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Vietnamese Students' Satisfaction toward Higher Education Service: The Relationship between Education Service Quality and Educational Outcomes

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Abstract: Student satisfaction with education service has been considered one of the most critical strategic factors to attract students of higher education institutions around the world. Various models of satisfaction with education service quality have been developed to motivate actions towards improving the education quality. This study aimed to confirm a Vietnamese theoretical five-dimension model of student satisfaction with higher education service and investigate the relationship between student satisfaction with education service quality and student satisfaction with educational outcomes in this model. A cross-sectional survey on 2933 students from four-member universities of Hue University in Central Vietnam was conducted. The research results showed that the model of student satisfaction with education service in Hue University was consistent with the proposed theoretical model, which comprises five dimensions including access to education service, facilities and teaching equipment, educational environment, educational activities, and educational outcomes. In addition, the satisfaction of all dimensions of education service quality from dimension 1 to 4 affects the satisfaction of educational outcomes, of which educational activities have the most significant impact. This research result can provide a number of implications and recommendations for Hue University to implement appropriate measures to improve student satisfaction with education services received, thereby enhancing educational outcomes, attracting and retaining students.

Keywords: *Educational outcomes, education service quality, Hue University, Vietnamese student satisfaction.*

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Introduction

Customer satisfaction is one of the top strategic priorities of any service provider to develop relationships with existing customers and attract new customers (Ugboma et al., 2007), and stay competitive (Kashif et al., 2016; Zineldin et al., 2012). An important factor influencing customer satisfaction is the perception of customers towards service quality (Lee & Hwan, 2005; Nguyen et al., 2020), which is the difference between expectation and service perceived by customers (Parasuraman et al., 1988). Despite debates among the causality between customer satisfaction and service quality, recent research mostly believes service quality leads to customer satisfaction (Cronin & Taylor, 1992; Ngo & Nguyen, 2016; Nguyen, 2013). Service quality strongly affects customers' decisions for purchasing a product or selecting a service (Rocha-Iona et al., 2013) and impacts "long-term benefits in market share and profitability" (Anderson et al., 1994, as cited in Chandra et al., 2018, p. 110).

Higher education (HE) is a part of the service industry (Kashif et al., 2016) and students are the core consumer group of HE (Nguyen, 2013). Some researchers even believe students are citizens of the HE community, indicating that HE community cannot survive without students (Tran, Phan, et al., 2020; Zineldin et al., 2012). Thus, HE institutions have to provide high-quality service to satisfy their students (Chandra et al., 2018; Dinh et al., 2021; Kashif et al., 2016). Such

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satisfaction will lead to more students sticking to the HE institutions, attracting more new students, and the HE institutions' images will be more prominent in the national education system.

An increasing number of studies has found that student satisfaction is a multidimensional process (Cardona & Bravo, 2018; Hanssen & Solvoll, 2015; Tran, Truong, et al., 2020; Weerasinghe et al., 2017). However, researchers have not yet found a unified model of student satisfaction with HE services. Even the most widely used instrument measuring service quality (called SERVQUAL), developed by Parasuraman et al. (1985, 1988), has still been criticized and questioned (Latif et al., 2019; Zineldin et al., 2012). The most controversial criticism is that SERVQUAL only measures dimensions of process quality, not outcome quality (Cronin & Taylor, 1992; Richard & Allaway, 1993).

Adding the dimension of satisfaction with educational outcomes when assessing student satisfaction with education service is essential. One of the students' most desirable targets is to have good educational outcomes, that is to enhance corresponding competencies after training. Educational outcomes depend considerably on the quality of education services such as teaching activities, educational environment, and facilities. Many studies have shown that some dimensions of the satisfaction with education service quality and the satisfaction with educational outcomes are interrelated (Chapman & Ludlow, 2010; Coleman et al., 1966; Douglas et al., 2006; Fraser et al., 2010; Goldhaber, 2007; Hanushek et al., 2005; McNaught et al., 2012; Nguyen et al., 2020; Postema & Markham, 2018; Stemmer & Mahan, 2016; Teeroovengadum et al., 2019; Wong & Cmor, 2011; Wong & Webb, 2011). Therefore, to improve student satisfaction with educational outcomes, education providers should determine the influence of student satisfaction with each dimension of the education service quality on their satisfaction with educational outcomes to design suitable plans.

