

Print ISSN: 2288-4637 / Online ISSN 2288-4645  
doi:10.13106/jafeb.2021.vol8.no6.0327

# Investigation of College Students' Intention to Accept Online Education Services: An Application of the UTAUT Model in Korea

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Received: February 20, 2021 Revised: April 20, 2021 Accepted: May 02, 2021

## Abstract

This study acknowledges the necessity to make changes in the domestic education service market given the coronavirus (COVID-19) pandemic outbreak in the fourth industrial revolution era. Considering the change from traditional classroom education service to online education service, we measure the online education service quality and investigate its effects on its acceptance intention among college students. We employ the SERVQUAL measurement model, a universal method with the longest history. In measuring acceptance intention, we use the unified theory of acceptance and use of technology (UTAUT), an accurate measurement method for the effect on acceptance intention of introducing new technology. So, this study mainly focuses on SERVQUAL and UTAUT as these tools relate to online education. The research results show that all five sub-factors of the online education service quality have positive correlations with acceptance intention. The higher the empathy with the online education service quality and the higher the performance expectancy and social influence in the UTAUT model, the higher the college students' intention to accept the online education service. Given that the significance of online education service will likely further increase in the future, this study can serve as a reference for preparing a practical framework.

**Keywords:** Online Education Service, SERVQUAL, UTAUT

**JEL Classification Code:** I2, I21, I23, I25

## 1. Introduction

The advent of the fourth industrial revolution era and the spread of COVID-19 have compelled the entire world to adapt the new normal of online activities. Thomas Friedman (2020) proposed a new division before and after COVID-19 – Before Coronavirus (BC) and After Coronavirus (AC) – emphasizing the expected changes in the online society and their significance. The development of Information Technology (IT) and the Internet also expands the domain of the online life zone. Akim (2018) reported that effective utilizations of IT should play important roles in today's market competition on products and service sectors for continue revenues. The above events emphasize the significance and role of

online. The Emergency Economy Central Countermeasure Headquarters (EECCCH), supervised by the Finance Minister, proposed the outline Korean version of the New Deal Policy (Yonhap News, 2020). In particular, the EECCCH supported the conversion to the digital economy, preparation for the fourth industrial revolution era, and investments in online industrial infrastructure, like post-COVID-19 medicine or education.

In South Korea, affected by the fall in school-age population and freezing tuition, each college is in crisis. As the government evaluates colleges each year, their survival is also threatened through strict entrance quotas and financial support reduction. Consequently, each college seeks a way out through global market development and industry-academic cooperation for survival, which is difficult to achieve.

Lee (2004) and Kang (2011) reported that colleges could have a competitive advantage only when they develop competitiveness through education service improvement. Choi and Jung (2014) defined that responding to rapid changes in the college education environment and providing top-notch service quality addressing student demands are critical. Lee and Seong (2020) reported that universities have been undergoing rapid changes in the educational

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environment these days, and there are constant needs for development and enhancement of service quality.

On this basis, this study aims to understand the factors affecting users' intention to accept the online education service in an early stage of revitalization and investigate the effects of these factors on their acceptance intention. We design our main research model based on the unified theory of acceptance and use of technology (UTAUT). We prove the superior performance of the proposed model in analyzing the potential factors affecting users' acceptance intention at the time of the introduction of new technology as follows: First, we consider the characteristics of the online education service quality by selecting the major quality variables of SERVQUAL (reliability, tangibles, responsiveness, assurance, and empathy) as the variables of service quality. Then, we investigate their effects on users' acceptance intention as the independent variables.

In this study, we reveal the factors affecting users' intention to accept the online education service quality. We expect that our results and their practical implications for domestic colleges and students will contribute to the further growth and development of the domestic online education service industry.

