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Student Engagement and Satisfaction with Online Learning: Comparative Eastern and Western Perspectives

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Abstract

This study investigated the antecedents of student engagement in online learning and the consequent impact on higher education students' satisfaction with online learning. More specifically, a structural model was proposed to examine students' perceptions of adaptability, interactivity, computer/ Internet self-efficacy and psychological safety as key factors impacting their engagement with online learning tools and satisfaction with the online learning experience. A self-administered online survey was conducted with 539 undergraduate students in China, Australia, and South Korea. Structural equation modelling and multigroup analysis were used to test the study's hypotheses. The findings indicated that the proposed four antecedents significantly impacted their engagement with online learning tools, influencing their overall satisfaction with the online learning experience. In addition, this study found significant differences between the relationships of the four antecedents of engagement with online learning tools among students in China, Australia, and South Korea, influencing their satisfaction with the online learning experience. The study concludes with theoretical and practical implications informing future institutional practices.

Practitioner Notes

1. The increased use of online learning tools and the disruptions of the COVID-19 pandemic have affected students' learning engagement and satisfaction with online learning.
2. Practitioners should be aware of four antecedents of student engagement with online learning tools – adaptability, interactivity, computer / Internet self-efficacy, and psychological safety.
3. Practitioners can evaluate how these antecedents affect peer-to-peer engagement, student-instructor engagement, and student engagement, in line with their adopted constructivist teaching and learning approach.
4. Practitioners should consider specifically whether online teaching and learning approaches and assessments are overwhelming or disengaging students in their learning process.
5. A mix of individually and socially constructed learning activities and assessments should be used in post-pandemic online classrooms.
6. Online teaching and learning strategies and the choice of online learning tools should be guided by students' evaluations of their effectiveness.

Keywords

Online learning, Student Engagement, Higher Education, Adaptability, Psychological Safety

Introduction

The transition to online learning during the COVID-19 pandemic, the on-and-off lockdowns and different country-specific restrictions, such as those in China continuing during 2022, challenged the planning and delivery of effective online education. The increased presence of online learning tools (e.g., Learning Management Systems, communication and collaboration apps) in the student learning process might have altered student engagement and satisfaction with the learning experience. Student engagement and satisfaction have been frequently used as important indicators to judge program quality (Bowden, Tickle & Naumann, 2021; Dixson, 2015). While student engagement studies have increased over the past few years in search of a better understanding of the multidimensional student engagement construct, it is not clear yet how to best assess student engagement to drive student success (Fredricks et al., 2004; Kahu, 2013; Kahu & Nelson, 2018). Further investigation of the influences that affect student engagement could lead to a better understanding of the student engagement construct and enable course instructors to make better course design decisions (Bond, 2020).

Bond et al. (2020) defined student engagement as "the energy and effort that students employ within their learning community, observable via any number of behavioural, cognitive or affective indicators across a continuum" (p.3). There are now three widely accepted sub-constructs of student engagement, including behavioural, emotional and cognitive engagement (Fredrics et al., 2004; Payne, 2017). Behavioural engagement consists of observable behaviours like completion of learning activities, assessments, persistence and participation. Emotional engagement considers feelings associated with learning and social interactions, like drive, boredom, curiosity, frustration, sense of belonging, and reactions to others in the learning environment. Cognitive engagement relates to focused effort and actions to understand what is being taught, like beliefs, self-regulation, planning, learning strategies and deep learning (Payne, 2017). However, Kahu (2013) highlighted that the problem in the studies of student engagement is due to "a lack of distinction between the state of engagement (e.g., behavioural, psychological, socio-cultural), its antecedents, and its consequences" (p. 2).

Kahu (2013) proposed a conceptual framework that notes the various aspects that impact student engagement. These include the individual student characteristics and backgrounds, the institutional influences, such as curriculum, teachers, other students and teaching, and also the wider social, cultural, political and educational system factors. Kahu and Nelson (2018) further expanded the student engagement framework by incorporating the educational interface, which suggests that the co-influence of the student characteristics and backgrounds and the educational institution and its practices impact student success. The conceptualisation was also related to the three sub-constructs of student engagement. While several researchers explored the educational interface qualitatively (for example, Hews, McNamara & Nay, 2022; Kahu, 2013; Kahu and Nelson 2018), the antecedents of student engagement in this context, and specifically in online education, are yet to be uncovered and investigated quantitatively. Paulsen and McCormick (2020) stressed that student engagement in the context of online learning is sparse. Understanding the antecedents that affect student engagement with online learning tools in the student learning process can inform the design of online courses, teaching and learning strategies and inform the current and future delivery approaches. Thus, the main aim of this study is

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to build on Kahu and Nelson's (2018) educational interface framework to identify and empirically investigate the antecedents of student engagement specific to online learning in higher education, in order to help identify the elements leading to student satisfaction in online learning. The review of student engagement and online learning literature pointed to four factors for student engagement specific to the online learning context – adaptability, interaction, computer/ Internet self-efficacy and psychological safety.

The study also aims to investigate the impact of student engagement on student satisfaction with the online learning experience. It focuses on student engagement specific to the classroom context – student interaction with learning content, other students, and with instructors through online learning tools. Broader university support and administration services are excluded.

Three institutions are compared – Chinese, Australian, and South Korean – to explore the effect of the four antecedents on students' perceived engagement with their institution-chosen online learning tools and the consequent satisfaction with the learning experience. Learning from students' perspectives among eastern and western institutional contexts can provide insights into student learning needs in times of rapid change, such as the disruptions caused by the COVID-19 pandemic. Such insights can inform student-focused institutional course design practices to help students thrive and succeed in the post-COVID-19 era.

This study adds to the student engagement literature as it identifies and tests four dimensions of student engagement linked to Kahu and Nelson's (2018) educational interface framework in the context of higher education online learning. From the practical standpoint, the study's research framework offers updated evaluation guidance for assessing student engagement conditions in the online learning context in order to continue improving the student higher education experience in the post-COVID-19 era.

Research Hypotheses and Model Development

Adaptability

In this study, adaptability refers to online learning tools' capacity to allow students to meet their individual learning needs and preferences (Normadhi et al., 2019). Literature on adaptability in the online learning context discusses various characteristics of the course, influencing students' expectations and perceptions. For example, Navarro and Shoemaker (2000) found that flexibility and access to online instructions and content are among the key variables contributing to student engagement. In terms of pedagogy, Tucker and Morris (2011) found that students' expectations also include the choice of socially- or individually-based online instructions, signifying the need to consider suitable constructivist approaches.

