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Exploring Variables Influencing University Students' Satisfaction with Online Courses in the Post-COVID-19 Era

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< ABSTRACT >

The purpose of this study was to determine factors influencing the satisfaction of university students participating in online courses and to develop an optimal model. Building upon previous research on factors influencing satisfaction in both online and offline university courses, this study establishes structural relationships among online learning experience, personalized learning environment, perceived quality, and satisfaction. The data for this study were collected from 161 university students who participated in an online education program during the spring semester of 2023. The collected data were analyzed using a structural equation model. The results of the study can be summarized as follows. First, this study empirically validates the significance of attitude as a primary influencing factor on satisfaction in university-level online courses. Second, this study empirically demonstrates that perceived quality in university online learning has a direct and indirect impact on satisfaction. Third, this study establishes empirically that a personalized learning environment indirectly influences satisfaction through the mediation of perceived quality and attitude. These results underscore the imperative for universities to prioritize enhancing learners' attitudes when devising strategies for online education. Theoretical and practical discussions, along with implications, are presented based on these findings.

Key Words : Post COVID-19, online course, online learning experience, personalized learning environment, perceived quality, satisfaction

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코로나19 이후 대학에서 이루어지는 온라인 강의에 대한 대학생들의 만족도에 영향을 미치는 변인 탐색

정한호[1] (총신대학교, 교수)

〈 요 약 〉

본 연구의 목적은 온라인 강의에 참여한 대학생들의 만족도에 영향을 미치는 결정 요인에 중점을 두어 최적의 모형을 개발하고, 만족도에 영향을 미치는 변인들의 영향력을 구조적으로 탐색하는 것이다. 본 연구의 자료는 2023년 봄학기 동안 진행된 온라인 교육 프로그램에 참여한 대학생 161명으로부터 수집되었다. 수집된 자료는 구조방정식 모형을 사용하여 분석하였다. 연구 결과를 제시하면 다음과 같다. 첫째, 본 연구에서는 대학 수준의 온라인 강의에서 만족도에 대한 주요 영향 요인으로 태도의 중요성을 실증하였다. 둘째, 대학 온라인 학습에서 지각된 품질이 만족에 직접 및 간접적인 영향을 미친다는 점을 실증하였다. 셋째, 맞춤형 학습 환경이 지각된 품질과 태도의 매개효과를 통해 간접적으로 만족에 영향을 미친다는 점을 실증하였다. 이러한 연구 결과는 대학에서 온라인 교육 전략을 구상할 때, 학습자의 태도를 강화할 필요가 있다는 점을 강조한다. 본 연구에서는 연구 결과를 바탕으로, 이론적, 실용적 논의 및 함의를 제시하였다.

주요어 : 포스트 코로나19, 온라인 강의, 온라인 학습 경험, 맞춤형 학습 환경, 지각된 품질, 만족도

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Ⅰ. Introduction

In the context of higher education in South Korea, the widespread implementation of online clssses due to the emergence of COVID-19 provided an opportunity to expand online courses. For instance, during the COVID-19 period, universities adopted various tools such as ZOOM, Google Meet, Microsoft Teams for real-time video interaction, and dedicated Learning Management Systems to facilitate the comprehensive execution of online courses (Song & Yeom, 2023). In particular, due to the expansion of online courses resulting from COVID-19 and the establishment of new equipment and facilities to support this expansion, it is anticipated that the prevalence of online courses in universities will significantly increase compared to the period before the outbreak of COVID-19. However, contrary to the original intention of online courses, a phenomenon of significant decrease in learner satisfaction is being observed. Research investigating online courses at Korean universities (Jeong, 2021) revealed that students expressed dissatisfaction with subpar content and the lack of instructor competence. Given the reality of online courses in the context of South Korean higher education, it becomes necessary to explore the factors that influence university students' satisfaction with online courses. Especially, considering the active execution of online courses in Korean universities following the COVID-19 pandemic, conducting research to explore the variables influencing the quality and satisfaction of online courses is meaningful.

Therefore, the purpose of this study is to explore the variables influencing satisfaction with online courses in universities and their effects, while also providing insights that contribute to the effective implementation of online courses. To achieve this research objective, we draw upon existing literature (Kim, 2022; Nam & Seong, 2021; Zhai et al., 2017) to establish online learning experience, personalized learning climate, perceived quality, and attitude as key variables influencing satisfaction with online courses. Specifically, in this study, we set online learning experience and personalized learning climate as exogenous variables, while perceived quality and attitude serve as mediators. We systematically investigate the direct and indirect effects on satisfaction with online courses.

Ⅱ. Literature review

1. Online courses at universities

1.1. Characteristics of Online Courses

In the context of South Korean higher education, online courses can be broadly categorized into three periods: Pre-COVID-19 Era (up to 2019), COVID-19 Pandemic Period (2020-2022), and Post-COVID-19 Transition (starting from 2023). In addition, online education has gained recognition as a crucial tool in higher education before and after the COVID-19 pandemic. The current study on ‘online courses in universities’ after the end of the COVID-19 pandemic is essential to understand and enhance the unique challenges and opportunities specific to the Korean higher education context (See <Table 1>). The current study aims to explore the factors influencing students’ satisfaction with their online learning experiences and to provide insights into the future direction of online learning in Korean higher education.

