**Direct effect**	**Indirect effect**	**Total effect**	**Direct effect**	**Indirect effect**
learning outcome	←	educational	.848	.440	.408	.806***	.418***	.388***
teaching presence	←	suitability	1.025	1.025	-	.823***	.823***	-
social presence	←		.965	.965	-	.647***	.647***	-
learning outcome	←	teaching presence	.284	.284	-	.336***	.336***	-
	←	social presence	.121	.121	-	.171***	.171***	-

$^{***}p$<.001

5. Discussion

The purpose of this research was to identify the structural relationship among educational suitability and learning results of learners who participated in K-MOOC. To this end, K-MOOC learners' educational suitability, teaching presence, social presence, and learning outcomes was measured, and structural relationships and mediating effects between variables were confirmed. It was substantiated that the educational fit perceived by learners through K-MOOC learning has a direct and indirect effect on learning performance. In addition, it was validated that the sense of teaching presence and the sense of social presence successfully mediate the relationship among the two variables. To increase the business effect of K-MOOC, which is a form of state-led operation, it is necessary to improve and provide a variety of curriculum required by learners. In addition, it is necessary to improve the educational performance by increasing the sense of educational presence and social presence. These analysis results support the findings of Luik wr al., (2019), which confirm that the main learning motivation of those who register for MOOC is the suitability of using the learning content they need in various contents. In addition, the suitability of MOOC education had a high impact on learners' learning effects Panyajamorn et al., (2016), and it is in the same context as the results that learners who participate in MOOC attach high meaning to educational suitability Murray (2014). Taken together, this study means that it is necessary to remember that learning suitability is the most important factor for MOOC to enhance the learning effect of learners. If left unchecked, learners are likely to easily forget or give up on learning given the low compulsory nature of free education. However, the initial purpose of MOOC education is not the completion of learning for learners, and if learners achieve their respective learning outcomes by selectively providing the contents they need, it can be said to be the highest educational effect. Therefore, this study suggests that it is important for MOOC as free education to be reborn as meaningful education by providing suitable education that reflects the diversity and timeliness of social change.

6. Conclusion

This study examined the structural relationships amongst educational presence, teaching presence, social presence, and learning outcomes of K-MOOC. The relationship among educational presence and learning outcomes, the mediating result of teaching presence and social presence and the effect of educational suitability on learning outcomes were examined. Through the results of the study, it was found out how important the educational suitability, which can be said to be the degree to which the requirements of the learners and the curriculum and contents match in the K-MOOC learning environment, has an important effect on the educational performance. Also, it was confirmed that the sense of teaching presence and social presence are important aspects that enhance learning outcomes.

The analysis results and the conclusions of this study are the following: First, educational suitability has been found to have a significant effect on the learning performance of K-MOOC. In K-MOOC, where most of the adult learners are, it is necessary to provide a variety of educational courses that identify learners' learning needs to prevent learners from leaving and improve learning outcomes. Second, the sense of real teaching was found to significantly mediate the relationship among educational suitability and learning outcomes. In K-MOOC, the teaching activity support system should be strengthened and the communication channel between learners and teachers should be expanded to enhance learning effects. Third, since social presence considerably mediates the relationship amongst educational suitability and learning outcomes, it activates interaction in the learning process for adult learners who have difficulty immersing themselves in long-term learning, and by sharing and disseminating information and knowledge on areas of interest, K- The learning outcomes of MOOCs should be improved.

The limitation of this study and its recommendations are the following: First, this study has limitations in that it was conducted about 3 years after K-MOOC was conducted. Therefore, follow-up research needs to be conducted additionally after this project is further progressed. Efforts are needed to find ways to develop K-MOOC through these studies. Finding the meaning of sustainable development in education by fulfilling the responsibility for the educational value of the K-MOOC project carried out by the state through taxation will help learners from a long-term perspective. Second, this study has limitations in that it only targeted a small number of learners who participated in K-MOOC. Therefore, follow-up research needs to involve more diverse learners in the research. Through these results, it is necessary to reflect the learning desire of more learners and prepare a plan to implement K-MOOC 2.0 centered on the learners.

References

Arceňo, R. A. (2018). Motivations and expectations of graduate students of the college of advanced education

(CAEd). *PEOPLE: International Journal of Social Sciences, 4*(1), 239-256.