## 2. Literature Review

### 2.1. Online Education

Online education has prepared instructors and learners to adapt fast to the digital education environment brought by the COVID-19 pandemic and the fourth industrial revolution era. The lifestyle characterized by the development of artificial intelligence, the use of big data, and personalized learning based on data eventually become the new normal (Yoon, 2020). Online education has required all domestic instructors to use education technology (edu-tech) in their remote classes. The effect of actively utilizing the online education system will linger even after educators and students return Traditional classroom education. Online education is also called online class, online video class and online remote learning.

At the college level, online education has two classifications: non-real-time and real-time. The former commonly conducts courses, assignments, and assessments using prerecorded lecture videos, PowerPoint materials, and learning resources through an online system (e.g., LMS) operated by each college (Oh, 2020). In other words, once instructors upload lecture materials through electronic device media, learners freely use their space and time to study, looking at the lecture materials. By contrast, the latter is characterized by instructors and learners' participation in a class at a fixed time. It has the advantage of easy interactions between instructors and learners or simultaneous discussions among learners through smooth real-time communication (Seo & Bang, 2019). In real-time systems with the development of online education, educators and learning institutions use platforms, such as Zoom, Webex, Google Meet, and Microsoft Teams, and

develop various methods to conduct classes. These platforms were originally developed and used for business purposes (e.g., video conferences) rather than for education, but as the domain of online education expanded due to the COVID-19 pandemic, the domain of use of these platforms expanded to online education (Kim, 2020). Choi, Kwon, and Choi (2020) noted a negative evaluation in the domestic education system that online classes would hardly improve learning the Korean language. At the same time, many study participants considered real-time online classes in 2020 helpful in other domains, including learning the Korean language. Kwon and Song (2017) reported that online classes had a few disadvantages, but over time, they have become accustomed to the online system, and above all, professors and learners have been able to actively communicate in real time. Given the significance and increase in the utilization of online education due to the current health crisis, this study investigates the factors affecting the reception of the online education service in the future by measuring the online education service quality.

### 2.2. Service Quality

Kotler (1991) defined service as “an activity or benefit that one party can offer to another that is essentially intangible and does not result in the ownership of anything. Its production may or may not be tied to a physical product.” Service has the four main characteristics of intangibility, inseparability, variability, and perishability (Kotler, 1991). In other words, service can neither be heard nor felt before being delivered. It is consumed simultaneously with production and cannot be separated from its providers. This concept has severe variability depending on who, when, and where it is provided and cannot be stored.

To sum up the above definition and several other definitions of service, we describe service as an intangible force performed to satisfy human needs. It is intangible but physical, simultaneous between providers and consumers, temporary and spatial, and perishes simultaneously with production. Service is the force carried out to meet human needs. Eventually, customers assume that service quality in terms of how much satisfaction they have received from the service (Klongthong, Thavorn, Wacharadamrongkun, & Ngamkroekjoti, 2020). The quality of service is the size of the force carried out to meet human needs, in other words, the degree of consumer satisfaction with the performed service.

### 2.3. Components of Service Quality

In general, the value of the firm increases shown by Parasuraman, Zeithaml, and Berry's (1988) series of studies on service quality through surveys with service providers and consumers since 1983. In their study conducted in 1985, they found that, regardless of the type of service provided, consumers have ten main criteria in evaluating service quality (i.e., reliability, responsiveness, competence, access,

courtesy, communication, credibility, security, understanding [knowing], and tangible). They classified these criteria as “service quality decision factors.” As the factors with similar characteristics were integrated into the development phase of the SERVQUAL evaluation model of Parasuraman et al. (1985) to evaluate customers’ recognition of service quality, they were adjusted as follows: other than reliability, tangible, and responsiveness, credibility, security, and competence were changed into assurance, and communication, courtesy, and access were changed into empathy (Table 1).

**2.4. UTAUT Model**

Scholars extensively investigated users’ acceptance intention and actual use of new technology or service as the main topic in the IT sector. However, the factors affecting how users accept and understand new IT technologies require further examination (Yu, Shin, & So, 2006).