<Table 1> Characteristics of online courses at universities in South Korea

Period	Characteristics	Main Contents	References
Pre-COVID-19 Era	Limited Online Presence	Online course was relatively limited, with only a small number of universities offering select courses online. Traditional classroom-based teaching remained the dominant mode	Choi (2017) Cho (2018)
	Supplementary Role	Online courses were often supplementary to in-person classes, offering flexibility for students to choose a blended learning approach if desired	Jeong (2022) Lee (2017)
	Basic Technological Integration	Learning Management Systems (LMS) were used for content distribution, but interactive elements and advanced digital tools were not extensively utilized	Choi (2019)
	Traditional Assessment Methods	Assessment primarily relied on traditional methods such as in-person exams, papers, and presentations. Online assessments were not widely employed	Kwon (2002)
	Faculty Training	Faculty members had varying levels of familiarity with online teaching methods, and professional development opportunities related to online pedagogy were limited	Ahn & Lim (2015) Hong & Lee (2016)

COVID-19 Pandemic Period	Rapid Transition to Online Course	The COVID-19 pandemic compelled universities to swiftly transition to online course due to campus closures. Virtual classes became the new norm	Jeong et al. (2020) Kim et al. (2021) Roh & Choi (2023)
	Online Platforms Expansion	Universities adopted video conferencing platforms like Zoom and Microsoft Teams for synchronous lectures, discussions, and collaboration among students	Cho (2021) Kim (2021)
	Digital Learning Resources	Online libraries, e-books, and academic databases gained prominence, becoming crucial resources as physical access to libraries was restricted	Ha (2023) Jang et al. (2022)
	Interactive Online Engagement	Educators incorporated breakout rooms, online quizzes, and discussion boards to enhance student engagement and participation during virtual classes	Park (2023) Seo et al. (2023)
	Assessment Adaptation	Assessment methods evolved, including online exams with monitoring tools, open-book assessments, and multimedia project submissions	Jung (2020) L. Lee (2022)
Post-COVID-19 Transition	Blended Learning Continuation	Universities embraced blended learning models, offering flexibility through a mix of in-person and online classes to cater to various learning preferences	Lee (2023) Park (2023)
	Hybrid Classrooms	Advanced hybrid classrooms equipped with interactive technology allowed for seamless integration of online and in-person students	Kim et al. (2023)
	Personalized Learning Paths	Adaptive learning platforms and AI-driven tools provided personalized learning experiences, catering to individual student needs and learning styles	Burm et al. (2023) Kim (2023)
	Lifelong Learning	Universities offered online modules and courses beyond traditional degree programs, catering to lifelong learners and professionals	Kim & Mun (2023)
	Faculty Development Focus	Institutions prioritized faculty training and development in online pedagogy, ensuring educators were proficient in delivering effective virtual education	Na (2023)

1.2. Exploring prior researches on perceptions of online courses at universities

Previous studies examining perceptions of online courses can also be classified into these three periods for further investigation. First, during the Pre-COVID-19 Era (2017-2019), research on perceptions of online courses in universities primarily focused on exploring learners' acceptance and effectiveness of online education. Second, during the period of COVID-19 outbreak (2020-2022), research on perceptions of online courses conducted at universities primarily focused on exploring the experiences and challenges of online learning, as well as satisfaction. Third, in the post-COVID-19 era (2023 and beyond), research on perceptions of online courses conducted at universities primarily focused on

exploring the variables and their influences that affect satisfaction. Particularly, during this phase, as most classes transitioned back to offline formats, research on perceptions of online courses in the post-COVID-19 period mainly concentrated on identifying the variables and influences that affect satisfaction (Jeong, 2023; Song & Yeom, 2023; Yoon & Kim, 2023). Moreover, a trend emerged in exploring factors affecting student satisfaction through aspects like online course preparation, learning engagement, teaching methods, utility, and intentions for continuous learning (Jeong, 2023; Song & Yeom, 2023; Yoon & Kim, 2023). In this context, examining students' perceptions of online courses and exploring the variables influencing satisfaction with these courses is meaningful. The current study aims to investigate these aspects. The previous studies exploring perceptions of online courses in Korean universities are summarized in <Table 2>.

<Table 2> Major prior studies on learners' perceptions of online courses at universities (2017-2023)

Period	Topic	Detailde contents	Researchers
Pre-COVID-19 Era	Exploring Acceptance Intention of Online Courses	Acceptance and Continued Usage Intentions of MOOCs	Cho (2019) Jeong (2017) Lee & Seo (2017)
	Exploring the Effectiveness of Online Courses	Strengths of Online Discussions, Outcomes of Online Courses, Effective Strategies for Online Learning	Chun (2019) Kim & Cho (2017)
COVID-19 Pandemic Period	Exploration of Online Courses Experience and Challenges	Online Learning Experiences, Challenges in Online Courses, Required Resources for Online Learning, Future Directions	Jeon (2020) Kim et al. (2021) Park & Han (2020)
	Exploration of Satisfaction in Online Courses	Satisfaction with Online Courses, Learning Attitudes, Online Practical Exercises, Online Interactions	Jang & Song (2021) Kim (2022) L. Lee (2022)
Post-COVID-19 Transition	Exploration of Factors and Influence on Satisfaction in Online Courses	Preparation for Online Courses, Learning Engagement, Teaching Methods in Online Learning, Perceived Usefulness of Online Courses, Intentions for Continued Online Learning, Approaches to Learning	Jeong (2023) Song & Yeom (2023) Yoon & Kim (2023)

2. Variables affecting satisfaction with online courses

First, online learning experience refers to the learner's engagement in various activities within the online context, such as attending lectures, interacting with instructors and peers, completing assignments, and taking exams (Jeon, 2020). The concept of online learning experience includes familiarity with various platforms and methods that facilitate education,

learning, and assessment within the online environment. Particularly, considering the prevalence of offline learning activities in the educational context, a learner's past experiences related to online learning can be seen as crucial factors influencing their current participation in online learning (Chen et al., 2011). Therefore, it can be stated that learners' prior learning experiences significantly affect their engagement in online learning activities.

Second, personalized learning climate refers to an educational approach aimed at adjusting instruction according to learners' individual learning styles and paces (Dabbagh & Kitsantas, 2012). In addition, personalized learning climate signifies a learner-centered approach tailored to the unique needs of individual learners (Schmid et al., 2022). This personalized approach is closely related to online learning (McLoughlin & Lee, 2010). The personalized learning climates have a close association with learners' learning in online education. The current study aims to present the concept of personalized learning climates related to online learning as the extent to which university students can adjust their learning pace, workload, content, and assignments according to their own learning styles and explore its structural relationship with perceived quality, attitudes, and satisfaction.