In the process of globalization and integration, Vietnamese education has gradually approached international standards in education. Studies of student satisfaction with education service have received the attention of researchers and the Vietnamese Government. A number of studies have been conducted in Vietnam measuring satisfaction toward education service, such as Dinh et al. (2021), Hoang et al. (2018), Nguyen (2013), Nguyen et al. (2014), Nguyen (2010), Nguyen et al. (2016), and Truong et al. (2016). Nonetheless, these studies mainly used tools available from international studies, conducted on small research groups, and did not examine the relevance of these tools to the Vietnamese educational context. Hence, finding suitable tools to examine student satisfaction with HE services in accordance with the context of Vietnamese education is critical for HE providers.

This paper presents the results of a study testing a five-dimension model of student satisfaction with education service in Hue University, Vietnam, and analyzing the relationship between four dimensions representing education service quality and educational outcomes of the model. This is the first model to assess student satisfaction with education service in the Vietnamese HE context, developed by Vietnamese researchers (Nguyen et al., 2014) and reflects characteristics of Vietnamese education service. It was designed based on international tools but comprised both dimensions of education service process quality and educational outcomes. This model is issued by the Vietnam Ministry of Education and Training to measure student satisfaction with education service at all educational levels (Vietnam Ministry of Education and Training, 2017, 2019). Due to the different characteristics of the educational environment, educational activities, and the diversity of learners between the university and high school environment, it is very likely that education service quality at the university level is recognized differently from that at high school. The verification of this model on a large sample at the university level is vital to consider the appropriateness of this model in practice. In this paper, the term *education service process quality* is used interchangeably to *education service quality*.

Literature Review

Measurement of Student Satisfaction with HE Service Quality in International Literature

There have been various tools emerging to measure student satisfaction with HE service. Nonetheless, researchers have not agreed on any measure. The SERVQUAL (Parasuraman et al., 1985) is the most widely utilized measure for assessing education service quality. The SERVQUAL measure how customer expectations have been met by the service provider across five dimensions: (1) Tangibility, (2) Reliability, (3) Responsiveness, (4) Security, and (5) Empathy (Parasuraman et al., 1985, 1988). Many studies have been utilized the SERVQUAL to explore student satisfaction with HE service quality, such as Arambewela and Hall (2009), Calvo-Porrall et al. (2013), Cuthbert (1996), Kashif et al. (2016), and Wong et al. (2012).

However, the use of SERVQUAL to measure HE service quality has been receiving criticism and questioning (Latif et al., 2019; Zineldin et al., 2012). Many researchers have pointed out that SERVQUAL did not comprehensively cover all dimensions of service quality in HE (Calvo-Porrall et al., 2013; Mai, 2005). SERVQUAL only focused on the dimensions of process quality, not on outcome quality (Cronin & Taylor, 1992; Richard & Allaway, 1993). Additionally, SERVQUAL was also criticized for its weak validity and reliability (Barnard, 1999, as cited in Zineldin et al., 2012). Education service has very particular attributes that SERVQUAL may not cover (Latif et al., 2019). Hence, researchers advocate to amend the questionnaires and add further dimensions to comprehensively measure service quality (Latif et al., 2019). Additionally, the country's culture may influence customers' perceptions of service quality (Kashif et al., 2016). Therefore, researchers strongly suggest that quality measurement scales should be suitable to the specific context it

measures (Kashif et al., 2016).