The technology acceptance model (TAM) developed by Davis (1989) is the most broadly used model theory among the studies on users’ intention to accept new technologies (Yang, Hwang, & Park, 2016). The TAM can predict the adoption and use of IT technologies in individuals’ tasks. TAM was developed to predict adoption and use of IT technology in individual tasks, and it is known that the key variables affecting user acceptance are perceived usefulness and perceived ease-of-use. Later, in the subsequent studies based on TAM, various independent variables have consistently been developed. However, prior research failed to fully reflect the changes in the information and communication technology environment by the spread of digital new technologies and various exogenous variables or analyze the interrelations among variables (Hwang, Kim, & Kim, 2018; Jun, Park, & Lee, 2011; Kwon, 2010; Agarwal & Karahanna, 2000).

To supplement these limitations of the TAM and measure users’ technology acceptance process effectively, we present

**Table 1:** Five Components of the SERVQUAL Evaluation Model

Component	Definition
Reliability	Competently, reliably, and accurately performing the promised service
Tangible	The appearance of physical facilities, equipment, personnel, and communication means
Responsiveness	Willingness to help customers and provide fast service
Assurance	Providers’ competence, knowledge, and courtesy, which can earn trust and confidence from customers
Empathy	Concern and care provided for customers

it from an integrated perspective using the UTAUT model (Venkatesh, Morris, Davis, & Davis, 2003). Venkatesh et al. (2003) coordinated and integrated the concepts presented in the TAM, the theory of reasoned action (TRA), the motivational model, the theory of planned behavior (TPB), combined TAM-TPB, the model of PC utilization (MPCU), social cognitive theory, and innovation diffusion theory (IDT) to propose the UTAUT model.

The UTAUT has an explanation power generally higher than that of the TAM in the studies on users’ acceptance intention or act (Hwang et al., 2018). The TAM’s explanation power for users’ acceptance intention and behavioral intention is 40%–50%, whereas the UTAUT model shows an explanation power of over 20%–30% higher than that of the TAM (Venkatesh et al., 2003). The UTAUT model is as follows.

Venkatesh et al. (2003) designed the UTAUT model by restructuring the 32 concepts mentioned in the eight existing theories, including the TAM, TRA, and TPB. The UTAUT model comprises four independent variables and four moderating variables affecting users’ behavioral intention and usage behavior. As the independent variables affecting users’ behavioral intention, we defined performance expectancy, effort expectancy, and social influence as follows:

**2.4.1. Performance Expectancy**

Performance expectancy refers to the degree of personal belief that using new technology or service would improve performance or achieve a goal. This concept is similar to perceived usefulness presented in the TAM, which includes external motives in the motivational model, suitability in the model of PC utilization, relative profit in innovation diffusion theory, and result expectancy in social cognitive theory. This variable also has the biggest effect on users’ behavioral intention and varies depending on the moderating variables, such as sex and age.

**2.4.2. Effort Expectancy**

Effort expectancy is a concept similar to perceived ease-of-use in the TAM, which refers to the degree of belief that using new technology or service would be easy and implies the meaning that integrates the concepts of variables in three theories, including perceived ease-of-use in the TAM. New information technology or service should be developed and provided for users’ ease-of-use, and learning how to use it should not be difficult to lead to actual usage. Thus, effort expectancy can be considered a factor affecting users’ acceptance intention.

**2.4.3. Social Influence**

Social influence indicates that one’s decision to accept or use new information technology or service is affected

by significant surrounding people. The constructs of social influence integrate subjective norms like TRA and TPB, social factors in MPCU, and the concept of IDT image. In other words, the user who would accept a new information technology or service is extremely likely to act by the significant surrounding people affecting him or her.

### 3. Research Method

This study grafted online education on the basis of the education service quality used in the existing studies on college education service quality and employed the UTAUT Model. We developed a new set of measurement items for college students using the online education service of colleges, investigated the relationships among these items using the online education service quality (SERVQUAL) and UTAUT model, and examined the effects of the factors of education service quality and the UTAUT model on acceptance intention to set the model shown in Figure 1.