Browne, M. W., & Cudeck, R. (1992). Alternative ways of assessing model fit. *Sociological methods & research, 21*(2), 230-258. https://doi.org/10.1177/0049124192021002005

Chevallard, Y. (1992). A theoretical approach to curricula. *Journal fuer Mathematik-didaktik, 13*(2), 215-230.

Cho, B., Choi, Y., & Seo, H. (2018). The Meaning of Sustainable Development as Educational Value Orientation. *Asia-Pacific Journal of Educational Management Research, 3*(1), 1-6. https://doi.org/10.21742/AJEMR.2018.3.1.01

Choi, K. A. (2008). Relationships of different interpersonal interactions and learners' perceptions about learning strategy growth and distance learning effectiveness in e-learning. *Journal of Educational Technology, 24*(4), 167-191.

Chung, Y., & 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. https://doi.org/10.14400/JDC.2018.16.12.109

Cohen, J. (1988). *Statistical power analysis Jbr the behavioral Sciences*. Hillsdale (NJ): Lawrence Erlbaum Associates, 18-74.

Conner, T. (2016). Relationships: The key to student engagement. *International journal of Education and Learning, 5*(1), 13-22. http://dx.doi.org/10.14257/ijel.2016.5.1.02

Dascalu, M. I., Bodea, C. N., Lytras, M., De Pablos, P. O., & Burlacu, A. (2014). Improving e-learning communities through optimal composition of multidisciplinary learning groups. *Computers in Human Behavior, 30*, 362-371. https://doi.org/10.1016/j.chb.2013.01.022

Garrison, D. R., & Arbaugh, J. B. (2007). Researching the community of inquiry framework: Review, issues, and future directions. *The Internet and higher education, 10*(3), 157-172. https://doi.org/10.1016/j.iheduc.2007.04.001

Hackman, M. Z., & Walker, K. B. (1990). Instructional communication in the televised classroom: The effects of system design and teacher immediacy on student learning and satisfaction. *Communication Education, 39*(3), 196-206. https://doi.org/10.1080/03634529009378802

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis* (6th ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Hoyle, R. H. (1995). *Structural equation modeling: Concepts, issues, and applications*. Sage.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal, 6*(1), 1-55. https://doi.org/10.1080/10705519909540118

Joo, Y. J., Ha, Y. J., Yoo, J. W., & Kim, E. K. (2010). The structural relationship among teaching presence, cognitive presence, social presence, and learning outcome in cyber university. *Journal of the Korean Association of information Education, 14*(2), 175-187.

Kang, M. H., Kim, N. Y., Kim, M. J., Kim, J. Y., & Lim, H. J. (2011). A structural relationship among teaching presence, learning presence and learning outcomes of e-Learning in Cyber University. *The Journal of Educational Information and Media, 17*(2), 153-176.

Kassabian, D. W. (2014). *Massive open online courses (MOOCs) at elite, early adopter universities: Goals, progress, and value proposition*. Philadelphia, PA: University of Pennsylvania.

Kim, J. J., & Im, G. Y. (2010). A Study on Relation between Social Presence and Learning Outcome in Distance Education. *Journal of the Korea Lifelong Education Research, 16*(1), 1-4.

Kim, J. K. (2018). *An analysis of K-MOOC structural relationship among characteristics and educational effectiveness*. Docter's thesis, The Graduate School of Korea University, Republic of Korea.

Kim, J. S., & Kang, M. H. (2010). Structural Relationship among Teaching Presence, Learning Presence, and Effectiveness of e-Learning in the corporate setting. *Asian journal of education, 11*(2), 29-56.

Kim, S. W., & Lim, K. Y. (2016). Relationships among self-regulation, teaching presence, perceived interaction, and learning outcomes in a flipped learning environment: Mediating effects of perceived interaction. *The Korean*

Association of Eductional Methodoogy Studies, 28(4), 743-766.

Kline, R. B. (2005). *Principles and practice of structural equation modeling*. New York: The Guilford Press.

K-MOOC Homepage. Retrieved from http:// www.kmooc.kr

Knowles, M. S. (1980). *The modern practice of adult education: From pedagogy to andragogy*. Englewood Cliffs, NJ: Prentice Hall.

Lee, H. J., Lee, H. S., & Kwon, J. H. (2006). Mentoring need analysis and the model development for the adult learner in distance education. *J Lifelong Educ, 12*, 279-306.

Lee, S. Y., & Lee, I. S. (2018). *The Investigation of Implementation of Standards-based Assessment in Korean High Schools*. Global Vision Press, 19-26. https://doi.org/10.21742/AJEMR.2018.3.1.04

Lim, E. (2013). *Investigating the Structural Relationship among Perceived Innovation Attributes. Intention to Adopt, and Actual Use of Mobile Learning in an Online University*. Master's Dissertation, Ewha Womans University.