Third, perceived quality is a term primarily used in the field of business (Parasuraman et al., 1988) that refers to users' subjective evaluations of excellence or superiority that become evident after using specific content, goods, or services (Zeithaml, 1988). Thus, the concept of perceived quality in online courses is a concept with multifaceted meanings, making it not easy to encapsulate and measure within a single concept or meaning. However, the perceived quality of online courses by learners is related to their perceptions of high-quality learning activities that align with the educational institution's curriculum (Chapman & Henderson, 2010). Therefore, the current study aims to define the perceived quality related to online courses as the extent to which learners perceive the effectiveness, reliability, assurance, and responsiveness of various content and instructor-learner activities delivered online.

Fourth, attitude is a relatively stable belief system that represents an emotional state in response to external stimuli, such as events, people, or objects (Fishbein & Ajzen, 1975). Attitudes refer to emotional responses towards specific objects, content, or behaviors and tend to have a future-oriented aspect rather than being focused on the present. According to Jang & Song (2021), attitudes toward online courses were found to significantly influence

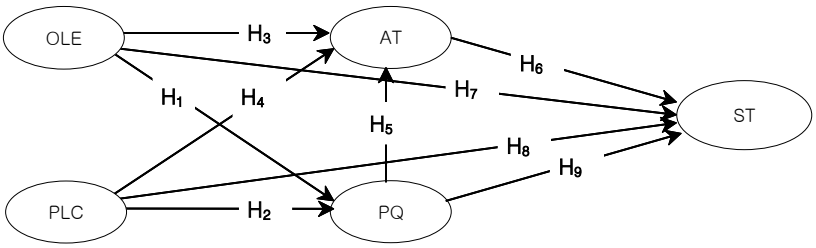
satisfaction. They mentioned that when learners perceive the quality of online courses as useful, they tend to exhibit more positive attitudes and this positive attitude also positively impacts satisfaction (Jang & Song, 2021). Based on prior researches, the current study aims to define attitudes related to online courses as the extent to which participating in online learning activities is perceived as enjoyable, wise decision-making, and a valuable effort, serving as a meaningful means to achieve predetermined learning objectives.

In the current study, satisfaction refers to the cognitive and affective perception of an individual that emerges after experiencing a purchased product or service for which payment has been made (Tse & Wilton, 1988). Satisfaction represents the cognitive and affective perception in terms of the aspects induced in an individual after utilizing a product or service (Ha & Jang, 2010). Furthermore, a satisfaction denotes the extent to which the acquired state of contentment (cognitive judgment) through the experience of a acquired product or service provides or enhances pleasure (affective judgment) (Oliver, 1997), signifying the level of emotionally perceived need fulfillment or satisfaction. Satisfaction in educational activities is a comprehensive outcome derived from learners' ongoing cognitive and emotional responses, encompassing the degree of fulfillment in achievements such as relevance, attention, and confidence (S. N. Lee, 2022). Accordingly, the present study defines satisfaction as satisfaction with course content, learning activities and engagement, and course selection in online learning and explores its structural relationship with influencing variables.

Ⅲ. Research Framework and Hypotheses

1. Proposed model

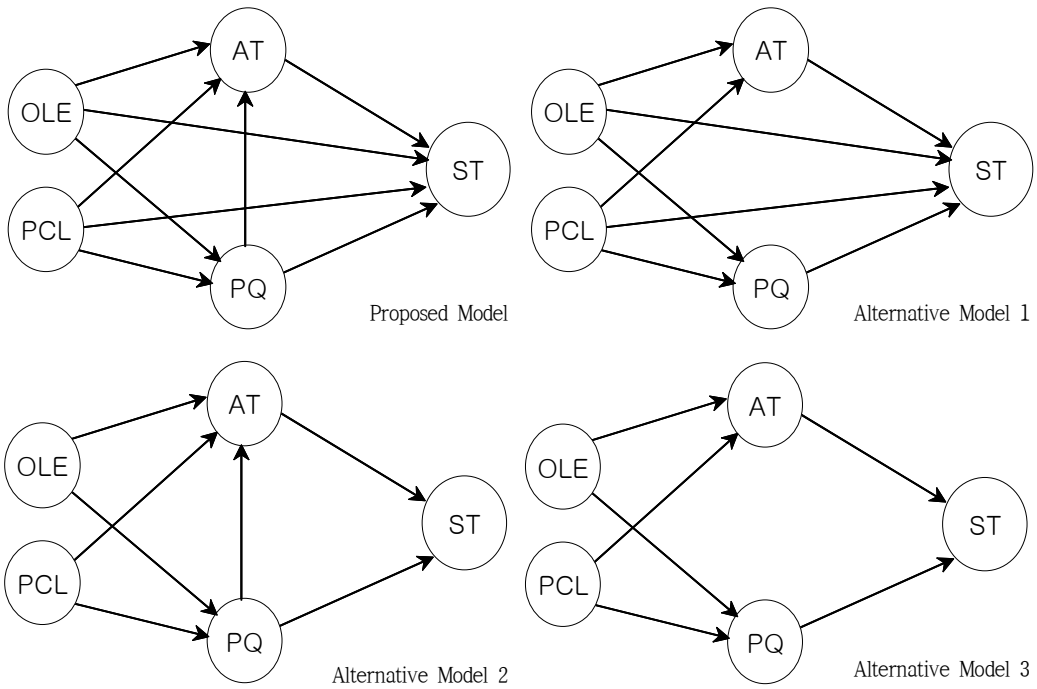
Based on relevant prior studies (Kim, 2022; Nam & Seong, 2021; Zhai et al., 2017), the proposed model was developed (See [Figure 1], [Figure 2]).



Note. OLE(online learning experience), PLC(personalized learning climate), PQ(perceived quality), AT(attitude), ST(satisfaction)

〔Figure 1〕 Hypothetical proposed model

2. Alternative model



Note. OLE(online learning experience), PLC(personalized learning climate), PQ(perceived quality), AT(attitude), ST(satisfaction)

〔Figure 2〕 Proposed model & Alternative model

3. Meaning of variables and research hypotheses

The operational definitions of the research variables and the hypotheses are presented in <Tables 3> and <Table 4>.

