Key success factors in the continuous use of MOOC education in South Korea

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Abstract: Society is facing a paradigm shift where general education is moving towards lifelong education. Massive open online course (MOOC) is the leading online education with large-scale open classes. South Korea has localised 1,340 MOOCs known as K-MOOCs. However, K-MOOCs are not being managed effectively, and are generally low-level lectures compared to MOOCs. The variance-based structural equation modelling (SEM) using the partial least squares (PLS) model was applied for data analysis. Online surveys and analysis of 224 respondents studied 14 hypotheses and analysed eight factors to improve K-MOOC operation in South Korea. Findings indicated 'authentic learning' positively affects 'learning transfer'; 'gamification', 'teaching presence' and 'reputation' positively affect 'satisfaction' and 'commitment'. 'Learning transfer' and 'satisfaction' impacts 'continuous use intention'. Furthermore, 'commitment' positively affects 'satisfaction', and

'continuous use intention'. This research suggests that these factors must be taken into account when constructing teaching methods and educational content to improve K-MOOCs continuous usage.

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1   Introduction

In this era of technological change, the education industry has been drastically evolving with the introduction of new technologies, especially in the COVID-19 situation. With new restrictions in many places, students in South Korea are mainly using video conferencing software such as ZOOM, Webex, Google Classroom, and Microsoft Teams to transform their offline classes into an online format instead. This shift with 'contact' and non-face-to-face education has become the most significant change in the education paradigm today. According to the Ministry of Education, non-face-to-face higher education in South Korea started with the opening of the Korea National Open University

(KNOU) in 1972, and since 2001, 21 remote (cyber) universities have been established and widely implemented across the nation, but general universities were restricted to offer less than 20% by remote education. However, in response to COVID-19, the Ministry of Education urgently revised regulations related to remote education (Ministry of Education, 2020a). During a Korean university's classes throughout 2020, data showed that 33% used lecture videos taken by professors, 29.1% used content-only videos, and 26.1% used real-time video lessons, such as Zoom. Furthermore, when studying the types of media used, YouTube accounted for the highest amount with 48.0%, followed by Korean OpenCourseWare (K-OCW) with 10.5%, KNOU public lectures with 6.6%, Korean massive open online courses (K-MOOC) 4.9%, and others with 30.0%.

Compared to massive open online courses (MOOCs) which started at Canada's Athabasca University and the University of Manitoba in 2008 (Dang et al., 2018), the Korean learners' K-MOOCs started mainly in 2015 and now have 1,340 courses (National Institute for Lifelong Education, 2020). It is a remarkable increase due to their comparative advantage over traditional face-to-face education, especially when the courses are also taught in Korean. Having started in 2015 with 27 K-MOOC courses, the number of courses and users has been rising to 1.16 million students enrolled and thousands of subscribers (Ministry of Education, 2020b). It is estimated that the number of participants of both instructors and learners will continue to increase in the future. Nonetheless, the K-MOOC project faces a few challenges including lacking diversity in content, production, and functions of courses compared to other MOOC courses.

This study aims to fill the lack in the literature about ideal ways to design K-MOOCs and it identifies the needed specific factors that affect Korean users in choosing K-MOOCs. Therefore, this study aimed to explore the various factors that have affected and continue to affect K-MOOCs based on existing literature and research. The primary goals of this study were twofold: First, this study explores existing online lectures in Korea and research on K-MOOCs to identify effective and efficient practices that have shown to be successful in the operations of MOOCs abroad. Secondly, suggestions for implementing a more efficient operation plan for K-MOOCs are identified. SPSS 26.0 is used for factor analysis. Then, SmartPLS 3.0 was used to confirm the fit of the research model and to verify the research hypothesis.

2 Literature review

2.1 MOOC prior research

Prior research on MOOCs can be classified into overseas and local prior research. In terms of overseas prior research, Wu and Chen (2017) studied the effects of task technology fit (TTF), MOOC characteristics, and social motivation factors on the intention to continue to use MOOCs, based on the technology acceptance model (TAM). TTF was divided into individual skill fit and task skill fit, and the results presented that the significant factors of MOOC were its openness and reputation. Moreover, Hsu et al. (2018) analysed the differences in factors affecting the behaviour intentions of MOOCs and traditional e-learning based on an integrated model of Social Support Theory (SST)

and TAM. The analysis suggests that perceived gains and perceived convenience were the main factors influencing the behaviour intentions of MOOCs. Zulkafli and Mohamad (2018) also agreed that the pedagogical elements (such as instructional design and content assessments) and technological aspects (such as learning analytics, user interface, and video content presentation) affect the level of satisfaction of MOOC learners.

Regarding local prior research, Kim (2020) confirmed the structural relationship between the characteristics of MOOCs and the effectiveness of education and analysed perceived usefulness and usability (PUU). As a result, it is found that teaching presence had the greatest effect on perceived usefulness and convenience of learners, followed by interest and trust. Results also suggest that perceived usefulness and convenience had a positive effect on education and learning expectations, and the characteristics of MOOC effectiveness of education were each analysed. Kim and Seo (2020) analysed factors related to the learning outcomes of MOOC learners. Their findings shows the content and self-regulated learning ability have a significant effect on the commitment to learning and the learning outcomes. Furthermore, Seo et al. (2020) studied the intention to use MOOCs based on the unified theory of acceptance and use of technology (UTAUT) model. Their results suggest that performance expectation, social impact, and conditions of promotion have a positive effect on the intention to use MOOCs. In addition, it was found that course intention and quality have a positive effect on academic achievement through learning satisfaction. Moreover, Joo et al. (2018) applied self-determination technology (SDT) and TAM to study the intention of continuous use of MOOCs for domestic university students. They conclude that the ease of use and usefulness of MOOCs positively affect satisfaction and the intention to use continuously, but self-determination doesn't have a significant effect on satisfaction.

2.2   MOOC and K-MOOC

2.2.1   MOOC

MOOCs are free online courses that offer open, unlimited enrolment classes. It is an advanced form of an online class. One of the key differences between MOOC and standard online classes is the number of students that can access and participate in the course. Standard online classes typically allow 10–20 students to enrol, with a maximum of 100 students for larger lectures. These courses are also often restricted to students at the university offering the course. MOOC is available for the general public and does not have limitations on student enrolment. Bandalaria (2019) has proved that MOOCs have many potential to address educational challenges such as improving content quality and making educational resources available to both learners and teachers. Based on the previous studies, the authors compiled some key MOOC providers such as Udacity, Coursera, EdX, Udemy, Athabasca University, etc. Athabasca University and the University of Manitoba started MOOCs in 2008 (Dang et al., 2018). Udacity was copied in 2011 providing thousands of online students lessons in Artificial Intelligence. Coursera started its MOOC course in 2012, and in the same year, Harvard and MIT also found EdX. The chronology of learning is shown in Table 1.