#### 3.1. Education Service

Kim and Choi (2009) investigated the relationships of service quality and information technology acceptance with customer satisfaction among IPTV service users. As the precedent variables affecting perceived usefulness, they developed a concept corresponding to performance expectancy and perceived ease-of-use and a concept corresponding to effort expectancy, tangible, reliability, responsiveness, and empathy of service quality. The results showed that responsiveness, empathy, tangible, and reliability positively affect perceived usefulness, and perceived ease-of-use, responsiveness, empathy, and tangible have positive effects.

Jung (2017) divided the service quality of O2O service into reliability, responsiveness, empathy, assurance, and tangible and proved that service quality positively influences continuous use intention through the mediation of perceived value and user satisfaction.

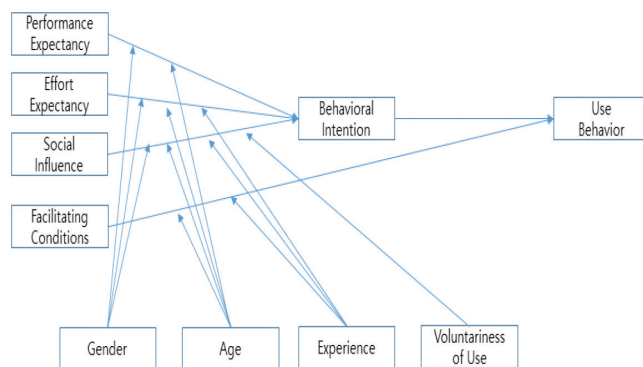


Figure 1: UTAUT Model (Venkatesh et al., 2003)

In a study on the factors affecting acceptance intention in the intelligent video security system, Kim (2017) revealed that service quality had the second biggest effect on the system acceptance intention. Shin and Kang (2018) revealed the interrelations between quality factors (system, information, and service quality) and users' satisfaction and intention to use business m-learning service. They proved that the service quality of m-learning significantly affects usage intention.

In a study on the intention to use the information system in the public sector, Lim (2018) proved that service quality significantly affects performance expectancy and effort expectancy, which in turn positively affect usage intention.

On the basis of the above studies, we considered education service a significant factor affecting performance expectancy, effort expectancy, and social influence of the online education service quality. Accordingly, we proposed the following hypotheses:

**H1:** The online education service quality positively affects performance expectancy.

**H2:** The online education service quality positively affects effort expectancy.

**H3:** The online education service quality positively affects social influence.

#### 3.2. Performance Expectancy

Performance expectancy refers to the degree of personal belief that using a new information technology would improve performance in the task involved (Park & Park, 2017; Davis, 1989; Venkatesh, Thong, & Xin, 2012). Prior studies found that performance expectancy was a precedent variable that greatly affects the intention to accept a new technology (Jun et al., 2011). Jun (2017) showed that performance expectancy affects customers' intention to accept the blockchain-based smart contract service of life insurance. In the current study, users may expect a more convenient and quicker education service than the existing education service when using an online education service. The greater this expectation, the greater the intention to accept the online education service they would develop.

On the basis of the above discussion, we considered performance expectancy as a significant factor affecting acceptance intention of the online education service. Accordingly, we proposed the following hypothesis:

**H4:** Performance expectancy positively affects acceptance intention.

#### 3.3. Effort Expectancy

Effort expectancy refers to the degree to which one believes that new information technology would be easy-to-use (Park & Ahn, 2012; Venkatesh et al., 2012). This concept is similar to the perceived ease-of-use