<Table 3> Research hypotheses

	Hypotheses	P	A1	A2	A3	References
H1	The online learning experience of university students will have a positive impact on perceived quality	○	○	○	○	Lee & Tsai (2010) Zhai et al. (2017)
H2	The individualized learning climate associated with online courses for university students will have a positive impact on perceived quality	○	○	○	○	Schmid et al. (2022) Zhai et al. (2017))
H3	The online learning experience of university students will have a positive impact on attitude	○	○	○	○	Colaco et al. (2023) L. Lee (2022)
H4	The individualized learning climate associated with online courses for university students will have a positive impact on attitude	○	○	○	○	Aviran & Blonder (2023) Park et al. (2023) Schmid et al. (2022)
H5	The perceived quality of online courses for university students will have a positive impact on attitude	○		○		Han & Kim (2023)
H6	The attitude of university students towards online courses will have a positive impact on satisfaction	○	○	○	○	Jang & Song (2021) Kim (2022) L. Lee (2022) Park & Kwon (2023)
H7	The online learning experience of university students will have a positive impact on satisfaction	○	○			S. N. Lee (2022) Park & Han (2020) Teo (2013) Zhai et al. (2017)
H8	The individualized learning climate associated with online courses for university students will have a positive impact on satisfaction	○	○			Chen et al. (2005) McLoughlin & Lee (2010) Zhai et al. (2017)
H9	The perceived quality of online courses for university students will have a positive impact on satisfaction	○	○	○	○	Annamdevula & Bellamkonda (2016) Waheed et al. (2016)

Note. P(proposed model), A(alternative model)

<Table 4> Operational definitions of variables

Variables	Operational definition	References
Online Learning Experience	The extent of participation in online courses, such as e-learning, ICT-based lectures, blended learning, cyber courses, or MOOC courses, experienced by university students	Gogus (2023) Jeon (2020)
Personalized Learning Climate	The degree to which university students can adjust their learning pace, learning volume, learning content, and learning tasks according to their own learning styles, providing an environment for personalized learning	Dabbagh & Kitsantas (2012) McLoughlin & Lee (2010) Schmid et al. (2022) Zhai et al. (2017)
Perceived Quality	The perceived effectiveness, reliability, confidence, and responsiveness of various online content and teaching-learning activities provided through online platforms	Setterstrom et al. (2013)
Attitude	The degree to which students perceive participating in online learning activities as enjoyable, wise decision-making, valuable effort, and a meaningful means of achieving set learning goals	Jang & Song (2021) L. Lee (2022) Kim (2022)
Satisfaction	Satisfaction with the lecture content, learning activities and participation, and course selection in online learning	Oliver (1997) Zeithaml (1988)

Ⅳ. Method

1. Participants

The current study was conducted with undergraduate students enrolled in the department of education at a 4-year university located in the metropolitan area of South Korea. The participants in the current study used personal computers, laptops, tablets, or mobile devices to take online courses. In addition, the participants completed the “Gender awareness education program“ (5th session) offered online during the spring semester of 2023. In this study, an online survey was conducted in June 2023 targeting undergraduate students with the backgrounds mentioned above. The specific background variables of the participants in this study are presented in <Table 5>.

<Table 5> Background variables of the participants

Division		Frequency (*n*)	Ratio (%)
Gender	Male	50	30.3
	Female	115	69.7
Grade	1st grade	21	12.7
	2nd grade	51	30.9
	3rd grade	56	34.0
	4th grade	37	22.4
Major	Christian education	30	18.2
	English education	33	20.0
	Korean history education	27	16.4
	Early childhood education	75	45.4
Main devices for taking online courses	Laptop	113	68.5
	Desktop	8	4.8
	Tablet pc	29	17.6
	Smartphone	15	9.1
Space for taking online courses	Personal study space (room, study, etc.)	140	84.8
	Collaborative learning spaces (university libraries, empty classrooms, etc.)	10	6.1
	Rest and convenience spaces (university color hall, cafe, etc.)	14	8.5
	On the move (bus and subway)	1	0.6
How to take an online course 1 (time plan)	Attend regularly at the scheduled time	64	38.8
	Free class with no scheduled time	98	59.4
	I don't remember	3	1.8
How to take an online course 2 (Repeat course)	Take all courses only once, without repetition	87	52.7
	Take some courses twice	65	39.4
	Repeatedly taking some courses 3 or more times	7	4.3
	I don't remember	6	3.6
Total		165	100.0

2. Development of research tools and procedures

Questionnaires for each constitutive variable were structured by primarily focusing on highly valid survey questions utilized in previous research. First, for Online Learning Experience (OLE), the survey items were developed based on studies such as Chen et al. (2011), Lee & Tsai (2010), Teo (2013), and Zhai et al. (2017). Survey items related to the Personalized Learning Climate (PLC) were derived from research by Chen et al. (2005),

Dabbagh & Kitsantas (2012), McLoughlin & Lee (2010), Mohd & Shahbodin (2013), and Zhai et al. (2017). Questionnaire items associated with Perceived Quality (PQ) were created by drawing upon studies like Annamdevula & Bellamkonda (2016), Chiu et al. (2005), and Sebastianelli et al. (2015). Survey questions pertaining to Attitude (AT) were based on research by Bhattacherjee (2001a, 2001b). Lastly, satisfaction survey questionnaire items were constructed using research by Setterstrom et al. (2013), and Wang et al. (2015).

Adapting survey items for assessing university students' satisfaction with online courses post-COVID-19, translation and refinement of English items into Korean were undertaken. In consultation with three Ph.D. experts experienced in online course, 6-8 items per variable were selected. Validation included review by eight experts in online education, with retention of items achieving a CVR of .78 or higher. To ensure practical applicability, feedback from three non-participating university students was sought, contributing to the finalization of the research instrument. The results of the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for the research instrument showed a value of .871, and the Bartlett's test of sphericity yielded a statistic of 2377.895 ($p<.001$). Descriptive statistics and correlation analysis were conducted using SPSS 22, while confirmatory factor analysis and structural equation modeling analysis were performed using AMOS 22 for statistical processing. The main contents of the survey items are summarized in <Table 5>.