Table 1 Chronology of learning

Year	Learning event
	Learning existed since before history was recorded
3500 BC	Writing Cuneiforms invented by Sumerians (Iraq), Hieroglyphs on stones appear by Nile – Egypt.
1400 BC	1,400 Bone script writing found in China-Shang Dynasty-led to more than 2,500 characters now.
597 BC	King's School opens in Canterbury, England
1088	University of Bologna, founded
1158	Emperor Frederick I in *Authentica Habita* gave the first privileges to students in Bologna
1160	University of Paris, founded, recognised. 1150
1167	University of Oxford recogn (teach. 1096)
1179	Pope Alex III forbid masters of church schools to take fees for granting the license to teach (*licentia docendi*), Obligated giving licenses to qualified teachers Cathedral schools and monasteries -Church mandated priests give free ed. Literacy is open to wider class.
1534	15 Aug Roman Catholic Church Jesuits society evangelise and educate (founding schools, colleges, universities and seminaries), intellectual research, and cultural pursuits. Ignatius of Loyola, Francis Xavier, and 5 others founded the society, in Montmartre outside Paris, in a crypt beneath the church of Saint Denis, now Saint Pierre de Montmartre. The society was headquartered in Rome and signed by Pope Paul III in 1540 and by Pope Julius III in 1550. Jesuit members had 30,000 in the 1960s to 18,000 now.
1728	Caleo Phillips teaches 'shorthand' by mail
1810	Wilhelm von Humboldt starts university in Berlin and becomes model for many research universities
1892	Univ of Chicago starts distance learning and exchange assignments and lessons by mail
1921	Colleges begin delivering ed through radio. Fed. Communications Commission grants first ed radio licenses to University of Salt Lake City, University of Wisconsin, and University of Minnesota. FCC grants these licenses to some 200 colleges
1963	ITFS, low-cost, subscriber-based, allows ed institutions to broadcast courses over TV. California State Univ. system 1st to apply for an ITFS license.
1964	University of Wisconsin creates the Articulated Instructional Media Project ~first to systemise distance learning ~provides guidance on how to create and incorporate materials distance
1976	*www.phoenix.edu/ Univ of Phoenix* - campus and online degree programs, certificate courses, and individual online classes-20 years of online ed. Now invests over $200 million yearly (while Harvard is said to invest nothing) in upgrading existing courses
1980	Learn/Alaska ~ 1st state ed TV. Students in 100 villages can watch 6 hours of classes daily
1985	National Tech Univ offers online degree courses by satellite. Course materials come from other universities for broadcast
1991	Tim Berners-Lee creates World Wide Web 'internet'-catalyses online ed
1993	International University founded by Glenn Jones becomes 1st fully online university accredited by the Higher Learning Commission.

Table 1   Chronology of learning (continued)

Year	Learning event
1993	Univ of Nebraska-Lincoln begins online doctorate program in Ed leadership and Higher Ed
2001	Moodle-virtual learning environment started
2002	MIT launches OpenCourseWare~free, web-based courses with lecture notes, exams, and videos.
2003	China's Open Resources for Ed, National Quality Course Plan, and Top Level Quality Project started
2005	Google Analytics starts in Nov.-free analysis of online info with advanced service for a fee.
2005	WebCT and Blackboard merge - ed services online.
2005	40% African students do not attend primary school
2005	3.2 million US students take course online in Fall
2006	India starts free National Prog for Tech Enhanced Learning-open to the world: http://nptel.iitk.ac.in/
2006	Salman Khan free ed www.khanacademy.org ~many subjects and over 4,300 video lectures.
2006	11,200 US college programs only by distance ed
2007	http://alison.com Started in Ireland
2007	https://education.10gen.com/ Started free online certifiable ed related to Oracle, DoubleClick, Apple, Twitter
2008 1st MOOC	*Connectivism and Connective Knowledge* (*CCK08*) by George Siemens and S. Downes teaches 25 Univ of Manitoba students and 2,200 online students for free. '*MOOC'* started
2008	http://academicearth.org/ started with 49 universities with 710 online courses (8,889 lectures)
2009	Eduventures reports for-profits' share of the online ed market rose to 42% in 2009 from 39% in 2008. Chronicle of Higher Ed- for-profits' share of all higher ed markets is 9%.
2009	YouTube EDU offers thousands of courses free
2010	Babson College reported 6.1 million students took 1+ online courses.
2011	Stanford's S. Thrun offers Artificial Intelligence, 160,000 online students then founded "Udacity."
2011	iversity Started in Germany
2011	Distance learning is preferred method in UK (vs high tuition fees of brick and mortar universities)
2012	UK's Open University for online learning started
2012	https://openhpi.de/ Started in Germany, for online ed of Info and Communications Tech (ICT)).
2012	http://schoo.jp Started in Japan
2012	Coursera online ed starts in April. In Sept 2013 it earned $1 million by course certificates
2012	EdX online ed starts May by Harvard and MIT
2015	K-MOOCs started in Korea with Korean universities

2.2.2 K-MOOC

Dang et al. (2017) summarised the chronology and evolution of Learning from 3500 BC to the first MOOC in 2008 and Open Education that developed throughout the 2000s with open educational resources (OER) as they developed into MOOCs over time. In South Korea, the K-MOOC was officially launched in 2015, with an interest in increasing higher education and continuous education. 'K-MOOC' is a portal that develops and operates courses through close collaboration with the Ministry of Education, universities, research institutions, and the National Institute for Lifelong Education Promotion (National Institute for Lifelong Education, 2020). What separates K-MOOC from the rest is that it provides differentiated learning methods for each user type. In 2015, ten universities including Yonsei, Kyunghee, Korea, Seoul National, Sungkyunkwan, and Ewha Women's University, and KAIST participated in the development of a total of 27 K-MOOC courses, led by the Ministry of Education and National Institute for Lifelong Education. Since then, there has been an increase in course development. In 2017, 320 lectures were provided, 740 courses in 2019, and the 'K-MOOCs' organisation says more than 1,340 courses as of October 2021. In December 2019, the number of K-MOOC member subscribers was 504,000 and the total for course enrolment was 1.16 million (Ministry of Education, 2020b). At the end of August 2021, we had 1.6 million applicants and 17 million visitors to K-MOOCs (K-MOOC, 2021).

A few challenges that the K-MOOC project has encountered include, lacking diversity in content, production based on open-source material, limited implementation of various functions, and open allowance of learners to systematically listen to developed lectures. These issues lead K-MOOCs to be described as less developed compared to MOOCs, and ultimately to low completion rates and a lower sense of satisfaction compared to MOOCs. To improve the use of courses many modifications are needed, such as indexing of content through modular analysis, overall teaching design and course development as described in this study, and an increase in the subjects of interest. After a course is concluded, a certificate of completion can be issued based on the student's progress and evaluation results.