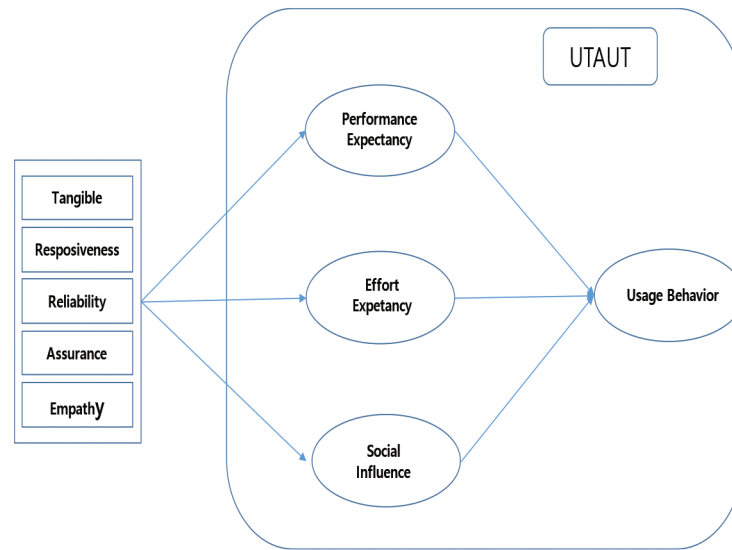


Figure 2: Research Mode

presented in the TAM (Davis, 1989). It has a significant effect in accounting for users’ acceptance intention concerning a new technology (Oh, 2010).

Moreover, in a study related to the intention to use a mobile payment service, Kang (2016) found that effort expectancy affects usage intention. If users perceive a new information technology as inconvenient or difficult to use, even if it is a useful one with good convenience or high expected performance, they would reject or hesitate to accept it. Instead, they would likely choose a technology that they could easily use in the same conditions.

On the basis of the above studies, we considered performance expectancy a significant factor affecting the intention to accept the online education service quality. Accordingly, we proposed the following hypothesis:

**H5:** Effort expectancy positively affects acceptance intention.

### 3.4. Social Influence

Social influence refers to the degree to which significant surrounding people believe that the user should use a new technology or information system (Venkatesh et al., 2012). Existing studies proved that social influence positively affects the intention to accept a new technology (Yang et al., 2016; Park & Ahn, 2012). Choi and Kang (2016) showed a positive relationship between social influence and users’ intention to use mobile easy money transfer. Jung and Jun (2017) found that social influence has a statistically significant effect on usage intention in the group that experienced mobile easy money transfer services.

Ko (2015) argued that, in the effects of service quality and user characteristics in a mobile online payment application

on the intention to use, social influence positively affects perceived ease-of-use and perceived usefulness.

Education services, especially online education, greatly affect the formation and maintenance of social relationships among people, including Koreans, foreigners, and faculty members. Thus, we expected that the effects of social influence would act greatly. If the significant surrounding people believe that the user should use the online education service, then the user would develop greater intentions to use it even if it is somewhat inconvenient and difficult.

On the basis of the above discussion, we considered social influence a significant factor affecting the intention to accept the online education service. Accordingly, we propose the following hypothesis:

**H6:** Social influence positively affects acceptance intention.

### 3.5. Data Collection

We surveyed 300 students enrolled in a university in Jeju Province from December 21 to 30, 2020. We distributed the URL of the online questionnaire through social media. Our analysis included 232 copies (77.33%) out of 234 copies returned within the deadline, excluding two respondents who did not agree to participate in the study.

### 3.6. Data Analysis

We employed SPSS Statistics 23 for empirical analysis. We conducted frequency analysis to investigate college students’ general characteristics and reliability analysis to test the survey tools’ reliability. Then, we performed a correlation analysis. Finally, we investigate

the effects of the education service quality and the UTAUT model factors affecting the intention to accept the online education service as follows: in Step 1 of the analysis, service quality (SERVQUAL) was input, and in Step 2, the UTAUT model was input to conduct a hierarchical multiple regression analysis.

## 4. Results

### 4.1. Demography

Table 2 shows the general characteristics of the respondents.