Besides the SERVQUAL, many studies measure student satisfaction with HE service quality based on different perspectives and research contexts. These studies have indicated various factors influencing the multi-aspectual process of student satisfaction (Hanssen & Solvoll, 2015; Weerasinghe et al., 2017). Elliott and Healy (2001) stated that students' central role in education, school environment, and teaching effectiveness substantially impacted student satisfaction with educational experience. Mai (2005) indicated that the overall opinion of the university and overall opinion of the education quality significantly predicted overall student satisfaction. This study also found out that lecturers' capability and interest in their subject, IT facilities, and the degree's prospect in advancing a student's career prospects were significantly correlated with the overall student satisfaction with education quality. Appleton-Knapp and Krentler (2006) found two groups of factors impacting student satisfaction with HE service quality, including personal and institutional factors. Personal factors include age, gender, temperament, preferred learning style, employment, and students' grade point average. Institutional factors include instructor teaching style, quality of instruction, research emphasis of the school, quality and promptness of instructor's feedback, clarity of instructor's expectations, and class size. Wilkins and Balakrishnan (2013) pointed out that lecturers' quality, resources quality and availability, and technology effective usage were critical causes of overall student satisfaction of HE institutions. Despite many efforts to measure student satisfaction with HE service quality, researchers have not agreed on the overall dimensions of student satisfaction (Cardona & Bravo, 2018).

Measurement of Student Satisfaction with Higher Education Service Quality in Vietnam

In Vietnam, there are several studies focusing on students satisfaction with HE service quality or students perceptions of service quality, such as Dinh et al. (2021), Hoang et al. (2018), Nguyen (2013), Nguyen et al. (2014), Nguyen (2010), Nguyen et al. (2016), and Truong et al. (2016). Some researchers have attempted to adapt the SERVQUAL instrument (Parasuraman et al., 1985, 1988) or develop scales based on the SERVQUAL to suit the Vietnamese educational context. Noticably, Nguyen (2013) tested the stability of the SERVQUAL in the HE sector in Vietnam by conducting a two-phase study. The first phase (an exploratory study) generated a questionnaire that was slightly different from the SERVQUAL and administered it to 675 students of a university. The study results revealed that Vietnamese students pay attention to three specific dimensions in assessing the service quality of their university, including tangibility, responsiveness, and assurance. This study is highly appreciated and recognized for its efforts to explore a suitable scale to measure HE service quality in Vietnam. However, it still has several limitations related to the limited sample (only conducted at one university) and the limited convergent validity of the scale to measure the construct 'assurance'.

One year later, Nguyen et al. (2014) proposed a toolkit to assess citizen satisfaction with public education in Vietnam in a summary report on science and technology tasks at the ministerial level, funded by the Vietnam Ministry of Education and Training. Accordingly, the construct of citizen satisfaction comprises five dimensions: (1) access to education service; (2) facilities and teaching equipment; (3) educational environment; (4) educational activities; and (5) educational outcomes. The authors referred the first four dimensions to the satisfaction with the process of delivering education service and the fifth dimension to the satisfaction with results of such process. Hence, the authors advocated that the first four dimensions represented education service quality, and student overall satisfaction should include their satisfaction with both education service quality and their satisfaction with educational outcomes.

Nguyen et al. (2014) also developed eight sets of questionnaires for assessing citizen satisfaction, including parents of students in Kindergarten, Primary School, Secondary School, students of High School, Secondary Education, students of Continuing Education Center, and students of College and University. They then conducted a pilot survey in educational institutions representing all educational and training levels in three provinces of Vietnam. The pilot study included surveying 1330 students' parents and students using the prepared questionnaires, combining with observation, discussion, and collecting opinions from teachers and administrators. The test results revealed that the five dimensions and the developed questionnaires were feasible, and the measurement process and method were relatively suitable to measure citizen satisfaction with education service in Vietnam. Based on this study's results, the toolkit and the five-dimension constructs of citizen satisfaction with education service quality of Nguyen et al. (2014) have been promoted by the Vietnam Ministry of Education and Training to be used among educational institutions from Kindergarten to HE across the country since 2017 and later updated in 2019.