2.3 Authentic learning

According to Collins (1988), learning knowledge and skills in practical contexts result in higher levels of effectiveness. This type of authentic learning or situated learning (Collins, 1988), can appear through role-playing exercises, shared problem-solving activities, and applying knowledge. This perspective highlights that learners can actively participate in learning and feels a sense of ownership over knowledge (Kang, 2003; Lombardi, 2007). The authentic learning of the activity means that the learner judges the situation that is given similar to real life. The authentic learning of the resource means that the provided material can assist in solving problems by using a variety of data.

Park and Kim (2006) suggest that learning motivation-related factors, learning task-related factors, and interactivity-related factors have a positive effect on intrinsic motivation variables and real variables. Also, variables of interaction between learners have a positive effect on learning commitment and academic achievement. Furthermore, Seo and Park (2015) conducted a study on the effects of teaching and learning materials including the reality of children's English learning attitudes. Data included authentic learning and support materials and practical tasks showing a positive impact on children's

English learning attitudes compared to general teaching and learning materials. However, this study only explored the elementary students' learning experience with English. Nowadays the students at universities/ colleges are more interested in studying major subjects taught in English because this type of education method not only supports the students learning English but also broadens their global knowledge. Therefore, to develop the referenced literature, this study defined authentic learning as a form of learning that improves the ability to adapt and apply knowledge to real-life situations and problem-solving.

2.4   Gamification

The gamification theory refers to a method that integrates game elements to motivate learners to actively participate by applying gaming elements to non-game contexts. Deterding et al. (2011) mentioned that gamification is a technique that induces the participation of several people by applying the elements constituting a game to various areas for cooperation, fun, and commitment among participants. According to Barata et al. (2013), applying gamification content to a learning environment can result in improved learning outcomes and participation. Park and Kim (2017) described educational gamification as a technique that applies pedagogical theory and environment to stimulate learners' learning motivation and increase class participation. Therefore, in this study, we intend to define gamification to the extent that it stimulates learners and provides various game elements so that learners can engage in learning activities and obtain positive learning effects. Hong and Park (2019) demonstrated that the class that applied the gamification strategies had a partial effect on enhancing the learning effect of the learner. Similarly, Park et al. (2018) found that gamification-applied content in the field of science education has a positive effect on the learner's motivation to learn science. These results highlight that when gamification content is applied to an educational environment, the learning motivation of the learner is stimulated.
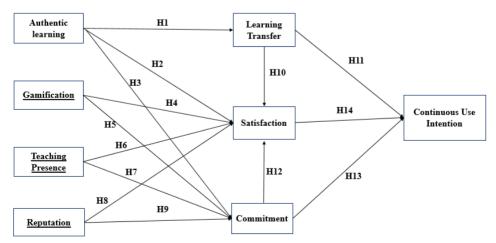
2.5   Teaching presence

One of the important factors in non-face-to-face education is creating a sense of teaching reality. Thornam's (2003) research defines teaching reality as the instructor checking and responding to the learners' learning process to induce their participation. Kim (2020) defines teaching presence as a learner's perception of the pedagogical phenomenon occurring in the learning process in a study on the characteristics and educational effects of K-MOOC and K-MOOC lectures at actual universities. Moreover, Shaw and Chen (2012) concluded that teaching presence can be measured by the level of success in linking communication of learning infrastructure, learning access, and learning dialogues. Noddings (2002) argued that learning commitment is difficult if the learner does not feel that the instructor exists in the same space when conducting online education where the learner can feel the management or reality of the instructor. Therefore, in this study, the teaching presence is defined as the extent of the learners' perception of whether or not the instructor has smoothly executed teaching presence in their curriculum.

2.6 Reputation

Alraimi et al. (2015) suggest that the reputation of higher education institutions reflects the quality, influence, and credibility of the institution, and that reputation is a key intangible asset that has a significant impact on the decision-making process of individuals choosing universities. More precisely, MOOC platforms related to reputable higher education institutions receive higher levels of trust from learners and that the perceived reputation of MOOC has a positive effect on satisfaction, enjoyment, and intention to continuously use. AlDahdouh and Osorio (2016) argue that, since MOOC lectures are provided worldwide, language problems, Internet systems, and computer abilities should be considered before service provision. Therefore, in this study, reputation is defined as the degree to which the evaluation of universities or for-profit companies operating MOOCs is recognised and is intended to be used for research.

2.7 Learning transfer

Merriam and Leahy (2005) argue that learning transfer is a continuous process by which the learners apply specific skill sets or knowledge to various settings and situations. Similarly, Jung et al. (2017) suggest that it is unnecessary for human resource development (HRD) training to be carried out simply for corporate education. Kim and Park (2019) conclude that learning transfer has a positive effect on organisational commitment. In this respect, Jin and Jung (2015) refer to Learning transfer as the level of applying what participants get through education to their job situation. Joo et al. (2018) argue that education and training are being conducted to reinforce learners' current or future job performance and that learning transfer is considered a key factor in supporting and evaluating the job performance of individuals and organisations. Therefore, in this study, learning transfer is defined as the extent to which applying knowledge or educational content acquired through MOOC lectures can be applied to real-world responsibilities and jobs to improve work efficiency.

Figure 1 Research model

3   Methodology

3.1   Research model and hypotheses

This study analyses how the factors of learning practicality, gamification, teaching presence, and reputation affect learning transfer, satisfaction, and commitment when learners use non-face-to-face teaching methods like K-MOOC. The following research model was established to determine how these factors affect learners' continuous use intention of K-MOOC.

3.1.1   Hypothesis on authentic learning, learning transfer, satisfaction, and commitment

The previous research shows that task authentic learning has a significant impact on team creativity, learning satisfaction, and perceived learning. You (2020) concludes that task authentic learning, task value, team efficacy, team negligence, and professors' feedback are the key factors in assessing team project-based learning outcomes. Similarly, Park and Kim (2006) reveal that the authentic learning factor of learning online has a significant effect on learning commitment. In general, prior studies show that learning task variables, which measure the authentic learning of learning tasks, have a significant impact on commitment. In this respect, Chen et al. (2000) suggest that variables that can induce commitment in learning in an online environment include immediate feedback, clear goals, based on and the assertion of the reality of the learning task. When enrolling in online courses, learners have shown an expectation that courses and learning activities provided through K-MOOC will provide authentic, real-life applicable knowledge. If the K-MOOC courses are offered that meet these expectations, learners will have increased levels of satisfaction and will therefore be able to better engage in the learning experience. Therefore, based on the existing literature, the following research hypotheses were determined with the assumption that learners would be more immersed and satisfied with course content if it was presented in a way that resembles an authentic, real-world situation.

Hypothesis 1   Authentic learning will have a positive effect on learning transfer.