Constructivism is a theory of learning, which posits that learners should construct their knowledge from the learning experience (Baviskar et al., 2009). Baviskar et al. (2009) identified four criteria for constructivist teaching and learning: 1) to elicit prior knowledge, 2) to create cognitive dissonance to stimulate learning through the awareness of prior and new knowledge, 3) to apply knowledge and generate feedback, and 4) to reflect on learning to note what learning occurred. Depending on the educational strategy of each given higher education institution, instructors can use various online learning tools (e.g., Learning Management Systems, collaboration apps, mobile technology, games, social networking and other) to support students' construction of their own knowledge, at their individual pace and level. More socially constructed learning has been linked to furthering one's developmental potential (Vygotsky, 1978). A variety of engagement activities and learners' perceived sense of community may better promote student engagement and satisfaction (Besser et al, 2020). Students have ranked flexible teaching and learning strategies in the area of course design (e.g., modular content, pre-recorded and interactive learning), delivery (e.g.,

asynchronous learning) and assessment types and variety (e.g., group projects, presentations, quizzes) as the key value-adding elements in online learning (Khan et al., 2021).

While these and other studies increasingly emphasise the need for a student-centred approach in the design of online learning experiences, it is not clear yet whether the mix of different online learning tools can support diverse student needs in times of rapid change. A cross-cultural study conducted during the COVID-19 pandemic by Cifuentes-Faura et al. (2021) found that students were able to adapt to the changed conditions in a fully online learning environment and also apply more energy to their studies than in pre-pandemic times. The study suggested the need for continued improvements in content delivery to elevate students' engagement and belonging.

Therefore, designing adaptable online learning experiences where students can engage in their preferred ways of learning is essential. In this study, it is hypothesised that institutional choices linked to the use of online learning tools will affect students' perceptions of adaptable learning experiences, which may influence the students' emotional, behavioural and cognitive engagement in their learning process. Hence, the following hypothesis was proposed:

Hypothesis 1. *Adaptability influences students' engagement with online learning tools*

Interactivity

Interactivity refers to the students' perceived quality and quantity of student-, instructor- and content-based interactions incorporated within the online learning course (Moore, 1989). Constructivist learning approaches stress that instructors play an important role in fostering a suitable learning environment – facilitating human development (Dunleavy & Milton, 2009). From the learner-to-learner interaction perspective, Jung et al. (2002) found that students who engaged in social interactions while working on a learning task performed better than those students who did not receive and build on instructor and peer feedback. Further, according to Moore and Kearsley (2011), learning content drives students' engagement and enables the construction of knowledge. Learner-content interaction refers to a student's enacted process, in which the student engages cognitively with the new information and ideas and elaborates and reflects on the studied subject matter (Moore, 1989), thus, integrating previous knowledge with new knowledge. According to Kuo et al. (2014), learner-content interaction contributed to a higher level of satisfaction when compared to instructor- and student-based interactions. While the study did not outline the type of content and the means of technological delivery, Laird and Kuh (2005) pointed that learning interaction can be effectively facilitated through learning technology tools. For example, students' engagement can be influenced through sound, text, graphical, video and virtual reality content if these are effectively used to immerse students in a task (Engeser & Schiepe, 2012). Wei and Chou (2020) found that students' confidence in using computers and the Internet leads to adaptable behaviours, such as interactions in the online learning environment. However, Eri et al. (2021) noted that it remains unclear how students across different country contexts responded to the changed conditions during COVID-19 and how technological advancements in online learning influenced student engagement.

Specifically, it is unclear whether students' interaction with the learning content, other peers and also the instructors through online learning tools influences their overall engagement, and whether there are any differences across different higher education institutional contexts. Thus, this study proposed that:

Hypothesis 2. *Interactivity enabled with online learning tools influences learners' engagement.*

Computer and Internet Self-Efficacy

Broadly, self-efficacy refers to an individual's beliefs, confidence and judgment of their own capabilities to perform specified tasks successfully at the intended level (Bandura & Locke, 2003). Joo et al. (2000) suggested that students' self-efficacy is central to successful learning and heightened perseverance when solving complex questions and obstacles, and student's ability to learn in the online context is a vital predictor of student success in online learning. Bates and Khasawneh (2007) found that students with higher computer self-efficacy tended to spend more time using online learning technology and were more engaged in the learning processes. Chang et al. (2014) also stated that students with high Internet self-efficacy were more confident and able to complete an online course than students with low Internet self-efficacy. In the context of the COVID-19 pandemic, Eri et al. (2021) found that higher education students across institutions in Australia, Cambodia, China, India and Malaysia learned to embrace online learning, and the sampled students felt most confident about their digital competencies, such as using online learning tools for assignments, using social networking sites for learning, digital tools to communicate and to share information. Choi and Fang (2022) found that higher education students' ability to use a computer and digital tools in learning contributed to their emotional readiness to learn, manage the learning content, and engage with the learning content, other students and the instructors.

The increasing use of online learning tools in learning points to a continued assessment of students' computer/ Internet self-efficacy levels to enable instructors to select suitable online learning tools and teaching and learning strategies to engage students in online learning. Thus, this study posited that:

Hypothesis 3. *Computer/Internet self-efficacy influences learners' engagement with online learning tools.*

Psychological Safety

Psychological safety refers to perceptions of the consequences of taking an interpersonal risk and describes the comfort that individuals can safely speak up and ask for help (Edmondson, 1999). Psychological safety lessens concerns about being judged and perceived as incompetent when seeking and asking for help from people, thus facilitating learning behaviours such as openly expressing thoughts and ideas and having own voice (Detert & Edmondson, 2011). According to Roh et al. (2021), psychological safety plays a vital role in the classroom environment, representing an important student-based factor influencing student engagement in online learning. However, if students are under pressure to use various new online learning tools to complete learning tasks and engage in social interactions, it may escalate their anxiety and stress levels during the learning process (Besser et al., 2020). Choi and Fang (2022) found that in online learning, higher education students perceived lecturer support and peer collaboration as important influences on how students felt during their online learning process. Therefore, students' perceptions of psychological safety in online learning may drive engagement with online learning tools. Thus, the following hypothesis was derived:

Hypothesis 4. *Psychological safety influences learners' engagement with online learning tools.*

Engagement and Satisfaction with Online Learning Tools

Student engagement refers to students' effort and commitment to learning (Krause & Coates, 2008). While many different definitions of student engagement have been coined, this study builds on the definition of

Bond et al. (2020): “the energy and effort that students employ with their learning community, observable via any number of behavioural, cognitive or affective indicators across a continuum” (p. 3). Engagement is important for online students as they need to actively take greater responsibility in online learning tasks to construct new knowledge (Jefferies & Hyde, 2010). Student engagement has been previously linked to outcomes such as satisfaction (Rajabalee et al., 2020) and dropping out of courses (Steele & Fullagar, 2009). This study focuses on student engagement with online learning tools as the pandemic led higher education institutions to adapt novel digital learning tools to facilitate students’ online learning.