The study of Nguyen et al. (2014) has significantly impacted how student satisfaction with education service is measured in Vietnam. Many educational providers in Vietnam are using the toolkit in their institutions. Nonetheless, to the best of our knowledge, there is no research testing this model on a large sample in HE settings. Only Truong and Nguyen (2021) used this five-dimensions scale to measure satisfaction with service quality of 410 students from a University in Vietnam. This study showed that the scale had high reliability as Cronbach's alpha of the five subscales ranged from 0.927 to 0.949. Nevertheless, the authors did not test the five-dimension model in their study. Therefore, it is necessary to test whether this model of student satisfaction fits the Vietnamese HE research context.

The Position of the Five-Dimensions Model of Student Satisfaction with HE Service Quality within the Literature

The five-dimension model of student satisfaction is supported by the international literature and may be suitable for the Vietnamese HE context, despite some mixed findings.

Access to education service

This dimension relates to enrollment, admission, tuition fees, and supporting policies for specific students (children of wounded soldiers, martyrs, low households, and ethnic minorities). Entry to HE can be challenging for ethnic minority students and students with financial disadvantages. Thus, some countries such as the United States of America have large-scale policies to encourage ethnic minority students to access HE by allowing open admissions and expanding community colleges (Admon, 2005). Elliott and Healy (2001) found that recruitment and financial aid effectiveness were essential factors of their overall satisfaction of HE service. Hanssen and Solvoll (2015) and Yusoff et al. (2015) also found the factor of studying costs related to student satisfaction. However, Navarro et al. (2005) found that enrolment and costs of studying were insignificant to student satisfaction.

Facilities and teaching equipment

This dimension refers to classrooms, lecture halls, IT systems, library, and dormitories. Facilities and teaching equipment have been confirmed to be one of the crucial factors that have an impact on service quality in many studies such as Hanssen and Solvoll (2015), Ling et al. (2010), Nguyen et al. (2020), and Yusoff et al. (2015). However, infrastructure proved to be insignificant to student satisfaction in the study of Navarro et al. (2005). Douglas et al. (2006) also indicated the low significance of the physical facilities, particularly the furnishings and decoration to student satisfaction.

Educational environment

This dimension indicates both the social and natural environment of educational institutions (such as receiving student feedback, staff-student relationship, supports from lecturers, security, safety, shade, light, and air). Dinh et al. (2021) and Elliott and Healy (2001) stated that university environment and academic advising were vital dimensions of students' experience of education. Nguyen et al. (2020) and Yusoff et al. (2015) found that factors related to the educational environment that influence student satisfaction were professional, comfortable environment, classroom environment, student - teaching staff relationship, knowledgeable and responsive faculty, staff helpfulness, and feedback.

Educational activities

This dimension relates to educational activities to lecturers' teaching and evaluation methods, careers education, and the training system. Researchers highly supported educational activities' influences on student satisfaction. Douglas et al. (2006) and Nguyen et al. (2020) emphasized teaching and learning as the most significant factors of student satisfaction. Elliott and Healy (2001) supported the strong impact of instructional effectiveness on student satisfaction with their experience of education. Yusoff et al. (2015) found that student assessment and learning experiences impacted student satisfaction. Dinh et al. (2021) and Navarro et al. (2005) proved that teaching staff, teaching methods, and course administration were critical aspects of student satisfaction. Interestingly, job prospects did not statistically significant impact student satisfaction in the study of Hanssen and Solvoll (2015).

Educational outcomes

Educational outcomes are a new dimension of service quality that Nguyen et al. (2014) added to the model to measure student satisfaction with service quality after her first attempt to measure student satisfaction in Nguyen (2013). Studies that have used the SERVQUAL often only emphasize the education process quality without considering other factors such as outcome quality. This has been pointed out by many researchers (Cronin & Taylor, 1992; Dinh et al., 2021; Nguyen et al., 2020; Richard & Allaway, 1993).