Hypothesis 2   Authentic learning will have a positive effect on satisfaction.

Hypothesis 3   Authentic learning will have a positive effect on commitment.

3.1.2   Hypothesis on gamification, satisfaction, commitment

Some researchers highlight the impacts of gamification elements on learning and educational experience. Urh et al. (2015) and Bernik et al. (2018) express the importance of clearly defined objectives, rules, and gamification techniques. When it is applied strategically, the integration of gamification in learning can have a positive effect on the motivation, participation, and satisfaction of students. Especially since 2011, gamification elements are applied in an e-learning environment that has had a remarkable increase in research and has been confirmed to have positive effects on learners' satisfaction and commitment. Han (2018) said that elements of game composition raise learners' interest through various stimuli to bring active participation. Moreover, in a study by Min and Kim (2015), elements of gamification such as levels, items, rewards,

leveling up, community, information exchange, and cooperative play have a positive influence on learners' commitment.

With the challenges of motivating students to participate in online and offline courses, it can be suggested that it would be beneficial to apply gamification strategies to educational content for in-person and non-face-to-face education. Similarly, K-MOOC has also experienced challenges in engaging the learners through simple online learning activities. K-MOOC classes should clearly define learning goals and objectives, encourage a competitive spirit with rewards, and introduce gamification strategies. Hence, the following research hypotheses were developed with the assumption that applying gamification elements to K-MOOC lectures or courses would affect learners' satisfaction, commitment, and levels of concentration.

Hypothesis 4   Gamification will have a positive effect on satisfaction.

Hypothesis 5   Gamification will have a positive effect on commitment.

3.1.3   Hypothesis about teaching presence, satisfaction, and commitment

Instructors' presence has been shown as an integral factor in learning and participation. The previous studies demonstrate that learners who are interested in learning for self-development perform in-depth learning, and learners who feel that they can receive help from instructors at any time feel satisfaction through learning. Cho and Do (2020) suggest that a sense of teaching presence and participation in learning is positively correlated with learning satisfaction. Since K-MOOC courses are conducted in an online environment, instructors can monitor learners' status, which has shown to also be important as learners' value immediate feedback to feel that they are progressing under the supervision of the instructor. Moreover, Shea et al. (2005) argues a sense of teaching reality improves the learning efficiency of the learners through a commitment to learning and collaboration with other students who take the same course. Similarly, Lee (2020) demonstrates that the role of the instructor in an online class is critical. Systematic management and content delivery are integral factors for learners' learning commitment. There is limited interaction in lecture-style content delivery of standard online courses, however, K-MOOC courses are more interactive by nature as learners and instructors engage in exchanged communication and immediate feedback. Therefore, based on prior research, the following research hypotheses state that learners will be satisfied and committed to a course, whether it is online or in-person if there is a sense of instructor presence.

Hypothesis 6   The teaching presence will have a positive effect on satisfaction.

Hypothesis 7   The teaching presence will have a positive effect on commitment.

3.1.4   Hypothesis of reputation, satisfaction, and commitment

The reputation of the organisation providing an online course acts as an important determinant of the student's enrolment. Alraimi et al. (2015) conclude that the perceived reputation in the MOOC environment positively influences satisfaction, perceived interest, and continued use of the learners. In general, when selecting a course, the students tend to take into consideration two main factors: the instructor's reputation or the university or institution's reputation in the field. Likewise, in K-MOOC, learners

choose courses based on their perception of the reputation of the instructor or university that is offering the course. Hence, reputation can be a factor that positively affects the commitment of learners to a course. Therefore, the following research hypothesis assumes that the reputation of content providers in the K-MOOC environment will affect course enrolment which will have a positive effect on satisfaction and commitment in the course.

Hypothesis 8   Reputation will have a positive effect on satisfaction.

Hypothesis 9   Reputation will have a positive effect on commitment.

3.1.5 *Hypothesis on learning transfer, satisfaction, and intention to continuous use*

The fact that the knowledge acquired through education can be applied and utilised in real life has an important influence on participation in education. Kim et al. (2010) argue that the level of learning transfer has a positive effect on job satisfaction. Similarly, Ramadiani et al. (2019) state that satisfaction and usefulness are the two main factors that directly affect the continuous use intention of MOOC. Jung et al. (2017) suggests that when learning transfer is successful, it leads to increased confidence in the job, positive attitudes toward the organisation, feelings of achievement from completing the job successfully, high satisfaction with the job result, and positive evaluations for the organisation. Learners who use K-MOOC often participate in the course with two major goals in mind. The first is knowledge acquisition, where learners enrol in courses as a way to gain knowledge in the field of interest. The second goal is to gain experience or skill sets that can be applied at the workplace or for a job. K-MOOC opens up opportunities for professionals to develop skills that can be applied to their jobs while also allowing them to educate themselves on various topics and fields.

With this, it is hypothesised that if learners who have received K-MOOC training are aware of the improvements it will have on their real-life job skills, there will be an increase in the learner's satisfaction and continuous utilisation of K-MOOC.

Hypothesis 10   Learning transfer will have a positive effect on satisfaction.

Hypothesis 11   Learning transfer will have a positive effect on the intention of continuous use.

3.1.6 *Hypothesis of commitment, satisfaction, and intention to continuous use*

Moon and Kim (2011) conducted a study on the factors that influence e-learning satisfaction for office workers and students. The study used video Q&A, offline lectures, content quality, and content structures as the independent variables while interactions between professors and students, and commitment were designated as the parameters to analyse the impact on lecture satisfaction. The findings prove that commitment has a positive effect on lecture satisfaction. Jin et al. (2018) argue that the effects of perceived autonomy, perceived ability, and perceived relationship were set as basic psychological needs affecting self-determination and learning commitment. Thus, learning commitment has a positive effect on the intentions for continued use. Similarly, Park and Yu (2014) find that learning presence using Facebook has an indirect effect on the intention to continue learning through learning commitment. Furthermore, Jeon and Cho (2019)

conducted a study on the factors that influence the satisfaction with the use of K-MOOC and the intention of continued use. The considered factors included perceived usefulness, perceived ease of use, task skill suitability, learning motivation, and self-directedness. The results highlight that perceived ease of use, usefulness, and suitability for task technology have a positive effect on K-MOOC satisfaction, while perceived ease of use and suitability for task technology has a positive effect on the intention for continued use. Additionally, Lee and Chung (2020) note self-regulated learning has a positive effect on learning participation and satisfaction in Chinese MOOCs. K-MOOC learners feel satisfied with the course operation and learning results when they immerse themselves in the course through the influence of various factors. Therefore, the following research hypotheses were established predicting that satisfaction with K-MOOC courses will affect intentions for continued usage of K-MOOC.

Hypothesis 12 Commitment will have a positive effect on satisfaction.

Hypothesis 13 Commitment will have a positive effect on the intention of continuous use.