This study posits that engaging online learning tools may enable students to focus on their learning and lead to satisfaction with the online learning experience. Previous studies in online learning found that students’ familiarity with technology usage and their perceptions of how they benefit from using online learning systems can influence student satisfaction (Bowden et al. 2021; Changchit, 2007; Hammoud et al., 2008). Students’ engagement with online learning tools may also influence satisfaction with online learning because technology and communication play deterministic roles. Thus, this study proposed that:

> **Hypothesis 5.** *Students’ engagement with online learning tools influences their overall satisfaction with online learning.*

Student Engagement and Satisfaction

Kahu (2013) and Kahu and Nelson (2018) stressed that institutional factors like curriculum, university policies, and assessment design could affect student engagement. Within the curriculum realm, studies that explored social constructivist approaches in online education showed mixed findings in terms of student engagement, pointing to various factors that limit effectiveness and satisfaction with constructivist education (e.g., Baeten et al., 2010). For example, socially constructed approaches in the online learning context may ask students to collaborate on group activities, projects, and assessment tasks that incorporate a variety of communication outputs, such as text, audio, and video. Kyndt et al. (2014) found that socially constructed learning that puts more emphasis on the interaction between students in the learning process puts more pressure on students. As students are required to engage in more complex tasks while completing a group project or assessment, the experience may lead to varying levels of engagement and satisfaction. Moreover, socially-based pedagogy advocates instructors’ support to engage proactively with students and to foster a sense of belonging and trust (Bell, 2021).

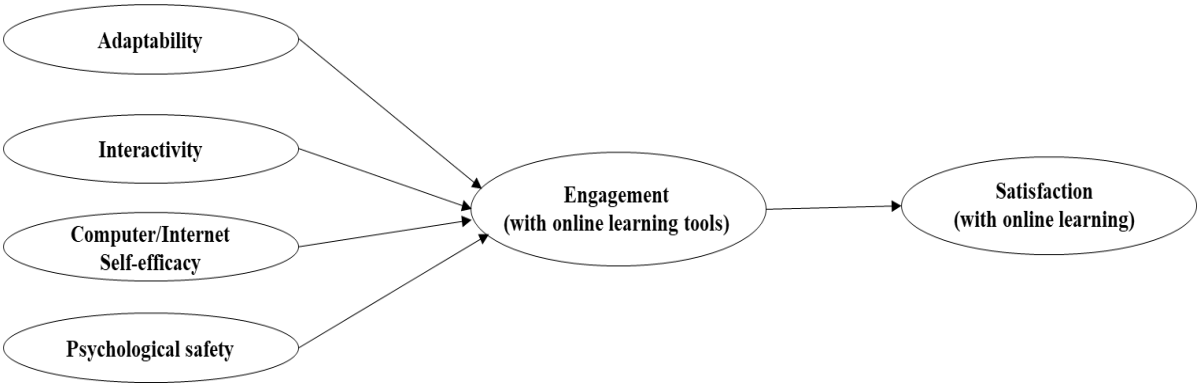

Figure 1
Research Framework

As institutional curriculum choices influence student engagement, this study further investigates the impact of student engagement on students’ satisfaction with online learning across three different institutions –

Chinese, Australian, and South Korean. Consequently, the study compares the effect of the four factors – adaptability, interactivity, computer/ Internet self-efficacy and psychological safety – on the three student cohorts' perceived engagement with online learning tools and their satisfaction with the online learning experience. Hence, the following hypothesis was proposed:

> **Hypothesis 6.** *There are significant differences in the relationships among students' perceptions, engagement, and satisfaction based on their institutional contexts.*

Based on the above discussion, the proposed research framework is presented in Figure 1

Methods

Online Learning Course Background

The higher education courses offered by the case institutions in each country ranged from theoretical- to project- and practice-based courses, presenting the learning content in synchronous and asynchronous ways. For example, video-conferencing platforms were used to deliver presentations by lecturers. Learning Management Systems (LMS) contained the instructions, course outlines, assessments, and weekly course content for asynchronous learning. The learning content included learning items like scholarly articles, case studies, video demonstrations, lecture recordings for on-demand viewing of the theoretical content or instructions, games, project work, assessments, individual and group challenges and activities.

Learning activities were (re)designed to enable students to meet the designated course learning outcomes, facilitated through different online learning tools to support student learning and construction of new knowledge. Learning challenges and assessments were individual and collaborative, chosen by course instructors and teaching teams to promote student engagement and learning outcomes. The online pedagogical approach across the institutions was underpinned by constructivism and student-centred teaching and learning approach. That is, the Chinese and Australian teaching and learning approaches offered more collaborative learning and assessments. In the South Korean case, the institution's management instructed individual assessments during this time. See Appendix 1 for a summary of online learning tools and course design choices across the three institutional cases.

The Chinese university case offered a combination of synchronous and asynchronous teaching and learning experiences. The students were presented with individual and collaborative activities and assessments. The institution also decided to use WeChat to engage students in their learning. It was believed the students would be more confident and able to engage in discussions with their peers and interact with the teaching staff, allowing better support when having questions regarding the course content and assessments. Reflective thinking was also identified as an essential part of the online teaching and learning experience.

In the Australian case, the institution's management decided to provide more synchronous teaching and learning approaches, where the lecture and tutorial content was delivered in live sessions over Zoom. It was believed this approach would drive teacher-student and student-student interactions that would better engage students in the learning process and enable teacher-student support during this time. While the Australian students could also review the lecture presentation later, live tutorials were facilitated over Zoom to drive interactivity and promote an individual and socially constructive learning environment. Overall, the interactivity was encouraged through various online learning tools, such as Zoom, Google documents, breakout rooms and other Internet-based collaborative tools like Padlet and Mural. Overall, this experience

was highly structured, anchored by lecture and tutorial blocks at set times and the expectations that students can and will attend all lecture and tutorial sessions each week for scaffolded learning.