**Table 2:** Demographic Characteristics of the Respondents

Variable	Categories	<i>n</i>	%
Gender	Male	132	56.9
	Female	100	43.1
Year	Freshman	53	22.8
	Sophomore	69	29.7
	Junior	64	27.6
	Senior	46	19.8
Major/ Undergraduate Course	Business Administration	50	21.6
	Tourism Management	34	14.7
	Hotel Management	105	45.3
	Education	26	11.2
	Physical Education	3	1.3
	Nursing and Health	12	5.2
	Arts	2	0.9

### 4.2. Reliability and Validity

Table 3 shows the results of reliability and validity tests.

### 4.3. Correlation

To examine the relevance among the major variables, we conducted Pearson correlation analysis. All variables had significantly positive correlations, as shown in Table 4.

### 4.4. Regression Analysis

To examine the results of the relative effects on the variables of acceptance intention, we conducted a comparative analysis of the factors affecting college students' intention to accept the online education service using hierarchical regression analysis. Model 1 ( $F = 33.112, p < 0.01$ ) and Model 2 ( $F = 70.752, p < 0.01$ ) had statistically significant differences, as shown in Table 5.

First, in Model 1, tangible ( $t = 3.053, p < 0.01$ ) and empathy ( $t = 3.480, p < 0.01$ ) had significantly positive effects on acceptance intention. However, reliability, responsiveness, and assurance did not have significant effects. The explanation power took up 49.9% of the total variables. Next, in Model 2, empathy ( $t = 3.393, p < 0.01$ ), performance expectancy ( $t = 4.672, p < 0.01$ ), and social influence ( $t = 7.399, p < 0.01$ ) had significantly positive effects on acceptance intention. The explanation power took up 77.6% of the total variables, and Model 2 had 27.7% higher explanation power than Model 1. Reliability, responsiveness, assurance, and empathy in the SERVQUAL model and effort expectancy in the UTAUT model did not have significant effects.

**Table 3:** Reliability of the Testing Tool

Construct		No. of Questions	Scale	Cronbach's Alpha
SERVQUAL	Total	25	Five-point Likert scale	0.95
	Tangible	4		0.83
	Reliability	8		0.90
	Responsiveness	5		0.85
	Assurance	4		0.86
	Empathy	4		0.84
UTAUT	Total	12		0.96
	Performance expectancy	4		0.93
	Effort expectancy	4		0.87
	Social influence	4		0.90
Acceptance intention		4		0.95

Table 4: Correlation Analysis

	Tangible	Reliability	Responsiveness	Assurance	Empathy	Performance Expectancy	Effort Expectancy	Social Influence	Acceptance Intention
Tangible	1								
Reliability	0.777**	1							
Responsiveness	0.715**	0.827**	1						
Assurance	0.696**	0.760**	0.694**	1					
Empathy	0.640**	0.688**	0.683**	0.693**	1				
Performance expectancy	0.667**	0.643**	0.614**	0.485**	0.562**	1			
Effort expectancy	0.746**	0.674**	0.657**	0.645**	0.561**	0.704**	1		
Social influence	0.680**	0.638**	0.631**	0.577**	0.518**	0.800**	0.774**	1	
Acceptance intention	0.627**	0.626**	0.604**	0.516**	0.612**	0.798**	0.680**	0.829**	1

Table 5: Hierarchical Regression Analysis

	Acceptance Intention									
	Model 1					Model 2				
	B	SE	$\beta$	t		B	SE	$\beta$	t	Tolerance
SERVQUAL	Tangible	0.262	0.086	0.270	3.053**	-0.047	0.064	-0.049	-0.736	0.312
	Reliability	0.184	0.112	0.189	1.638	0.069	0.077	0.071	0.901	0.218
	Responsiveness	0.141	0.103	0.137	1.370	0.018	0.070	0.017	0.255	0.293
	Assurance	-0.087	0.093	-0.085	-0.944	-0.084	0.066	-0.082	-1.279	0.338
UTAUT	Empathy	0.339	0.097	0.283	3.480**	0.230	0.068	0.192	3.393**	0.430
	Performance expectancy					0.226	0.048	0.301	4.672**	0.331
	Effort expectancy					0.040	0.065	0.040	0.624	0.333
	Social influence					0.432	0.058	0.494	7.399**	0.308
					$R^2 = 0.499$ , Adjusted $R^2 = 0.484$ , $F = 33.112$ , and $p = 0.000$ .					
					$R^2 = 0.776$ , Adjusted $R^2 = 0.765$ , $F = 70.752$ , and $p = 0.000$ .					