Hypothesis 14 Satisfaction will have a positive effect on the intention of continuous use.

3.2 Research method

Survey design: The research model of this study consists of eight factors: Authenticity, gamification, teaching presence, reputation, learning transfer, satisfaction, commitment, and continuous use intention. To analyse factors that influence the continued use of K-MOOC, various measurement items were selected for the questionnaire items based on previous studies. The questionnaire consisted of a total of 51 items; the statements were responded to using a five-point Likert scale, where 1 was 'not at all' and 5 was 'very much'. The study had a pilot test conducted and was divided into nine parts. The first part includes statements related to authenticity factor; its measurements were adopted from Chen et al. (2000), Park and Kim (2006), and You (2020). The second part is measurements of gamification adopted from Jeong and Cho (2012), Min and Kim (2015), Urh et al. (2015), Bernik et al. (2018), and Han (2018). The measurements of teaching presence were done mainly using the prior papers of Shea et al. (2005), Kim et al. (2010), Joo et al. (2018), Cho and Do (2020), and Lee (2020). The reputation factor was measured by Alraimi et al. (2015), and Kang and Han (2017). Measurements of learning transfer were adapted from studies of Kim et al. (2010), Jung et al. (2017), and Kim and Lee (2019). Commitment factor was measured by adapting from Moon and Kim (2011), Park and Yu (2014), Jeong (2017), Jin et al. (2018), and Lee and Chung (2020). Satisfaction measurements were used from Jeong and Cho (2012), Joo et al. (2018), and You (2020). The measurements of Intention of Continuous Use were done through Park and Yu (2014), Jin et al. (2018), and Jeon and Cho (2019). This survey was uniquely designed, analysing a combined collection of factors that were individually studied for cluster-type random sampling of a given population of 1,340 K-MOOC courses' participant of the K-MOOC portal and related online universities' participants' emails. The last part consists of demographic questions.

Sampling approach: a structured questionnaire was designed in English and Korean languages using Google forms to explore the connection of research factors in the practices. Before collecting the preliminary data, the survey was checked and

recommended by experts to make sure all questions were well organised based on the structure of the framework. Then, the pilot test was conducted twice in total. After pilot tests were accepted, the surveys were conducted officially. The surveys were posted at the K-MOOC portal taking time-based clusters of students, and with online universities' random selection of K-MOOC participants, being aware of non-random, convenience sampling issues. The target participants in this study consisted of all types of learners who are currently taking K-MOOC courses and who have acquired credits through K-MOOC courses and/or have a history of completing K-MOOC courses in South Korea. More precisely, 247 surveys were distributed online, and the analysis was conducted based on a total of 224 responses. The excluded surveys were deemed invalid or unreliable and are not included in the performed analysis.

Data analysis method: after getting 224 valid responses, by using SmartPLS 3.0, this study conducted descriptive statistics analysis first to know about the characteristics of the samples. The second step was factor analysis. The purpose of conducting factor analysis was to check reliability and validity. To measure the variance and consistency, an analysis using Cronbach's alpha, average variance extracted (AVE), and composite reliability was performed. To analyse the conceptual validity of the research variables, convergence validity and discriminant validity were used. Then the third step after checking measurements and conceptual validity was hypothesis testing to explore the various factors that have affected and continue to affect K-MOOC. The variance-based structural equation modelling (SEM) using the partial least squares (PLS) path modeling method was applied to confirm the hypotheses. The PLS-SEM method was used following many researchers and in particular that of Liang et al. (2007). It is particularly suitable for smaller sample sizes and non-normal distribution of data. It enables estimating the full models with many constructs, indicator variables, mediation, and moderation effects. More importantly, PLS-SEM emphasises prediction in estimating statistical models, whose structures are designed to provide causal explanations (Hair et al., 2019).

4   Results and findings

4.1   Sample characteristics

Results from the demographic analysis of the 224 samples used in this study are summarised in Table 2. The demographic breakdown indicates that respondents consisted of 80 males (35.7%) and 144 females (64.3%). Furthermore, 11 participants (4.9%) are under 20 years old, 4 (1.8%) aged 31–40, and 1 (0.4%) over 51 years old. Participants include 206 students (92.0%), 11 office workers (4.9%), 1 freelancer (0.4%), and 6 others (2.7%). The students' majors consisted of 54 (24.1%) in social studies, 53 (23.7%) in science and engineering, 46 (20.5%) in Natural Sciences, and 31 (13.8%) in humanities.

A notable number of participants indicate that the use of K-MOOC courses was voluntary/self-motivated, as 220 responded 'Yes' (98.2%) and 4 responded 'no' (1.8%) to a related question. This suggests that K-MOOC courses are taken to satisfy the desire for learning, without any influence from external factors. Additionally, the number of courses taken also ranged across the surveyed participants: 181 students (80.9%) are enrolled in 1–2 course subjects, while 41 students (18.3%) are enrolled in 3–5 subject

courses. Of the 224 participants, 216 students (96.4%) responded to 'yes' they have completed the K-MOOC experience while 8 students (3.6%) responded with 'no'.

Table 2 Sample demographic variables/characteristics

Demographic variable/characteristic		Count (persons)	Percentage (%)
Gender	Male	80	35.7
	Female	144	64.3
Age (in years)	Below 20	11	4.9
	21–30	208	92.9
	31–40	4	1.8
	41–50	0	0
	Above 50	1	0.4
Occupation	Housewife	0	0
	Student	206	92.0
	Office workers	11	4.9
	Freelancers	1	0.4
	Self-employed	0	0
	Other	6	2.7
Major(s)/field of study	Humanities	31	13.8
	Social studies	54	24.1
	Natural sciences	46	20.5
	Science and engineering	53	23.7
	Arts and physical education	11	4.9
	Other	29	13.0
Voluntary/ self-motivation	Yes	220	98.2
	No	4	1.8
Number of courses	1–2	181	80.9
	3–5	41	18.3
	6–10	1	0.4
	Over 11	1	0.4
Course completion	Yes	216	96.4
	No	8	3.6

4.2 Feasibility analysis

Before analysing the measurements, the variance inflation factor (VIF) and multivariate skewness used are analysed to evaluate collinearity of the measurements. According to Hair et al. (2019), VIF values of 5 or above indicate critical collinearity issues among the indicators of formatively measured constructs. In this study, based on the result of Table 3, the measured values are below 5, therefore it can be concluded that no multicollinearity has been found.