In the South Korean case, the university's direction called for the application of integrative and teacher-centred passive pedagogy. The online instruction included synchronous and asynchronous learning experiences, but overall, the instruction design emphasised practice-based learning experiences. Students interacted with the learning content presented each week on the Learning Management System, which involved reviewing the content, completing challenges, solving problems, answering questions and comparing their views with their peers in tutorial sessions. This learning approach was further reinforced through the instructor's feedback on each submitted assessment.

Overall, this overview of pedagogical choices across three higher education institutions highlights how institutional choices can influence educational strategies and teaching and learning practices. It is a reality of the international higher education sector that no one institution is like the other. Despite these differences, it is imperative to look for effective evaluation approaches and measures to understand what works and what does not work. Hence, to enable effective evaluation of online learning experiences, this study investigates the impact of the four proposed antecedents on engagement across the three socio-cultural contexts.

Data Collection and Instrument

This study employed a self-administered online survey method targeting students enrolled in online courses in three different higher education institutions – Chinese, Australian, and South Korean – using a purposive sampling method. An online survey questionnaire was developed on Google forms, and undergraduate students were recruited to participate in this survey once they completed the online course. The data were collected from December 2020 to February 2021 in China, from October to November 2020 in Australia, and from April to May 2021 in Korea. The questionnaire was developed based on academic literature.

To measure the proposed constructs, we used a total of 27 items generated from the literature, ensuring reliability and validity. Students' online learning adaptability was measured with four items adapted from Wei and Chou (2020), which encompassed measures linked to convenience enabled by the online learning experience and students' perceived adaptability. The items related to the extent to which students felt able to decide on the best time and location to learn, an opportunity to review the learning materials repeatedly, and to overcome time and place constraints – incorporating the measures of emotional, cognitive and behavioural engagement. Six items from Sun et al. (2008) were used to measure interactivity toward online learning – the extent to which students perceived the quality of student-, instructor-, and content-based interaction – measuring cognitive and emotional engagement. Three items from Hung et al. (2010) were adopted to measure students' self-efficacy with computer and Internet use, which considered the extent to which students felt confident in performing the basic functions of Microsoft Office programs, using their knowledge and skills to manage software for online learning, and using the Internet to find or gather information for online learning – measuring cognitive and emotional engagement. Four items were adapted from Schepers et al. (2008) to capture perceived psychological safety – the extent to which the students felt safe to speak up, ask for help and openly express thoughts and ideas and have their own voice in the online class – measuring emotional engagement.

The engagement with online learning tools was measured with four items from the Student Engagement Questionnaire (SEQ) – Online Engagement scale – which evolved from the US NSSE framework (Krause & Coates, 2008). The Online Engagement scale is the most closely linked scale to measure engagement specific to the use of technology in the online learning process. The terminology was modified from online

learning systems to online learning tools, which better fit the context at the case institutions. The scale assessed the extent to which the online learning tools were the major part of students' study, the extent to which the students used the tools to improve how they learned, the extent to which the tools helped the students to better interact with others, and the extent to which the students could manage their studies – encapsulating cognitive, emotional and behavioural engagement.

Students' overall satisfaction with an online course was measured with six items from Arbaugh (2000). The items assessed the overall satisfaction with the online course, the decision to take the course online, future intention to take another online course, and the online course's ability to meet the students' needs. All items were measured on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree).

After all 27 items were developed in English, pre-testing was conducted with five researchers. Their feedback from the pre-testing led to a modification of the wording of some items slightly to ensure context, word clarity and agreement with the types of measured engagement. Once the items were revised, the questionnaire was translated into Korean and back-translated to English to ensure accuracy. Two researchers and four other PhD students whose native languages were Korean reviewed the translated questionnaire to assure the validity and reliability of the items. Consensus on the items was reached through three rounds of discussions. The expert group quantitatively assessed the few differences in the items, predominantly the expression, and finally reached a consensus on the Korean version of the questionnaire. English is a medium of instruction in the Chinese institution; an English version of the questionnaire was used in the case of Chinese students.

Data Analysis

This study examined a model using structural equation modelling (SEM) via AMOS 27.0. Two steps are included in SEM. First, evaluating and refining the measurement model using confirmatory factor analysis (CFA) and, secondly, testing the estimation of the structural model and hypotheses (Byrne, 2016). This two-step approach ensures that adequate processes have been undertaken to learn about the theoretical constructs and their interrelations (Anderson & Gerbing, 1988). A multigroup analysis was undertaken to test any differences in the proposed relationships.

Results

Respondent Profile

A total of 539 students completed the survey, with 202 from China, 196 students from Australia, and 141 from Korea, as summarised in Table 1. The sample size was in line with the level recommended in the literature for using an SEM, suggested as a ratio of numbers of responses to the number of items, 1:15 (Wolf et al., 2013). Female respondents accounted for 69.4% of the overall sample. Approximately 77.4% of the respondents were between 18 and 24 years old, 16% were between 25 and 34, and 6.7% were older than 35. About 23.9% of the respondents were in their first year, 31.7% in the second year, 15.0% in the third year, and 29.3% in their final year. About 43% of the respondents majored in hospitality and tourism management, and 12.6% in accounting. On average, 36% of them had studied longer than 8 hours per week online. The respondents of 35.6% preferred to use the content on Moodle among different online learning activities, and 31.2% of them had used Zoom most frequently as an online learning tool.