Educational outcomes comprise both students' academic and non-cognitive skills for making personal and professional progress, adapting to the labor markets, and fulfilling social responsibilities. It can be seen that these results have more to do with the social aspects of students after graduating. It is also closely related to the aims of university education as mentioned in the Vietnam Law on Education (National Assembly of Vietnam, 2019). Researchers have supported such outcomes as a critical dimension contributing to student satisfaction with HE service quality (Cardona & Bravo, 2018; Yi et al., 2018). Yi et al. (2018) stated that HE needed to develop students' academic and professional growth to make the right decisions for their professional and personal life. Higher education institutions (HEIs), therefore, need to focus on improving non-cognitive skills for students to optimize student ability to secure a job and be successful at it. Student satisfaction with the HEIs and their intention to remain at the enrolled institutions were considerably influenced by their grades (Nguyen et al., 2020; Postema & Markham, 2018; Stemmer & Mahan, 2016; Teeroovengadum et al., 2019; Tran, Phan, et al., 2020).

The reviewed literature has confirmed that the five-dimension model of student satisfaction maybe fit with the Vietnamese HE context. Thus, the first hypothesis of the current study was proposed as follows:

Hypothesis 1 (H1): student satisfaction with HE includes five dimensions: access to education service, facilities and teaching equipment, educational environment, educational activities, and educational outcomes.

The Possible Relationship between the Four Dimensions of Service Quality and Educational Outcomes within the Literature

Research has shown the possible relationship among the five above dimensions of student satisfaction, especially the positive impact of the four dimensions of education service quality on student educational outcomes. Teacher quality, a factor closely representing educational activities, influences students' educational outcomes the most (Coleman et al., 1966; Hanushek et al., 2005; Nguyen et al., 2020) and plays a critical role in the students' professional success (Goldhaber, 2007; Postema & Markham, 2018). Chapman and Ludlow (2010) figured out that the efforts expended by both students and lecturers have significantly positive impacts related to student educational outcomes. Fraser et al. (2010) found that a supportive classroom learning environment (particularly positive lecturer-student interactions) and improved student achievement and attitudes were positively correlated. A mild relationship between characteristics of online learning designs, which can be considered an aspect of the training system, and student educational outcomes, was also found (McNaught et al., 2012; Stemmer & Mahan, 2016; Teeroovengadum et al., 2019).

Researchers also point out the close relationship between facilities such as the library and student outcomes. Wong and Webb (2011) discovered that checking out materials and a student's final grade point average were positively correlated. Nguyen et al. (2020) and Stemmer and Mahan (2016) confirmed this later, who found that library usage was positively associated with student outcomes. Additionally, Wong and Cmor (2011) indicated that library instruction was directly related to student performance. Class size, which is an aspect of institutional facilities, was proved to independently negatively impact perceived student learning (Dinh et al., 2021; McNaught et al., 2012). Nonetheless, Douglas et al. (2006) specified that teaching and learning factors were the most critical while factors related to the physical facilities were the least important.

Although studies explicitly looking at the relationship among each dimension of the theoretical model have not been found, it has been strongly suggested the possible impact of the four dimensions of service quality on educational outcomes. Therefore, the following hypotheses and the model of this study were proposed.

Hypothesis 2 (H2): Student satisfaction with service quality can predict student satisfaction with educational outcomes.

H2.1: There is a positive impact of access to education service on educational outcomes

H2.2: There is a positive impact of facilities and teaching equipment on educational outcomes

H2.3: There is a positive impact of educational environment on educational outcomes

H2.4: There is a positive impact of educational activities on educational outcomes