Ⅴ. Result

1. Validation of research instruments

1.1 Reliability of research instruments

The reliability of the research instruments was validated through confirmatory factor analysis based on factor loading, composite reliability, and average variance extraction. In this study, the commonly accepted thresholds from previous research were employed as minimal criteria: factor loading ≥ .70, conceptual reliability ≥ .70, and average variance extraction ≥ .50. The validation results revealed that the range of factor loading was between .777 and .890, conceptual reliability ranged from .885 to .918, and average

variance extraction ranged from .659 to .736. These outcomes exceeded the minimum thresholds, affirming the reliability of the research instruments (Refer to <Table 6>, <Table 7>).

<Table 6> Main Content of Survey Items

Variables	Main contents	References
Online Learning Experience	University students' perceptions of their experiences with e-learning, courses using ICT, cyber courses, or MOOCs	Chen et al. (2011) Lee & Tsai (2010) Teo (2013) Zhai et al. (2017)
Personalized Learning Climate	University students' perceptions of the appropriateness of learning content and workload, suitability of learning activities and assignment difficulty, support for personalized learning strategies, and flexibility in learning approaches, among other individual learning environment aspects	Chen et al. (2005) Dabbagh & Kitsantas (2012) McLoughlin & Lee (2010) Zhai et al. (2017)
Perceived Quality	University students' perceptions of the effectiveness, reliability, responsiveness, and confidence in online courses.	Annamdevula & Bellamkonda (2016) Sebastianelli et al. (2015) Tsai et al. (2012) Zhai et al. (2017)
Attitude	University students' perceptions of online course enrollment as an enjoyable and wise decision, a valuable process, and an important means for achieving goals	Bhattacherjee (2001a, 2001b)
Satisfaction	University students' perceptions regarding satisfaction derived from the content provided in online courses, individual satisfaction levels, alignment of content with individual satisfaction, and the impact of fulfilling online content on learning and problem-solving experiences in online courses	David (2011) Setterstrom et al. (2013) Wang et al. (2015)

<Table 7> Confirmatory factor analysis results

Variable	Item	*M*	*SD*	Factor Loding (λ) (>.70)	Reliability (λ^2) (>.50)	Composite Reliablity (>.70)	AVE (>.50)
OLE	OLE1	4.16	.937	.802	.643	.885	.659
	OLE2	4.26	.847	.785	.616		
	OLE3	4.31	.901	.859	.738		
	OLE4	4.17	.867	.799	.638		
PLC	PLC1	4.15	1.049	.878	.771	.918	.736
	PLC2	4.21	1.017	.857	.734		
	PLC3	4.12	1.095	.890	.792		
	PLC4	4.39	.909	.804	.646		

PQ	PQ1	4.04	1.112	.814	.663	.916	.731
	PQ2	3.98	1.104	.864	.746		
	PQ3	4.07	1.048	.860	.740		
	PQ4	4.05	1.147	.881	.776		
AT	AT1	4.32	.961	.835	.697	.890	.670
	AT2	4.30	.933	.878	.771		
	AT3	4.27	.931	.780	.608		
	AT4	4.33	.865	.777	.604		
ST	ST1	3.51	1.323	.815	.664	.905	.703
	ST2	3.38	1.206	.851	.724		
	ST3	3.47	1.233	.833	.694		
	ST4	3.52	1.328	.855	.731		

Note. OLE(online learning experience), PLC(personalized learning climate), PQ(perceived quality), AT(attitude), ST(satisfaction)

1.2. Validity of research instruments

The validity of the research instruments was assessed through discriminant validity (Segars & Grover, 1998). For discriminant validity, when the square root of the average variance extracted (AVE) exceeds the correlations between constructs, it is considered significant (Anderson & Gerbing, 1988). The validation results indicate that the square root of the AVE for all variables used in the current study exceeded the corresponding correlation values (<Table 8> for details). Through the verification of reliability and validity of the aforementioned research instruments, it can be confirmed that the tools employed in the current study are suitable for the application of structural equation modeling.

<Table 8> Discriminant validity verification results

Construct	AVE	OLE	PLC	PQ	AT	ST
OLE	.659	.812				
PLC	.736	.245**	.858			
PQ	.731	.142	.335**	.855		
AT	.670	.224**	.409**	.491**	.819	
ST	.703	.163*	.288**	.419**	.519**	.838

* $p<.05$. ** $p<.01$,

Note. The italicized values on the diagonal represent the square root of AVE (Average Variance Extracted). OLE(online learning experience), PLC(personalized learning climate), PQ(perceived quality), AT(attitude), ST(satisfaction)

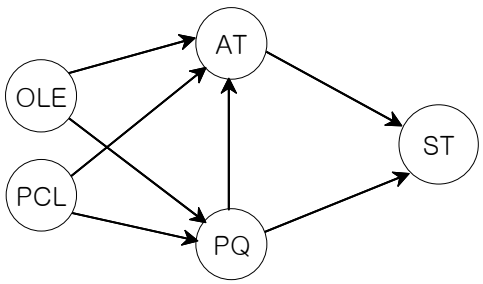
2. Comparison and analysis of proposed model and alternative model's goodness of fit

In the current study, the comparison of goodness of fit between the proposed model and the alternative models presented earlier was conducted. To assess the models' goodness of fit, various indices such as χ^2/df, GFI, NFI, RFI, IFI, TLI, CFI, and RMSEA were utilized. The results revealed that the goodness of fit of alternative model 2 was superior compared to the other models, as evidenced by the comparison of these fit indices (See <Table 9>).