Table 1

Profile of Respondents

Demographic Information (N=539)			China (*n* = 202)		Australia (*n* = 196)		South Korea (*n* = 141)	
	N	%	n	%	n	%	n	%
Gender								
Female	374	69.4	150	74.3	140	71.4	84	59.6
Male	165	30.6	52	25.7	56	28.6	57	40.4
Age								
18-24	417	77.4	202	100.0	121	61.7	94	66.7
25-34	86	16.0	-	-	45	23.0	41	29.1
Over 35	36	6.7	-	-	30	15.3	6	4.3
Year of Study								
First year	129	23.9	8	4.0	116	59.2	5	3.5
Second year	171	31.7	97	48.0	45	23.0	29	20.6
Third year	81	15.0	15	7.4	25	12.8	41	29.1
Fourth year	158	29.3	82	40.6	10	5.1	66	46.8
Major								
Hospitality	143	26.5	-	-	108	55.1	35	24.8
Tourism	89	16.5	-	-	36	18.4	53	37.6
Accounting	68	12.6	68	33.7	-	-	-	-
Culture	64	11.9	64	31.7	-	-	-	-
Business	59	10.9	58	28.7	-	-	53	37.6
Economics	58	10.8	6	2.9	-	-	-	-
Other	58	10.8	6	2.9	52	26.5	-	-
Average Online Study Hours per week								
Up to 2hours	49	9.1	30	14.9	13	6.6	6	4.3
2 – < 5 hours	133	24.7	52	25.7	40	20.4	41	29.1
5 – < 8 hours	163	30.2	56	27.7	58	29.6	49	34.8
Longer than 8 hours	194	36.0	64	31.7	85	43.4	45	31.9
Most Useful Online Activity								
Content (Moodle)	192	35.6	3	1.5	94	48.0	95	67.4
Reflection (Journal)	90	16.7	89	44.1	1	.50	-	-
Social (Live class)	87	16.1			59	30.1	28	19.9
Questioning (Discussion Board)	77	14.3	65	32.2	7	3.6	5	3.5
Evaluation/Assessment	61	11.3	37	18.3	18	9.2	6	4.3
Collaboration (Group Discussion)	30	5.6	8	4.0	15	7.7	7	5.0
Others	2	0.4	-	-	2	1.0	-	-
Frequently Used Online Learning Tool								
Zoom	409	31.2	108	28.1	193	23.5	108	55.7
Moodle	319	24.4	122	31.7	174	23.8	23	11.9
Social Media	163	12.4	78	20.3	85	11.6	-	-
Google docs	156	11.9	19	4.9	133	18.2	4	2.1
Padlet	86	6.6	1	0.3	69	9.4	16	8.2
Echo360	79	6.0	2	0.5	77	10.5	-	-
Panopto	55	4.0	55	14.3	-	-	-	-
Commons	26	2.0	-	-	-	-	26	13.4
Webex	17	1.3	-	-	-	-	17	8.8

Confirmatory Factor Analysis

Before conducting CFA, an Exploratory Factor Analysis (EFA) was conducted to assess factor structure and dimensionality for all constructs (Netemeyer et al., 2003). Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were performed. The KMO value of .93 exceeded the recommended level of .60 (Tabachnick & Fidell, 2007), and the result of Bartlett's test of sphericity was 9560.96, df = 276 ($p < .001$), suggesting that the factor analysis was appropriate. To identify the number of items in a scale so that the remaining items maximise both explained variance in the scale and the scale reliability, items with cross-loadings or factor loadings of below .40 were considered for removal (Hinkin, 2005). EFA returned a six-factor solution after the deletion of four items owing to cross-loadings or factor loadings of below .40 (i.e., one item 'Online learning enables me to decide on the best location to learn' from adaptability; two items 'Online learning can encourage interaction between instructors and students' and 'Online learning enables me to meet more classmates or peers with the same interests or habits' from interactivity; and one item 'My choice to take the online course was a wise one' from satisfaction). All factors exceeded Cronbach's alpha criterion of .70 (Hair et al., 2010).

We performed a CFA to the measurement model through the validity and reliability of the construct measures. To identify problematic measurement items or model misspecification, the modification indices (MI) were examined. According to Byrne (2016), an MI greater than 10 is considered large and problematic. Researchers suggest that deleting questionable items could be an effective way to improve a measurement model (Byrne, 2016); as such, large MI values were evaluated for a better measurement model. This step resulted in two additional items being removed as suggested by the MI (i.e., one item from interactivity 'Online learning provides sufficient discussion opportunities' and satisfaction 'I am satisfied with my decision to take the online course', respectively). A final list of 21 measurement items is shown in Appendix 2. The measurement model resulted in a significant chi-square value of 478.70 (df = 174, $p < .001$). Overall, the measurement model achieved acceptable fit with CFI = .96, TLI = .95, RMSEA = .057, SRMR = .048 (Byrne, 2016; Hu & Bentler, 1999).

Table 2

Results of Discriminant Analysis

Construct	R	AVE	MSV	ADP	INT	EFF	SAF	ENG	SAT
ADP	.81	.60	.39	.77					
INT	.83	.62	.27	.33	.79				
EFF	.88	.72	.30	.43	.19	.85			
SAF	.88	.65	.33	.37	.41	.42	.90		
ENG	.88	.64	.39	.56	.38	.55	.56	.80	
SAT	.94	.80	.40	.63	.52	.28	.52	.62	.89

Note. The bold diagonal elements are the square root of the variance shared between the constructs and their measures. Off-diagonal elements are the correlations between constructs. R = composite reliability; AVE = average variance extracted; MSV= maximum shared variance; ADP= adaptability; INT = interactivity; EFF = computer/Internet self-efficacy; SAF = psychological safety; ENG = online engagement; SAT = satisfaction.

In addition, the validity and reliability of each scale were examined. Convergent validity was evidenced with statistically significant ($p < .01$) item factor loadings and standardised factor loadings for all items ranged

from moderate to strong, with t values greater than 2.57 (Netemeyer et al., 2003), as indicated in Appendix 2, suggesting that all items are significant indicators of their respective constructs and providing support for convergent validity. The composite reliabilities were above .70, and the average variance extracted (AVE) scores of the six dimensions exceeded .50, indicating good evidence of construct reliability (Fornell & Larcker, 1981; Hair et al., 2010). The square root of the AVE value for each dimension is greater than the correlations among them, indicating discriminant validity for all pairs of constructs, as shown in Table 2. Overall, the preceding statistical tests provide strong empirical support that the scales were valid and reliable measures of their respective constructs.

Structural Model Estimation

The results of structural model presented in Table 3 indicate a good model fit with $\chi 2 = 633.80$, df = 178, $p < .00$, CFI = .94, TLI = .93, RMSEA = .069, SRMR = .079. The R2 was .43 for engagement and .57 for satisfaction, exhibiting a substantial amount of variance in the dependent variables was explained by the model. The structural path coefficients suggest that all of the proposed paths were significant.