Table 3   Collinearity statistics (VIF) and descriptive statistics

	Average	Std. deviation	Kurtosis	Skewness	VIF
Gamification 1	4.299	0.804	0.255	−0.959	2.983
Gamification 10	3.942	0.983	−0.098	−0.651	3.420
Gamification 2	4.134	0.935	0.518	−0.963	2.657
Gamification 3	4.232	0.891	0.797	−1.084	3.052
Gamification 8	3.612	1.152	−0.479	−0.487	2.011
Gamification 9	3.987	0.923	−0.068	−0.590	2.923
Teaching presence 10	4.321	0.770	−0.288	−0.802	3.812
Teaching presence 11	4.313	0.797	−0.050	−0.890	2.796
Teaching presence 12	4.313	0.762	−0.786	−0.658	4.086
Teaching presence 2	4.491	0.713	0.967	−1.268	2.663
Teaching presence 3	4.424	0.734	−0.305	−0.928	3.068
Teaching presence 4	4.304	0.849	1.128	−1.156	2.965
Teaching presence 5	4.339	0.797	−0.408	−0.848	3.333
Teaching presence 7	4.232	0.855	−0.435	−0.768	2.020
Teaching presence 9	4.339	0.762	−0.175	−0.845	2.840
Satisfaction 2	4.085	0.962	0.391	−0.898	3.250
Satisfaction 3	4.210	0.853	0.310	−0.895	3.298
Satisfaction 4	4.192	0.847	0.320	−0.866	3.044
Reputation 1	3.955	0.944	−0.215	−0.552	2.084
Reputation 2	4.027	0.860	−0.405	−0.475	2.581
Reputation 3	4.179	0.815	−0.580	−0.589	2.440
Commitment 2	3.911	0.982	−0.514	−0.530	3.027
Commitment 3	3.920	1.006	−0.233	−0.633	3.159
Commitment 4	4.045	0.981	0.489	−0.918	2.253
Continuous use intention 1	4.049	0.978	0.417	−0.934	2.321
Continuous use intention 2	4.018	1.009	0.193	−0.850	2.321
Authentic learning 1	4.170	0.772	−0.032	−0.655	2.333
Authentic learning 2	3.857	1.042	0.204	−0.853	2.743
Authentic learning 3	3.906	0.943	0.102	−0.616	2.777
Authentic learning 4	4.357	0.705	−0.791	−0.635	2.238
Authentic learning 5	4.223	0.770	−0.538	−0.585	2.516
Authentic learning 6	3.808	1.079	−0.336	−0.599	2.082
Authentic learning 7	3.991	0.973	−0.151	−0.685	2.349
Authentic learning 8	4.027	1.039	0.404	−0.991	1.958
Learning transfer 2	3.862	1.002	−0.641	−0.470	1.807
Learning transfer 3	3.402	1.184	−0.764	−0.187	1.807

Before testing the hypothesis, a reliability and validity test was first conducted. To measure the variance and consistency, an analysis using Cronbach's alpha, AVE, and composite reliability was performed. Theoretically, if the Cronbach's alpha coefficient for reliability is 0.6 or more, it is considered reliable. The AVE value represents the amount of variance explained by the constituent concept, and if the value is greater than 0.5, it is deemed that the constituent concept is reliable (Fornell and Larcker, 1981). Additionally, composite reliability is a method of evaluating the reliability of each factor calculated by taking other factors into account. There is internal consistency if it is greater than or equal to 0.8. If the Dijkstra-Henseler's rho_A value is 0.7 or higher, it is concluded that there is internal consistency reliability.

Table 4 Verification of internal consistency of research variables through CSRI

	AVE	Composite reliability	R square	Cronbach's alpha	rho_A
Gamification	0.694	0.931		0.911	0.914
Teaching presence	0.693	0.953		0.944	0.947
Satisfaction	0.855	0.946	0.760	0.915	0.916
Commitment	0.825	0.934	0.662	0.894	0.898
Continuous use intention	0.877	0.935	0.754	0.860	0.864
Reputation	0.795	0.921		0.872	0.886
Authentic learning	0.584	0.918		0.898	0.904
Learning transfer	0.834	0.909	0.503	0.801	0.804

According to the results of the internal consistency verification in Table 4, the AVE values of the variables are 0.5 or more, Cronbach's alpha measurements are all 0.8 or more, and the composite reliability measurements are all 0.9 or more. In addition, all of the measured values of rho_A are 0.8 or higher, so it can be concluded that all of the measurement items used in this study are reliable.

To analyse the conceptual validity of the research variables, convergence validity and discriminant validity are analysed. First, the factor loading value and the cross factor loading value with other variables are calculated and organised for each measurement item. The result of convergence validity analysis shows that the factor loading values for the corresponding variable of each measurement item are all 0.7 or more, indicating that there is convergence validity (refer to Table 5).

The AVE value is used to analyse the discriminant validity. If the square root of the AVE is 0.7 or higher and is greater than the correlation coefficient of other variables, it can be determined as valid. According to the analysis results in Table 6, since all the AVE squared values of the measured variables are greater than 0.7 and the values of the correlation coefficients of other variables are also high, it can be argued that all the variables used in this study have discriminant validity.

Table 5   Factor loading value and cross factor loading value for each variable

	Gamification	Teaching presence	Satisfaction	Reputation	Commitment	Intention of continuous use	Authentic learning	Learning transfer
Gamification 1	0.851	0.720	0.725	0.575	0.693	0.697	0.664	0.621
Gamification 10	0.855	0.595	0.707	0.585	0.685	0.720	0.689	0.607
Gamification 2	0.839	0.585	0.671	0.527	0.698	0.698	0.640	0.626
Gamification 3	0.853	0.612	0.660	0.526	0.699	0.738	0.659	0.604
Gamification 8	0.759	0.432	0.611	0.530	0.589	0.624	0.621	0.644
Gamification 9	0.835	0.629	0.679	0.564	0.599	0.627	0.689	0.599
Teaching Presence 10	0.617	0.869	0.626	0.546	0.557	0.540	0.599	0.513
Teaching Presence 11	0.650	0.822	0.635	0.615	0.642	0.551	0.639	0.609
Teaching Presence 12	0.643	0.871	0.684	0.592	0.591	0.587	0.597	0.562
Teaching Presence 2	0.476	0.794	0.507	0.491	0.448	0.433	0.501	0.423
Teaching Presence 3	0.543	0.843	0.564	0.575	0.496	0.485	0.575	0.486
Teaching Presence 4	0.568	0.829	0.592	0.547	0.536	0.570	0.615	0.521
Teaching Presence 5	0.595	0.858	0.643	0.561	0.565	0.564	0.591	0.536
Teaching Presence 7	0.666	0.770	0.668	0.557	0.586	0.611	0.631	0.557
Teaching Presence 9	0.585	0.831	0.614	0.571	0.550	0.551	0.624	0.522
Satisfaction 2	0.736	0.656	0.924	0.568	0.752	0.753	0.635	0.616
Satisfaction 3	0.730	0.705	0.926	0.638	0.722	0.760	0.664	0.605
Satisfaction 4	0.784	0.700	0.923	0.678	0.739	0.809	0.642	0.653