<Table 9> Results of goodness of fit analysis for proposed model vs. alternative model

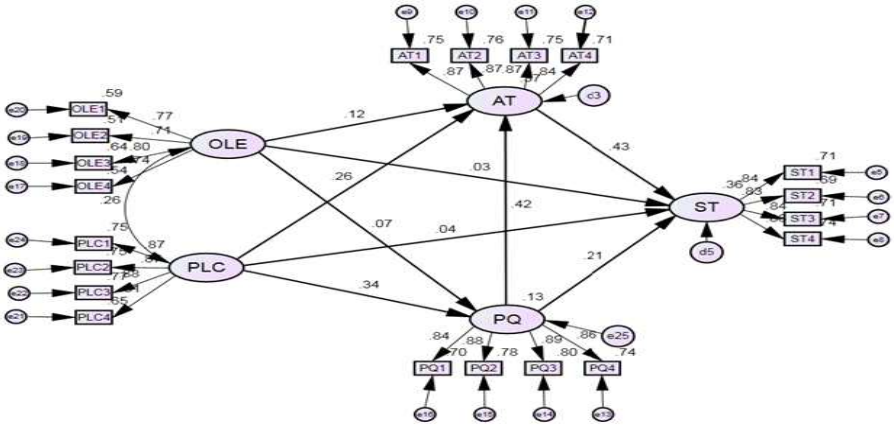
Models	χ^2	χ^2/df	GFI	NFI	RFI	IFI	TLI	CFI	RMSEA
Proposed Model	227.177	1.420	.878	.909	.892	.971	.965	.971	.051
Alternative Model 1	254.583	1.581	.868	.898	.879	.960	.952	.959	.060
Alternative Model 2	227.637	1.405	.878	.909	.893	.972	.967	.971	.050
Alternative Model 3	254.966	1.564	.868	.898	.881	.961	.953	.960	.059

Based on the analysis, the alternative model 2 has been selected as the research model for the current study (See [Figure 3]). This model was used to test the research hypotheses (See [Figure 4]).

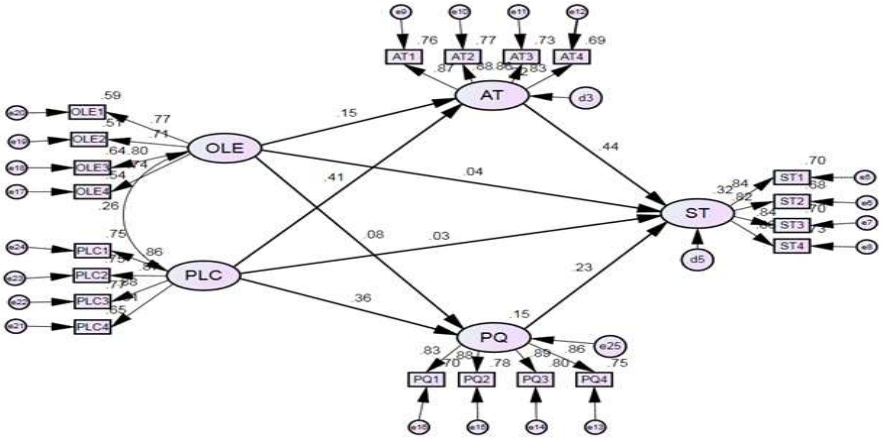


OLE(online learning experience),
PLC(personalized learning climate),
PQ(perceived quality),
AT(attitude),
ST(satisfaction)

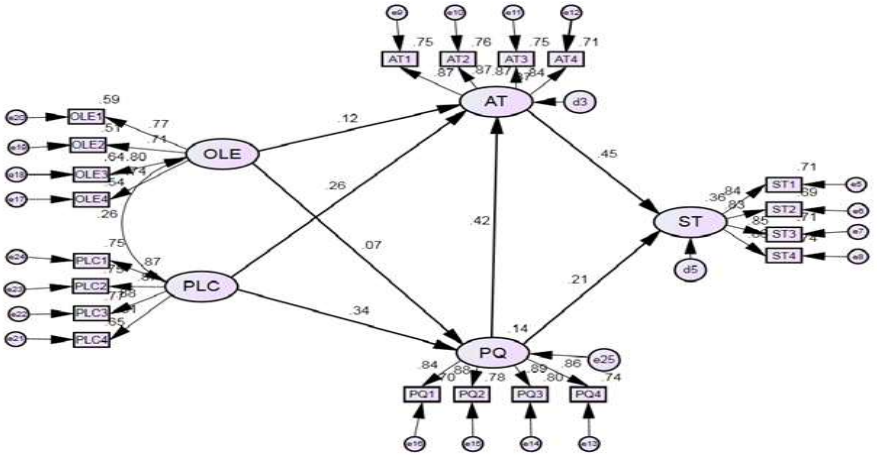
〔Figure 3〕 Alternative model 2 (Research model)



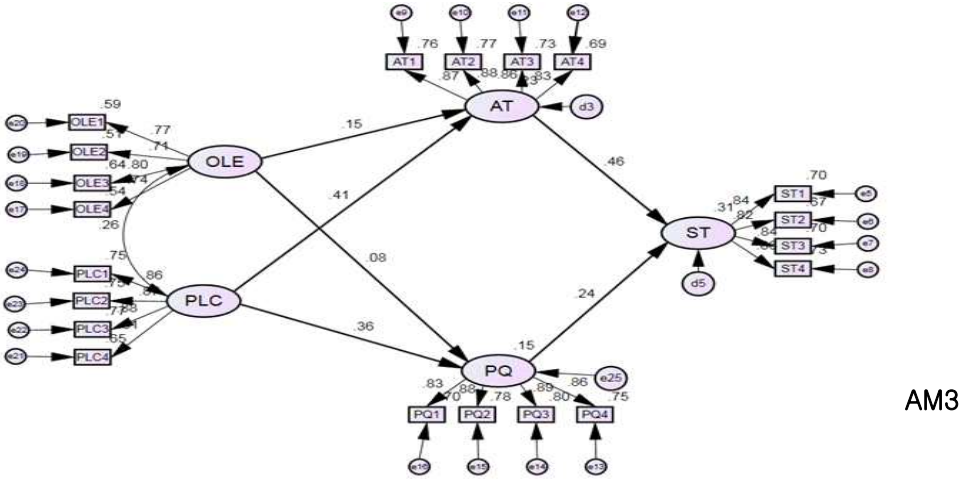
PM



AM1



AM2



〔Figure 4〕 Path diagram analysis of proposed model and alternative model

Note. OLE(online learning experience), PLC(personalized learning climate), PQ(perceived quality), AT(attitude), ST(satisfaction) PM(Proposed Model) AM(Alternative Model)