Table 3
Results of Hypotheses

Testing Hypothesis	Path	Path Coefficient	Critical Ratio	Result
H1	ADP → ENG	.33	7.00***	Supported
H2	INT → ENG	.13	3.18***	Supported
H3	EFF → ENG	.24	5.46***	Supported
H4	SAF → ENG	.33	7.02***	Supported
H5	ENG → SAT	.66	15.60***	Supported

Note. ADP= adaptability; INT = interactivity; EFF = computer/Internet self-efficacy; SAF = psychological safety; ENG = online engagement; SAT = satisfaction.
*** $p < .001$

Multigroup Analysis

A multigroup analysis was conducted to examine path differences in the proposed relationships across the three sampled institutional student groups: Chinese (N = 202), Australian (N = 196), and Korean (N = 141). Sample sizes of two groups are greater than the recommended minimum number of subjects of 100-150 cases per group for multigroup modelling suggested by Wolf et al. (2013). Students' engagement with online learning tools had a positive influence on their satisfaction with online courses regardless of their institutional origin. As Table 4 indicates, the path from students' engagement with online learning tools to overall satisfaction is significantly stronger in the Australian students' group than in the Chinese group (difference = .55, $p < .001$) and Korean group (difference = .31, $p < .05$). In contrast, the path from interactivity to engagement with online learning tools is significantly stronger in the Chinese students' group than in the Australian group (difference = .46, $p < .001$). The results partially support hypothesis 6.

Table 4
Results of Multigroup Analysis for Three Institutional Groups

H6 Paths		Group1: China		Group2: Australia		Group3: Korea		Group 1 vs Group 2		Group 2 vs Group 3		Group 1 vs Group 3	
		PC	CR	PC	CR	PC	CR	Path Difference	Z Score	Path Difference	Z Score	Path Difference	Z Score
ADP	→ ENG	.32	2.25***	.06	.98	.31	3.29***	.26	1.69*	.01	.07	.25	2.24**
INT	→ ENG	.57	5.23***	.11	1.89*	.06	.55	.46	3.73***	.51	3.32***	.05	-.40
EFF	→ ENG	.13	1.75*	.13	1.73*	.28	3.39***	.00	.01	.15	-1.38	.15	1.39
SAF	→ ENG	.12	.81	.59	6.63***	.15	1.55	.47	-2.7***	.03	-.20	.43	-3.23***
ENG	→ SAT	.72	10.31***	1.28	10.85***	.96	10.13***	.55	4.03***	.24	-2.02**	.31	-2.07**

Note. PC = path coefficients; CR = critical ratios; ADP= adaptability; INT = interactivity; EFF = computer/Internet self-efficacy; SAF = psychological safety; ENG = online engagement; SAT = satisfaction. *** p < .001. ** p < .05. * p < .01.

Conclusion and Discussion

This study investigated student engagement with online learning tools in the online education context. The aims of this study were to 1) build on Kahu and Nelson's (2018) educational interface framework to identify and empirically investigate the antecedents of student engagement specific to higher education online learning; 2) investigate the impact of student engagement on student satisfaction; and 3) compare the impact of institutional choices of three different institutions – Chinese, Australian, and South Korean – on student engagement with online learning tools and the consequent satisfaction with their learning experience. The study results support (H1, H2, H3 and H4) that students' perceived adaptability, interactivity, psychological safety, and computer/Internet self-efficacy significantly influence their engagement with online learning tools. The results of testing (H5) lend support to the argument that engagement with online learning tools influences students' overall satisfaction with the online learning experience. The study results (H6) also partially support the argument that significant differences exist in the relationships among the Chinese, Australian, and South Korean students' perceptions of engagement with online learning tools and satisfaction with online learning.

Theoretical implications

First, this study uncovered four antecedents of student engagement specific to online learning underpinned by Kahu and Nelson's (2018) educational interface framework – adaptability, interactivity, computer/ Internet self-efficacy, and psychological safety – which adds to the research on student engagement specific to online learning. Existing studies exploring the educational interface were of qualitative nature (Hews, McNamara & Nay, 2022; Kahu, 2013; Kahu & Nelson 2018); thus, this study is enriching the research perspective of student engagement in online education. Specifically, the study shows that students' perceptions of adaptable online learning courses significantly and positively influence students'

engagement with online learning tools in their learning process. This is similar to Khan et al.'s (2021) findings, in which flexibility and convenience were ranked as the key benefits of online learning education. The study's results further indicate that a higher level of interactivity in online learning leads to significant student engagement with online learning tools. This can be explained through Wei and Chou's (2020) findings that if students have the confidence to use computers and the Internet, they can better interact with the content and others in the online learning process. The higher level of perceived psychological safety also led to greater engagement with online learning tools. This expands the previous argument that psychological safety plays a crucial role in successful learning (Roh et al., 2021), supporting students in overcoming learning barriers and thus improving engagement. As the four antecedents of engagement were underpinned by Kahu and Nelson's (2018) conceptualisation of educational interface – institutional elements impacting students' adaptability; students' perceptions of computer/ Internet self-efficacy and psychological safety depicting student characteristics; and interactions of students with instructors, other students and content depicting the relational interface between the two – the combined effect resulted in a more complete range of engagement (behavioural, cognitive, and emotional) in the context of online learning. Hence, this study adds to a better understanding of the multidimensional student engagement construct (Kahu, 2013), specific to online learning (Paulsen & McCormick, 2020).

Second, existing research suggests that social constructivism is better suited for online education (Secore, 2017). However, we find that different socio-cultural contexts and crisis events (e.g., COVID-19 pandemic) call for different pedagogical choices. Such choices consequently affect how students experience and perceive their online education. Under average interaction, when most learning was independent and social interactions with peers and instructors were not enforced in the learning process, South Korean students perceived higher engagement and satisfaction in online learning. It appears the institutional model of constructivist teaching and learning in Korea was better aligned with the learners' needs during this time. In contrast, it appears that social constructivism in the Chinese case while pitched at a higher level of interaction was still at the right level for the students to contribute to student engagement with online learning tools and satisfaction. Australian students felt more engaged yet more overwhelmed when most of the learning occurred in the collaborative learning environment, which hindered the acceptance of social constructivism during this time, contributing to a lower level of satisfaction with the overall online learning experience. These findings suggest there is a tipping point on the individual-to-social constructivist curve where too much of a socially constructed teaching and learning focus begins to regress students' level of satisfaction. Our findings also suggest that aligning the four antecedents of engagement to the different institutional contexts and in line with institutional policies, pedagogical approaches using online learning tools matter for effective student engagement and satisfaction, thereby extending the knowledge about constructivist learning theory (Schell & Janicki, 2013), and adding to the student engagement literature.