The results of the relative effects among variables enhancing acceptance intention are as follows. Social influence had the highest effect ( $\beta = 0.494$ ), followed by performance expectancy ( $\beta = 0.301$ ) and empathy ( $\beta = 0.192$ ). Given that the Durbin-Watson value was 1.818, a numerical value close to 2, the residuals had no correlations. With a numerical value higher than 0.1, tolerance was at an appropriate level. Variance inflation factors ranged between 2.185 and 4.585, which was lower than 10. Thus, multicollinearity was not a problem in this study.

## 5. Conclusion

The contact-free field is increasingly becoming significant global. We selected the online education service as our research focus given the scarcity of findings and conclusions in this field. We conducted an empirical analysis of the online education service quality in close relationships with colleges and students. On the basis of the survey results among college students who experienced the online education service, we investigated the effects of the online education service quality and UTAUT model on acceptance intention through hierarchical regression analysis. We also assessed the effects on acceptance intention by inputting the online education service quality factors and the UTAUT model as explanatory variables. Following our review of prior studies, we designed a unified research model utilizing the SERVQUAL and UTAUT models. The results are as follows.

First, all sub-factors of the online education service quality, including tangible, reliability, responsiveness, assurance, and empathy, are positively correlated with performance expectancy, effort expectancy, and social influence. In the future, different online education service qualities should be investigated to increase the efficiency of the online education service. Its efficiency is affected by all service quality factors rather than by a single factor. Thus, with the current COVID-19 pandemic, if genuine interests and efforts are exerted as regards the factors that could meet the students' needs in many difficulties in online education, a high online education service quality would act as a positive factor for college students.

Second, in Model 1, among the sub-factors of the online education service quality, tangible and empathy have positive effects on the intention to accept the online education service. Having a proper online system and manual for online education is necessary to use its service consistently. Given that it is available online, unlike the contact education service provided offline, communication and empathy with professors and students' interests have become increasingly significant.

In Model 2, empathy in the online education service quality and performance expectancy and social influence

in the UTAUT model positively affects college students' intention to accept the online education service.

When college students use the online education service, the higher the empathy in the education service quality and performance expectancy and social influence in the UTAUT model, the higher their intention to accept the education service. In other words, even if online education becomes the new normal, students' empathy and communication with colleges and professors have greater effects than the other factors. Moreover, performance expectancy and social influence positively affect users' acceptance intention. Users' expectations and perceptions about the convenience and usefulness of the service usage, their expectations for easier and faster learning and use of the online education service, and the significant surrounding people's usage or recommendations of use of the online education service promote the spread of the service usage.

These results are consistent with prior studies on the UTAUT model, which proved that performance expectancy and social influence are significant factors in the use of new technologies or services. Therefore, our study can serve as a reference for the online education service usage.

Despite the above theories and practical implications, our study still has the following limitations.

First, given that we only surveyed college students who experienced online education in Jeju Province, our results may be difficult to generalize. Thus, further investigation is necessary to achieve more specific and more in-depth samples for the generalization of our results and the diversification of research methods in the future.

Second, whether our model of measuring the online education service quality applies to the real-world domestic online education service should be further tested. Future research should add variables with different attributes for measuring the online education service quality other than SERVQUAL. Supplementing the limitations of this study and problems through continuous examinations will make our results useful for the establishment of a managerial strategy concerning the domestic online education service and further encourage college students to become a continuous growth engine for the development of the online education service. We hope that more researchers would draw objective and in-depth results by complementing one another given these problems.

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