3. Hypothesis testing of the research model

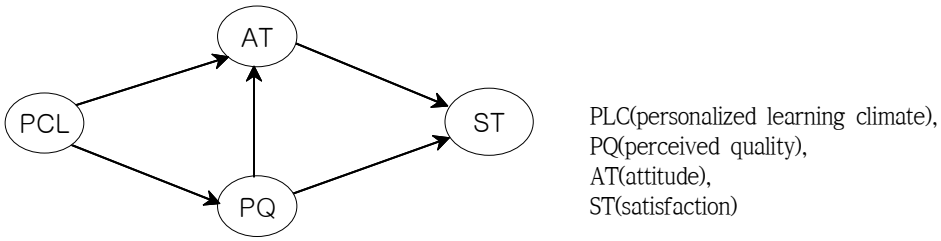
Upon validating the hypotheses in the research model, out of the total seven hypotheses, five were found to be significant, excluding 'PLC→PQ' and 'OLE→AT'. First, it was observed that PLC had a significant impact on PQ (β=.343, p<.001), though the initially anticipated relationship of 'OLE→PQ' did not yield significance. Consequently, H1 was accepted while H2 was rejected. Second, both PLC and PQ significantly influenced AT separately. However, the originally hypothesized 'OLE→AT' did not yield significance. Therefore, H4 and H5 were accepted while H3 was rejected. When comparing the influence on AT by the two variables that exhibited significance, it was found that PQ (β=.418, p<.001) had a larger effect compared to PLC (β=.259, p<.01). Third, both AT and PQ significantly influenced AT, supporting H6 and H7. In terms of their impact on satisfaction, when comparing the influence of the two variables, it was found that AT (β=.455, p<.001) had a stronger influence compared to PQ (β=.213, p<.05) (<Table 10> and [Figure 5] for reference).

<Table 10> Hypothesis testing results

No.	Hypothesis Paths			Coefficient		S.E.	C.R.	Results
				Standardized	Unstandardized			
H1	OLE	→	PQ	.070	.108	.134	.803	×
H2	PLC	→	PQ	.343	.462	.117	3.955***	○
H3	OLE	→	AT	.121	.157	.101	1.561	×
H4	PLC	→	AT	.259	.294	.092	3.208**	○
H5	PQ	→	AT	.418	.353	.068	5.217***	○
H6	AT	→	ST	.455	.610	.122	4.984***	○
H7	PQ	→	ST	.213	.242	.099	2.443*	○

* $p<.05$, ** $p<.01$, *** $p<.001$

Note. OLE(online learning experience), PLC(personalized learning climate), PQ(perceived quality), AT(attitude), ST(satisfaction)

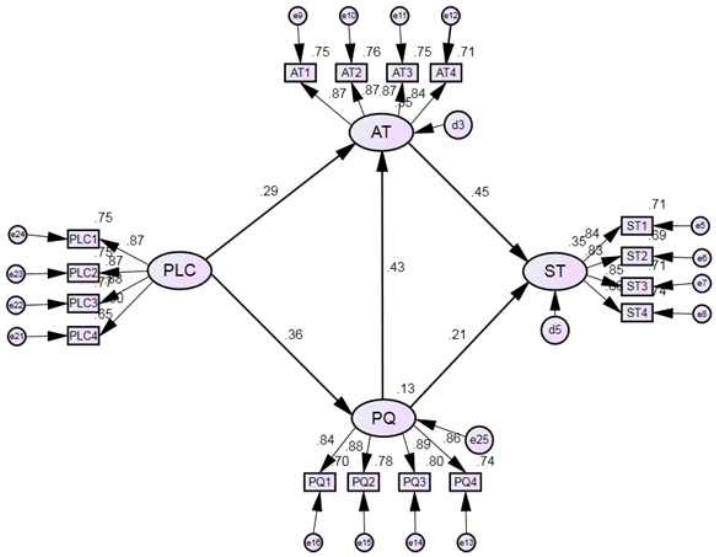


〔Figure 5〕 Modified model

The comparison of fit indices between the two models revealed that the modified model exhibited higher values for GFI, NFI, RFI, and CFI, while the proposed model had higher values for χ^2/df, TLI, and RMSEA (See <Table 11> and [Figure 6]). The IFI value remained consistent between the two models. Therefore, considering the higher fit indices and the simpler paths between variables, the modified model was selected as the final model in the current study. Based on this final model, the relationships among variables were analyzed structurally.

<Table 11> Fit indices comparison between alternative model 2 and modified model

	χ^2	χ^2/df	GFI	NFI	RFI	IFI	TLI	CFI	RMSEA
Research Model	227.637	1.405	.878	.909	.893	.972	.967	.971	.050
Modified Model	155.992	1.576	.894	.928	.912	.972	.966	.972	.059



〔Figure 6〕 Path diagram analysis of the final model

Note. PLC(personalized learning climate), PQ(perceived quality), AT(attitude), ST(satisfaction)

4. Exploring the influence of variables on satisfaction

In this study, utilizing bootstrapping, I analyzed the structural relationships among variables and the direct, indirect, and total effects of variables on satisfaction with non-face-to-face adult social education. The results of the analysis are presented as follows. First, PLC exerts an indirect significant influence on ST through PQ and AT. For instance, paths such as ① PLC → PQ → AT → ST, ② PLC → PQ → ST, and ③ PLC → AT → ST were identified as influencing factors (β=.278, p<.01). Second, PQ was found to have a direct and indirect significant influence on ST through AT. Paths such as ① PQ → AT → ST and ② PQ → ST were identified as influencing factors (β=.408, p<.05). Third, AT was found to have a direct significant influence on ST (β=.454, p<.05). The direct and indirect influences of variables on satisfaction with non-face-to-face adult social education are presented in <Table 12>.