Loehlin, J. C. (2004). *Latent variable models: An introduction to factor, path, and structural equation analysis*. Psychology Press. https://doi.org/10.4324/9781410609823

Luik, P., Suviste, R., Lepp, M., Palts, T., Tõnisson, E., Säde, M., & Papli, K. (2019). What motivates enrolment in programming MOOCs? *British Journal of Educational Technology, 50*(1), 153-165. https://doi.org/10.1111/bjet.12600

Markus, K. A. (2012). Principles and practice of structural equation modeling by Rex B. Kline.

Ministry of Education in South Korea Homepage. Retrieved from http://www.moe.go.kr

Moon, S. B. (2009). *Understanding and application of structural equation modeling*. Seoul: Hakjisa.

Murray, J. A. (2014). Participants' perceptions of a MOOC. *Insights: The UKSG Journal, 27*(2), 154-159. https://doi.org/10.1629/2048-7754.154.

Oh, S. H., & Kim, S. H. (2006). A study on the extended technology acceptance model and primary factors affecting usage of internet banking: Focusing on the role of trust and compatibility. *Korean Marketing Association, 24*(1), 175-205.

Panyajamorn, T., Kohda, Y., Chongphaisal, P., & Supnithi, T. (2016). *The effectiveness and suitability of MOOCs hybrid learning: A case study of public schools in Thai rural area*. In 2016 11th International Conference on Knowledge, Information and Creativity Support Systems (KICSS) (pp. 1-6), IEEE.

Park, J. H., & Lee, Y. S. (2018). The Mediating Effect of Learning Flow on Relationship between Presence, Learning Satisfaction and Academic Achievement in E-learning. *Journal of the Korea Society of Computer and Information, 23*(11), 229-238. https://doi.org/10.9708/jksci.2018.23.11.229

Park, S. Y. (2010). *The Structural relationship among learning strategies, perceived usefulness ease of use and learning outcome in cyber university*. Unpublished master's thesis, Ewha Womans university.

Roh, S. Z. (2015). Structural relationships of adult e-learners' teaching presence, self-efficacy toward e-learning, and learning satisfaction: Focused on the mediating effect of learning presence and learning flow. International Information Institute (Tokyo). *Information, 18*(6 (B)), 2759.

Rovai, A. P., & Wighting, M. J. (2005). Feelings of alienation and community among higher education students in a virtual classroom. *The Internet and higher education, 8*(2), 97-110. https://doi.org/10.1016/j.iheduc.2005.03.001

Shea, P., Li, C. S., & Pickett, A. (2006). A study of teaching presence and student sense of learning community in fully online and web-enhanced college courses. *The Internet and higher education, 9*(3), 175-190. https://doi.org/10.1016/j.iheduc.2006.06.005

Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications*. Toronto; London; New York: Wiley.

Swan, K., Shea, P., Richardson, J., Ice, P., Garrison, D. R., Cleveland-Innes, M., & Arbaugh, J. B. (2008). Validating a measurement tool of presence in online communities of inquiry. *E-Mentor, 2*, 1-12.

Trow, M. (1973). *Problems in the transition from elite to mass higher education. Carnegie commission on higher education*. Berkeley, CA: Carnegie commission on higher education.

Watson, S. L., Watson, W. R., Richardson, J., & Loizzo, J. (2016). Instructor's use of social presence, teaching

presence, and attitudinal dissonance: A case study of an attitudinal change MOOC. *The International Review of Research in Open and Distributed Learning, 17*(3). https://doi.org/10.19173/irrodl.v17i3.2379

Yang, J., Schneller, C., & Roche, S. (2015). *The Role of Higher Education in Promoting Lifelong Learning*. UIL Publication Series on Lifelong Learning Policies and Strategies: No. 3. UNESCO Institute for Lifelong Learning. ISBN: 978-92-820-1194-2.

Yuan, L., & Powell, S. J. (2013). MOOCs and open education: Implications for higher education.

Zheng, S., Rosson, M. B., Shih, P. C., & Carroll, J. M. (2015). *Understanding student motivation, behaviors and perceptions in MOOCs*. In Proceedings of the 18th ACM conference on computer supported cooperative work & social computing (pp. 1882-1895). https://doi.org/10.1145/2675133.2675217