Table 5 Factor loading value and cross factor loading value for each variable

	Gamification	Teaching presence	Satisfaction	Reputation	Commitment	Intention of continuous use	Authentic learning	Learning transfer
Reputation 1	0.529	0.487	0.556	0.866	0.524	0.540	0.510	0.578
Reputation 2	0.669	0.652	0.680	0.918	0.648	0.652	0.631	0.680
Reputation 3	0.557	0.665	0.573	0.890	0.517	0.541	0.596	0.569
Commitment 2	0.730	0.617	0.692	0.593	0.917	0.716	0.634	0.646
Commitment 3	0.752	0.632	0.792	0.578	0.928	0.766	0.621	0.688
Commitment 4	0.681	0.571	0.684	0.564	0.879	0.676	0.567	0.615
Continuous Use Intention 1	0.789	0.635	0.825	0.604	0.772	0.942	0.618	0.633
Continuous Use Intention 2	0.752	0.596	0.742	0.618	0.712	0.931	0.598	0.663
Authentic Learning 1	0.760	0.624	0.669	0.520	0.641	0.628	0.822	0.578
Authentic Learning 2	0.608	0.397	0.485	0.504	0.522	0.485	0.763	0.583
Authentic Learning 3	0.639	0.513	0.511	0.546	0.531	0.493	0.770	0.593
Authentic Learning 4	0.478	0.601	0.439	0.439	0.422	0.424	0.704	0.437
Authentic Learning 5	0.513	0.563	0.443	0.430	0.422	0.387	0.744	0.476
Authentic Learning 6	0.626	0.533	0.578	0.534	0.573	0.553	0.768	0.614
Authentic Learning 7	0.633	0.604	0.579	0.552	0.491	0.499	0.797	0.562
Authentic Learning 8	0.526	0.589	0.528	0.437	0.436	0.450	0.740	0.454
Learning Transfer	0.711	0.655	0.652	0.652	0.700	0.666	0.649	0.920
Learning Transfer	0.637	0.501	0.581	0.602	0.606	0.594	0.646	0.906

Table 6   Verification of discriminant validity through AVE square root value of research variables

	Gamification	Teaching presence	Satisfaction	Commitment	Intention of continuous use	Reputation	Authentic learning	Learning presence
Gamification	0.833*							
Teaching presence	0.719	0.833*						
Satisfaction	0.812	0.744	0.924*					
Commitment	0.795	0.669	0.798	0.908*				
Intention of continuous use	0.823	0.658	0.838	0.793	0.937*			
Reputation	0.662	0.677	0.681	0.637	0.652	0.892*		
Authentic learning	0.793	0.720	0.700	0.669	0.649	0.652	0.764*	
Learning transfer	0.739	0.636	0.676	0.717	0.691	0.687	0.709	0.913*

Note: *Represents the square root of the AVE of two variables greater than the correlation coefficient of the variables, it can be determined as valid.

4.3 Hypothesis verification and result interpretation

Based on the verification results, the research model used in this study is deemed satisfactory regarding the reliability and validity, and the hypotheses are verified. The analysis results through PLS-SEM are the same as the verification results in Figure 2 and Table 7.
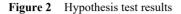
Figure 2 Hypothesis test results

Table 7 Hypothesis test results

Hypothesis	Path	Path coefficient	t value	Verification result
H1	Authentic learning → learning transfer	0.709	20.552***	Selected
H2	Authentic learning → satisfaction	–0.007	0.093	Rejected
H3	Authentic learning → commitment	–0.002	0.020	Rejected
H4	Gamification → satisfaction	0.337	3.358***	Selected
H5	Gamification → commitment	0.598	6.416***	Selected
H6	Teaching presence → satisfaction	0.222	3.496***	Selected
H7	Teaching presence → commitment	0.141	1.910*	Selected
H8	Reputation → satisfaction	0.122	2.085**	Selected
H9	Reputation → commitment	0.147	2.152**	Selected
H10	Learning transfer → satisfaction	–0.029	0.381	Rejected
H11	Learning transfer → intention of continuous use	0.140	2.572**	Selected
H12	Commitment → satisfaction	0.330	4.169***	Selected
H13	Commitment → intention of continuous use	0.275	3.337***	Selected
H14	Satisfaction → intention of continuous use	0.524	7.140***	Selected

Notes: * $p<0.1$, ** $p<0.05$, *** $p<0.01$

Hypothesis 1   *Authentic learning has a positive effect on learning transfer.* Hypothesis H1 is selected at a significance level of 1%, and it is determined that authentic learning has a positive effect on learning transfer (path coefficient = 0.709, t value = 20.552) which is consistent with the results of Kang et al. (2009). Same as previous studies, the results show learners tend to give the meaning of learning content, actual assignments, and educational content to a similar situation in real life. Educational and learning content based on actual evaluation procedures or practical evaluation in real life is found to affect the learning transfer, which determines the degree of application.

Hypothesis 2   *Authentic learning has a positive effect on satisfaction.* In contrast to previous studies, hypothesis H2 is rejected as the path coefficient = –0.007 and t value = 0.093, indicating that authentic learning has an insignificant effect on satisfaction. As the subjects of the questionnaire were composed of students who have enrolled in a course to acquire credits, this result is because of their relatively low sense of achievement through learning.

Hypothesis 3   *Authentic learning has a positive effect on commitment.* Hypothesis H3 is rejected as the path coefficient = –0.002 and t value = 0.020, indicating that learning practicality has an insignificant effect on commitment. This is mainly because the student enrols in a course to acquire credits, rather than to gain knowledge and education.

Hypothesis 4   *Gamification has a positive effect on satisfaction.* Hypothesis H4 is selected at a significance level of 1%, and gamification is found to have a positive effect on satisfaction (path coefficient = 0.337, t value = 3.358). Thus, learners will have higher levels of satisfaction and learning efficiency if the instructor provides educational content in a manner that encourages voluntary participation and excitement.

Hypothesis 5   *Gamification has a positive effect on commitment.* The hypothesis H5 is selected at a significance level of 1%, and gamification is found to have a positive effect on commitment (path coefficient = 0.598, t value = 6.416). If the application is set in a way that allows users to set goals and be rewarded for completing a competition, the users will participate with higher interest. As aforementioned, by setting learning goals to better engage and immerse students, clearly presenting assignments, and introducing a competitive element in evaluations when designing a curriculum, the user commitment can be positively influenced.

Hypothesis 6   *The teaching presence has a positive effect on satisfaction.* Hypothesis H6 is selected at a significance level of 1%, and that teaching presence has a positive effect on satisfaction (path coefficient = 0.222, t value = 3.496). As consistent with the results of previous studies, the use of K-MOOC has a positive effect on education satisfaction when learning is conducted in a non-face-to-face situation.