<Table 12> Analysis results of variables influencing satisfaction

A \ B	PQ			AT			ST		
	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
PLC	.362*	-	.362*	.287*	.154*	.442*	-	.278*	.278*
PQ				.427*	-	.427*	.214*	.194*	.408*
AT							.454*	-	.454*

* $p<.05$

Note. PLC(personalized learning climate), PQ(perceived quality), AT(attitude), ST(satisfaction)

Ⅵ. Discussion and Conclusion

The purpose of the current paper is to establish an optimal model for understanding factors influencing satisfaction among South Korean university students taking online courses. This involves formulating and selecting models, exploring paths, confirming a modified final model, and deriving direct and indirect impacts of variables on satisfaction. The main findings are subsequently discussed.

First, the present study empirically confirms the significance of attitude as a key determinant of satisfaction in university-level online courses. South Korean university students' attitudes towards online courses significantly influence satisfaction, demonstrating the crucial role of attitudes in shaping the relationship between the online learning experience and satisfaction. These findings align with prior research (Jang & Song, 2021; Kim, 2022; L. Lee, 2022), reinforcing the established link between attitude and satisfaction. The current study extends existing literature by providing empirical validation, particularly emphasizing that satisfaction among students adapting to online courses during COVID-19 is intricately tied to their attitudes. Policymakers and educators are urged to prioritize learners' attitudes in formulating online education strategies. The results underscore the imperative of cultivating positive attitudes to enhance the online learning experience and foster a satisfying environment. Universities are encouraged to actively influence shifts in students' attitudes toward online courses, anticipating positive outcomes such as increased participation and engagement, ultimately contributing to favorable learning experiences.

Second, the present study provides empirical evidence that perceived quality in university

online learning significantly influences satisfaction both directly and indirectly through the mediating role of attitude. The findings highlight the crucial role of perceived quality in shaping the satisfaction of South Korean university students with their online learning experiences. This contributes to existing knowledge on the relationship between perceived quality and satisfaction, reinforcing previous research findings (Waheed et al., 2016). Remarkably, the current study stands out by empirically demonstrating the post-COVID-19 impact of perceived quality on online learning satisfaction, mediated by attitude. Additionally, we emphasize that students maintaining a positive attitude towards online learning are more likely to perceive it as a valuable asset in their educational journey. Consequently, our study underscores the significance of perceived quality in university online learning, offering insights into strategies for enhancing learner satisfaction and attitudes. Improving perceived quality emerges as a crucial factor for elevating the overall learning experience and effectively implementing online education, contributing novel perspectives to scholarly and pedagogical discussions on enhancing online education and fostering learner engagement.

Third, the present study empirically establishes that a personalized learning climate indirectly influences satisfaction through the mediation of perceived quality and attitude. These findings reinforce previously explored relationships like personalized learning climate-perceived quality (Schmid et al., 2022; Zhai et al., 2017), personalized learning climate-attitude (Aviran & Blonder, 2023; Park et al., 2023), and personalized learning climate-satisfaction (McLoughlin & Lee, 2010). Distinguishing itself from prior research, our study provides additional clarity by establishing a structural relationship wherein a personalized learning climate is intricately linked to perceived quality, attitude, and satisfaction. Moreover, our findings emphasize that learners' online learning experiences do not significantly impact perceived quality or attitude. This highlights a new dimension of post-COVID-19 online learning, suggesting that the pandemic has brought about these changes. In contrast to earlier research findings (Park & Han, 2020; Zhai et al., 2017), our study suggests an evolution in the nature of online learning due to the effects of COVID-19. Participants in our study, all experienced in pandemic-era online learning, suggest a potential reduction in its impact on perceived quality and attitude. However, comprehensive research is needed to fully grasp the extent of the online learning experience's influence.

Based on the foregoing discussions, several implications can be drawn. First, university authorities must develop strategies to boost students' attitudes toward online learning, given its empirical link to satisfaction. Prioritizing positive student attitudes in future online education strategies is crucial for overall satisfaction and engagement. Second, efforts should be directed towards enhancing the quality of online education, as the study establishes the direct and indirect influence of perceived quality on satisfaction. Improving perceived quality in the post-COVID-19 online education landscape is vital for effective planning and execution. Third, universities should focus on providing personalized learning environments, acknowledging their indirect impact on satisfaction through perceived quality and attitudes. Tailored online learning experiences for each student are essential. Lastly, creating a strategic online learning environment is emphasized, with a need to improve attitudes and perceived quality. Universities should strategically design an environment aligning with student attitudes for successful online education implementation.

The current paper has several limitations that should be taken into consideration when interpreting the results. First, there is a limitation in the sample's representativeness. the current paper targeted online learning within South Korean universities after the conclusion of COVID-19. As a result, the generalization of paper findings to online learning situations in other regions or timeframes might be restricted. Including samples from more diverse regions and timeframes could enhance the validity of research results. Second, there is a limitation due to the cross-sectional research design. the current paper derived results through a cross-sectional research design. However, such a design may have limitations in clearly establishing causality between causes and outcomes. To achieve a clearer understanding of causality between causes and outcomes, consideration of experimental or longitudinal research designs could be beneficial. Third, there are limitations related to self-report data. The data used in the current paper largely rely on learners' self-reporting. Such data are based on subjective perceptions and might differ from actual behaviors. This introduces the possibility of result distortion, and for more accurate results, the utilization of objective data collection methods could be more desirable. Fourth, there could be a lack of consideration for various variables that might influence satisfaction. While the current paper primarily focuses on the relationship between personalized learning environments, perceived quality, attitudes, and satisfaction, various external variables (e.g., personal characteristics, learning approaches, technological competencies) could affect the

outcomes. Investigating the impact of these external variables to generate more comprehensive results should be considered. In the future, building upon robust research methods and targeting, as well as employing well-defined measurement tools, I hope for studies that can minimize these limitations. Such studies would be capable of offering effective strategies to enhance satisfaction in online learning within universities while considering these limitations.

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