Practical Implications

The increasingly widespread use of various online learning tools in higher education, particularly since the COVID-19 pandemic, affected students' learning engagement and satisfaction with their online learning experience. Institutions and practitioners can build on this study's four factors – adaptability, interactivity, computer/ Internet self-efficacy, and psychological safety – to foster student engagement in online learning, thus, strengthening the students' learning experiences in online education. It is suggested that instructors promote psychological safety in online learning classes as soon as the classes commence and also during the time of the course (e.g., term, semester). When students feel psychologically safe, they find the learning environment more supportive to engage, driving their interactions with other students, instructors, and the learning content. It is under these conditions that students feel free from interpersonal risks and judgements (Roh et al., 2021), particularly when social constructivism is being upheld by institutional educational strategies. Institutions and practitioners should also pay close attention to the online learning tools chosen

to engage students in the learning process. Specifically, consider whether such tools can support or hinder online learning adaptability for students. Students may engage in their learning process, given online learning tools that enable flexible learning support and secure access to the classroom, the activity and the assessment. Also, online learning tools should enable the students to interact with not only the learning content but also the peers and instructors in a psychologically safe manner. Conversely, students may disengage in activities when online learning tools impede access to engage, suppress certain voices, isolate students from interaction or fail to produce learning outcomes and feedback. Teaching and learning strategies and activities aligned to students' perceived computer/ Internet self-efficacy levels can further drive engagement and satisfaction. Students can engage with online learning tools when they know how to use them and are supported by their instructors to use different online learning tools to improve their learning process and learning outcomes.

Practitioners should also develop an awareness of how the four antecedents of student engagement with online learning tools affect peer-to-peer engagement, student-instructor engagement, and student engagement, while students use the different online learning tools. Also, it is important to be aware of how the different and overall engagement aligns with the adopted constructivist teaching and learning approach (e.g., individually to socially constructed learning activities and tasks). Practitioners can use reflective and reflexive approaches to observe and collect evidence of what works and does not work during their teaching and learning practices. Through this scholarly approach, practitioners can continue to search for new and better online learning tools to drive the desired level of student engagement. Instructors can also collect student feedback on the level of student-perceived socially-constructed learning to keep students engaged in the learning process. This will enable the instructors to continually search for the right balance of learning challenges and engaging experiences for students that stretch their learning rather than block the learning progress. The point is to help students engage in intelligent discussions, critical thinking and problem-solving that support their individual development. Learning engagement can be further enabled through appropriately scaled student- and instructor interactions to produce greater and more quality responses. Instructors should help students recognise how online learning tools contribute to the construction of new knowledge and how it may shape the way they see the world. Association to the current and the future of work workplace may further motivate students to use the course online learning tools in more proactive ways, as skills related to the use of online tools in business communication are becoming a core requirement.

In the context of teaching and learning approaches and the selection of assessments, practitioners should specifically consider whether the online teaching and learning approaches and assessments are or may potentially overwhelm or disengage students in their learning process. Practitioners can ask students to assess the employed online learning tools, and whenever a new tool is introduced, let the students reflect on whether and how the given tool enabled student engagement and satisfaction in their learning process, and contribute any other thoughts. For example, students can relate to the factors of adaptability, interactivity, computer/ Internet self-efficacy, and psychological safety so practitioners can better understand the effectiveness of the chosen teaching and learning strategies and tools. Encouraging students to reflect on the learning activities and assessments, including the use of online learning tools during the process stage (e.g., research, writing, collaboration, presentation and other) can elevate students' awareness of their learning and growth.

Emerging from the comparative findings, the choice of online teaching and learning strategies and tools should be guided by students' evaluations of their effectiveness (e.g., from collecting feedback during and after the course is finished). For example, the results derived from this study show that different tools and engagement strategies used during the learning process lead to different students' perceptions. The learning model, which featured WeChat, supported and resulted in a much higher level of interaction

between students and instructors in the Chinese case. Instructors who wish to heighten the level of interaction among their students and also staff may consider the use of social apps in the teaching and learning practice. Further, Korean students perceived online education as significantly more adaptable and flexible than Australian students. The perceived level of adaptability significantly reinforced the South Korean students' belief that online education was meeting their individual learning needs. Institutions should invest in understanding their students' learning needs, including the level of online learning adaptability in these everchanging times and offer online learning models that best meet such needs. While the online learning constructivist design was more individualistic in South Korea, the extent of adaptability was nevertheless perceived at a high level for this student group – meeting their learning needs. The study results also suggest varying strength of relationships between the four engagement antecedents, engagement with the online learning tools, and satisfaction among students from Chinese, Australian and South Korean institutions. The relationship between interactivity and engagement was stronger in the Chinese sample than in the Australian sample. This is in agreement with Hou et al.'s (2021) study in which WeChat played an important role in engaging university students. Overall, the results suggest that a higher level of adaptability and interactivity with the content, peers and instructors change students' perceptions of how engaging online learning tools may be in the student learning experience. It is suggested that adaptability and interaction are considered when practitioners look for new online learning tools to engage students with their peers, instructors and the learning content.

In terms of institutional policies, as Covid-19 changed the way people work and learn in the post-COVID-19 era, and as educational technology continues to evolve and change teaching and learning approaches, higher education institutions need to promote suitable online strategies and practices that promote engaging online learning experiences that support human development. A mix of individually- and socially constructed learning activities and assessments should be used in post-pandemic online classrooms, and the mix of approaches continually be evaluated to prepare students for the future of work. Many industry contexts, specifically the service industry, increasingly call for effective collaboration, interpersonal interactions and creative problem-solving. Accordingly, institutional policies should promote adaptability and lifelong learning through constructivist approaches to enable students to deal better with future uncertainties and challenges; however, these should be well balanced with individual learning strategies, so students are not overwhelmed in the learning process. Course and subject mapping could enable instructors to revise online learning content, the learning process (e.g., how students are supported to construct their own knowledge) and assessments in line with the designated course learning outcomes in the post-COVID-19 era. Overall, the four antecedents of engagement can help direct current and future institutional decision-making, particularly when reviewing or writing new online learning courses. Hence, the four empirically tested factors can be included in the end-of-course evaluation surveys to inform future course teaching and learning strategies, and to drive behavioural, emotional and cognitive engagement in online education.