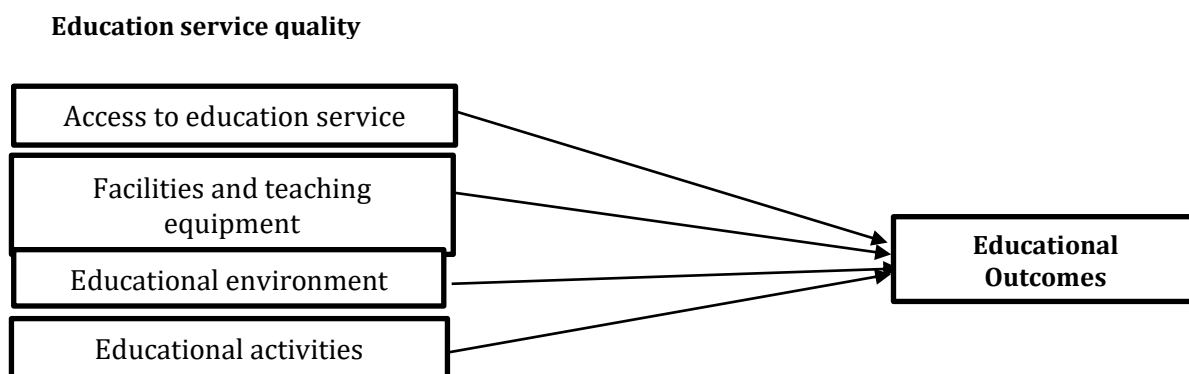


Figure 1. Student Satisfaction with Education Service

Methodology

Research Goal

This study aimed to test whether the theoretical model of student satisfaction fits our HE research context and investigate the relationship between student satisfaction with education service quality and educational outcomes.

Sample and Data Collection

Sample

This study was conducted at Hue University, located in Central Vietnam. Hue University has the following tertiary training institutions: eight member Universities, one School, three affiliated Faculties, and one Campus located in Quang Tri province. The research sample was selected from four member Universities, including the University of Medicine and Pharmacy, the University of Agriculture and Forestry, the University of Economics, and the University of Foreign Languages. Up to the survey time in December 2019, the total student population of these four member Universities was 23625 students. We randomly selected three Faculties of each University and randomly chose students of each academic year. A total of 2933 students participated in this study. The sample characteristics are shown in Table 1.

Table 1. Sample Characteristics

		Frequency	Percent
Gender	Male	816	27.8
	Female	2117	72.2
Ethnicity	Kinh	2872	97.9
	Minorities	61	2.1
University	University of Medicine and Pharmacy	767	26.2
	University of Agriculture and Forestry	611	20.8
	University of Economics	869	29.6
	University of Foreign Languages	686	23.4
Study year	Year 1	532	18.1
	Year 2	968	33.0
	Year 3	749	25.5
	Year 4	550	18.8
	Year 5	101	3.4
	Year 6	33	1.1
Age		M=19.8	SD=1.3
Total		2933	100.0

The sample characteristics selected in Table 1 show that female students made up a larger proportion (72.2%), and ethnic minority students occupied a small proportion (2.5%). Among the four universities participating in the study, the students of the University of Economics accounted for slightly more than other Universities (29%). The second-year students accounted for a higher proportion (33.3%), followed by the 3rd year (25.5%). The students in the 5th and 6th years were from the University of Medicine and Pharmacy. The sample comprised students from 27 different fields of study, including natural sciences and social sciences. The students of English Language accounted for the highest proportion (10%), and students of Business and Commerce accounted for the lowest rate (0.2%). In general, the selected sample reflected the actual distribution, was randomly selected, and was, therefore, a representative sample for Hue University students.

Data collection

To verify the research hypotheses, we utilized a self-rated scale comprising 22 items of Nguyen et al. (2014), asking students about their satisfaction with HE service. Students rated each item based on a 5-point Likert scale which 1 means very dissatisfied, and 5 means very satisfied. The students' demographic information was also collected including gender, age, school, study year and ethnicity. It took students up to 15 minutes to complete the questionnaire. Table 2 lists the items reflecting student satisfaction with four dimensions of HE service quality as independent variables and student satisfaction with educational outcomes as a dependent variable.