Hypothesis 7   *The teaching presence has a positive effect on commitment.* Hypothesis H7 is adopted at a significance level of 10% and suggests that teaching

presence has a positive effect on commitment (path coefficient = 0.141, t value = 1.910). As in previous studies, learners using K-MOOC are found to be more committed when they feel that the class is systematically conducted, a variety of content is provided, and class management is well-performed.

Hypothesis 8   *Reputation has a positive effect on satisfaction.* Hypothesis H8 is selected at a significance level of 5% and reputation is found to have a positive effect on satisfaction (path coefficient = 0.122, t value = 2.085). As in previous studies, results indicate that the reputation of instructors or companies that provide K-MOOC content has a significant effect on students' learning choices and satisfaction.

Hypothesis 9   *Reputation has a positive effect on commitment.* Hypothesis H9 is selected at a significance level of 5% and reputation is found to have a positive effect on commitment (path coefficient = 0.147, t value = 2.152). As in previous studies, this study finds that the reputation of instructors or the reputation of companies has a positive influence on the learning commitment of students.

Hypothesis 10 *Learning transfer has a positive effect on satisfaction.* In contrast to previous studies, hypothesis H10 is rejected as the path coefficient = – 0.029 and t value = 0.381, indicating that learning transfer does not affect satisfaction.

Hypothesis 11 *Learning transfer has a positive effect on the intention of continuous use.* Hypothesis H11 is adopted at a significance level of 5% and indicates that learning transfer has a positive effect on the intention of continuous use (path coefficient = 0.140, t value = 2.572). If the learner can apply and utilise the knowledge acquired through education, the learner will be satisfied with the education, participate in similar courses, or consider improving their participation in education.

Hypothesis 12 *Commitment has a positive effect on satisfaction.* Hypothesis H12 is selected at a significance level of 1% and suggests that commitment has a positive effect on satisfaction (path coefficient = 0.330, t value = 4.169). Same with Lee and Kim (2015) and other previous studies, K-MOOC learners are found to have greater satisfaction when immersed in learning.

Hypothesis 13 *Commitment has a positive effect on the intention of continuous use.* Hypothesis H13 is selected at a significance level of 1% and suggests that commitment has a positive effect on the intention of continuous use (path coefficient = 0.275, t value = 3.337) which is similar to previous studies.

Hypothesis 14 *Satisfaction has a positive effect on the intention of continuous use.* Hypothesis H14 is selected at a significance level of 1% and suggests that satisfaction has a positive effect on the intention of continuous use (path coefficient = 0.524, t value = 7.140) which is consistent with previous studies.

5   Conclusions and implications

This study has summarised the current state of K-MOOCs from various non-face-to-face educational institutions, where the necessity of MOOCs has been further solidified since entering the era of COVID-19. Overseas, MOOCs are actively gaining recognition for their operating methods and effectiveness, while K-MOOCs, which have been localised in Korea, are less frequently used compared to overseas MOOCs. To analyse the cause why they are used less frequently, the present research assessed the current state of MOOC operations in Korea and shed light on prior studies in the field. By reviewing existing literature, this study was conducted to analyse the factors that influence the continued use of K-MOOCs.

This study has four main findings. First, authentic learning has a positive effect on learning transfer but does not have a significant effect on satisfaction and commitment. These results indicate that it is very important for the instructor to provide educational content that allows real-life applications. In contrast to previous studies, authentic learning has an insignificant effect on satisfaction and commitment of the learners. As the subjects of the questionnaire were composed of students who have enrolled in a course to acquire credits, this result is because of their relatively low sense of achievement through learning to gain knowledge and education. Secondly, gamification, teaching presence, and reputation have positive effects on satisfaction and commitment. This finding is consistent with the findings from previous studies in similar contexts. Therefore, instructors should prepare a strategy to encourage and increase the amount of participation by capturing the interest of the learners and managing their attentiveness throughout the course. Thirdly, learning transfer has an insignificant effect on satisfaction, but it has a positive effect on the intention of continuous use. If the course content can be applied to real life, it will affect the intention of continuous use in the future. This result is different from the literature review, as learning transfer does not affect the learners' satisfaction because the learners take K-MOOCs courses as one of the requirements for their school or work. Fourth, commitment has a positive effect on satisfaction and intention of continuous use, while satisfaction has a positive effect on intention of continuous use only. This finding is similar to the past results. Based on the findings of this paper, it is crucial for educators or instructors to develop and deliver the applicable lessons that are helpful to the learners. These results are not only applied for success with MOOCs in South Korea but also in similar East Asian countries with cultural similarities.

Several implications can be drawn from these results. First, in theoretical contribution, based on the survey of the previous studies, this paper has advanced a research model of collaborative factors. The complex model has been tested empirically. It uniquely contributes to research on Korean-MOOCs while general education is moving towards lifelong and online learning environments. The findings of this paper are consistent with previous research pointing to a positive association between authentic learning and learning transfer; gamification, teaching presence, and reputation and satisfaction, commitment, and behavioural intention to use. However, the findings also pointed out that authentic learning has no relationship with satisfaction and commitment; the same result was also seen between learning transfer and satisfaction. Secondly, this paper has great contributions to K-MOOCs' success, as various factors must be considered for the continuation of online, non-face-to-face K-MOOC courses. Authentic learning has the strongest effect on learning transfer. The content and assignments of

learning should be constructed at a level that the learner can apply details to real-life situations. In this study, gamification was found to have a strong impact on the learners' commitment and satisfaction. Hence, courses should be organised and operated to inspire learners' interest by considering gamification factors such as level-up, rewards, and competitive psychology; the practicality factor should be taken into account when creating a K-MOOC course. When students are satisfied and have high commitments to the courses they are taking, they definitely have a high intention to continue studying the K-MOOCs. These are clear that commitment and satisfaction have significantly positive impacts on the intention of K-MOOCs' continuous use.

Like any other studies, this research should be considered in light of limitations. First, factors affecting the continued use of K-MOOC are selected based on previous studies. However, prior Korean studies have not yet clearly distinguished the difference between MOOCs and existing online education. Second, as the majority of respondents were in their twenties, the results cannot be generalised to the larger population of potential K-MOOC participants. While the main users of K-MOOCs are college students, who are typically in their 20s and 30s, some students may be working at the same time. Therefore, one direction for future research should be to expand the study to include larger samples and population sizes. Significant results will be derived from learners with diverse occupational backgrounds, age groups, and other demographic traits.

Acknowledgements

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Abbreviations

MOOC	massive open online course
K-MOOC	Korean massive open online course
K-OCW	Korean OpenCourseWare
PUU	perceived usefulness and usability
TTF	task technology fit
TAM	technology acceptance model

SST   social support theory

UTAUT   unified theory of acceptance and use of technology

SDT   self-determination technology

OER   open educational resources

HRD   human resource development

AVE   average variance extracted.