Limitations and Future Research

The study offers insight into the role of the four antecedents of engagement and satisfaction with online learning experience across the eastern and western institutional contexts. However, the study has several limitations. Students' evaluation of online courses relied on their most recent online learning experience during the first pandemic lockdowns. Students who previously experienced online courses might have greater digital capabilities. Future research can consider a comparative study between repeat and new students. While the study's findings provide insights into what online factors contribute to students' perceived value derived through online learning and online learning tools, it is not known how the different constructivist approaches in east and west can contribute to better outcomes and how institutions can align the four factors of engagement in their own contexts most effectively. Future research could investigate the

impact of these factors in accordance with the different online learning pedagogies. As this study only relied on student-based self-report measures, future research could adopt more objective measures to investigate the correlations.

Conflict of Interest

The authors disclose that they have no actual or perceived conflicts of interest. The authors disclose that they have not received any funding for this manuscript beyond resourcing for academic time at their respective university.

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Appendix 1

Institutional Online Course Design and Online Learning Tools: Content and Process View

	China	Australia	S. Korea
Content. The way teaching content is created, organised, structured and presented to students to drive interaction. This may include synchronous and asynchronous ways, using various digital technologies for organising (Conceicao & Howles, 2021).			
Online learning module/ subject (e.g. Lecture/Tutorial) shell via LMS	iSpace (Moodle) & Panopto	Moodle	Learning X,
Lecture PowerPoint and Tutorial notes/ activities	iSpace (Moodle) & WeChat	Moodle, Google docs, Microsoft tools	Microsoft tools, Hancom Office tools
Lecture/ tutorial video recordings for after-class viewing	iSpace (Moodle) & Panopto	Zoom, Echo360	Silverstream/Readystream Producer
Students' assessments	PowerPoint, Zoom, Tencent Meeting	PowerPoint, Canva, Google docs, Zoom, Echo360, Moodle	Microsoft tools, PowerPoint, Zoom,
Assessments and rubrics	iSpace (Moodle) & WeChat	Microsoft tools, Moodle	Microsoft tools, Hancom Office tools
Module/ subject-specific instructional content (e.g. course syllabus)	iSpace (Moodle)	Microsoft tools, Moodle	Microsoft tools, Hancom Office tools
Process. An institutional strategic approach to teaching and learning, such as the type of online learning pedagogy. Digital technologies are used to enable engagement, such as interpersonal communication between individuals (e.g., student and instructors) and completion of learning tasks and assessments (Conceicao & Howles, 2021).			
Intentional online learning designed and mandated from Institutional level/Divisional level/Programme level	Institutional level (Pedagogies: socially constructed)	Institutional level (Pedagogies: socially constructed)	Institutional level (Pedagogies: Integrative + Instructor-centred)
Formal and informal interaction via social media	WeChat	Zoom	N/A

Formal social interaction asynchronous or synchronous (e.g., group project discussions) for collaborative exchanges/ assessments	WeChat, iSpace (Moodle)/Panopto, Zoom, Tencent Meeting	Zoom, Moodle, email	email, Zoom, learning X
Learner-instructor:			
Informal social interaction asynchronous (e.g., logistic questions)	WeChat, email	email	Email
Informal social interaction synchronous (immediate feedback when clarifying issue)	WeChat	email, Zoom	Email, Kakao Talk (mobile messenger app)
Instructor-learner:			
Set positive learning environment with ground rules	WeChat, iSpace (Moodle)	Moodle, Zoom	Learning X, Zoom
Trial-tested online teaching tools (e.g., Zoom) prior to the virtual class with learners	Panopto/Zoom	Zoom	Zoom

Appendix 2

Results of Confirmatory Factor Analysis

Factor and Item	Mean			SFL	CR
	China	Australia	Korea		
Adaptability (Mean = 3.94, SD = .93)					
Online learning enables me to decide on the best location to learn.	3.64	3.81	4.39	.75	N/A
Online learning enables me to repeatedly review learning materials.	3.86	3.86	4.35	.79	16.51
Online learning overcomes time and place constraints.	3.78	3.82	4.37	.78	16.46
Interaction (Mean = 2.83, SD = 1.05)					
Online learning can shorten the distance between instructors and students.	2.69	3.03	2.98	.78	N/A
Online learning enables me to meet more classmates or peers with the same interests or habits.	2.55	2.41	2.83	.79	17.07
Online learning provides convenient tools to communicate with other learners.	2.80	3.16	3.14	.79	17.12
Computer/Internet Self-efficacy (Mean = 3.99, SD = .86)					
I feel confident in performing the basic functions of Microsoft Office programs (MS Word, MS Excel, and MS PowerPoint)	3.80	4.39	3.43	.79	21.92
I feel confident in my knowledge and skills of how to manage software for online learning	3.77	4.30	3.65	.88	N/A
I feel confident in using the Internet (Google, Yahoo) to find or gather information for online learning	3.87	4.50	4.01	.86	24.22
Psychological Safety (Mean = 3.43, SD = .97)					
I'm not afraid to express my opinions in my online learning group.	3.59	3.56	3.25	.78	N/A
I feel safe to take a risk in my online learning group.	3.67	3.54	3.21	.84	20.37
In the online class, it's easy to speak up about what is on my mind.	3.61	3.35	3.17	.85	20.44
I feel it is easy to ask other students in my online class for help.	3.60	3.21	3.17	.75	17.89
Online Engagement (Mean = 3.75, SD =.87)					
Online learning tools (i.e., Moodle, Zoom, Google docs, and other) are a major part of my study.	3.73	4.36	3.89	.65	16.58
I used online learning tools to improve how I learn.	3.77	3.93	3.48	.85	24.87
Online learning tools helped me to interact better with others.	3.70	3.54	3.33	.82	23.26
I used online learning tools to manage my study.	3.77	3.81	3.46	.87	N/A
Satisfaction (Mean = 3.32, SD = 1.15)					
If I had an opportunity to take another online course, I would gladly do so.	3.46	3.05	3.66	.91	N/A
I feel that the online course served my needs well.	3.45	3.08	3.50	.90	36.03
I will take as many online courses as I can.	3.27	2.76	3.54	.86	30.56
Overall, I am satisfied with the online course.	3.45	3.20	3.77	.91	38.04

Note: χ 2=478.70, df = 174, p < .001, CFI = .96, TLI = .95, RMSEA = .057, SRMR = .048; SD = standard deviation; SFL = standardized factor loadings; CR = critical ratio.