Table 2. Dimensions and Variables of Student Satisfaction with HE Service Scale

Dimensions/ Sub-scales	Variables/Items
<i>Student satisfaction with HE service quality (Independent variables)</i>	
Access to education service	<ul style="list-style-type: none"> - Providing sufficient and timely information about enrollment and admission - Applying convenient admission procedures - The tuition fees and contributions are in keeping with Hue University regulations - State policies assist well for specific students
Facilities and teaching equipment	<ul style="list-style-type: none"> - Classrooms, lecture halls meet requirements - IT systems well support training - Providing enough books/journals in the library, references, equipment, and service time - Student dormitories meet requirements
Educational environment	<ul style="list-style-type: none"> - The university focuses on receiving students' feedback - Student-student relationship is friendly, kind, and united - Lecturers are enthusiastic and responsible for supporting students - Natural environment has enough shade, light, and fresh air - University campus is secured, safe, and healthy
Educational activities	<ul style="list-style-type: none"> - Training following credit system is effective and quality - Lecturers concentrate on developing students' self-study, self-research, creative thinking, and practical skills - The forms and methods of evaluating students' learning results are diverse and objective - Organizing various careers education
<i>Student satisfaction with educational outcomes (Dependent variable)</i>	
	<ul style="list-style-type: none"> - Masters the knowledge, professional and career skills, and cultivates morality according to self-needs - Makes much progress in self-study and self-research - Has the ability to resolve academic and practical issues - Has the skills for communication, team-working, and adapting to the changing labor markets - Fulfills civic obligations

Data analysis

AMOS21 and SPSS 22.0 were used to analyze the data. Scores of all independent and dependent variables were calculated by the mean of the respective items. The higher the score, the higher the satisfaction level with education service quality and educational outcomes. Scores ranged from 1 to 5. The descriptive statistics including mean, median, standard deviation, skewness, and kurtosis were used to describe the distribution and summarize features of dependent and independent variables.

The Cronbach's alpha coefficients and corrected item-total correlation were calculated to test the internal consistency of the scales. Table 3 shows that all the sub-scales used to examine student satisfaction with education service at Hue University had Cronbach's alpha > .7 and corrected item-total correlation > .4. According to Cronbach (1951), a confidence coefficient > .70 is acceptable, and according to Gliem and Gliem (2003), a rule-of-thumb is that values of corrected item-total correlation should be at least .40. Therefore, all of the five sub-scales were reliable in measurement.

Table 3. Reliability of Student Satisfaction with Education Service Sub-Scales

Sub-scales	No. of items	Cronbach's alpha	Corrected Item-total correlation range	Composite reliability (CR)
Access to education service	4	.728	.465 - .569	.649
Facilities and teaching equipment	4	.749	.467 - .608	.685
Educational environment	5	.765	.459 - .578	.768
Educational activities	4	.798	.554 - .650	.787
Educational outcomes	5	.839	.519 - .708	.794

To redefine the theoretical structure of satisfaction with education service on Hue University students, confirmatory factor analysis (CFA) was used with 22 observed variables and five latent variables as five individual construct theoretically. CFA is a statistical method of multivariate analysis for testing whether the number of constructs from the sample data fits the theoretical model. Since the structure of the five-dimension scale was formed according to the literature reviewed above, we ignored the exploratory factor analysis, which is used to discover how the factors are collected from the data set. Model fit indices were calculated from this analysis. We used the cutoff threshold based on

the suggestions of Hair, Black, et al. (2014). The reliability of each latent variables was then considered again by calculating composite reliability (CR). The CR of 5 dimensions ranged from .649 to .794 (Table 3), and those values were acceptable (Hair, Hult, et al., 2014), which indicate that the scale was reliable.

We used multiple linear regression to investigate the relationship between the independent variable and the dependent variable. Multiple linear regression assumptions were tested (linearity of the relationship between the independent and dependent variables, normality of distribution of residuals of the regression, multicollinearity, and homoscedasticity). The Variance Inflation Factor values (VIF) were reported in Table 6. The highest VIF among all variables was 2.331, lower than threshold 4 (Hair, Black, et al., 2014), showing no multicollinearity problems. Other assumptions checked through the corresponding histogram or scatterplots of the data also showed no violation of the assumptions for multiple regression analysis.

Results

Structure Model of Student Satisfaction with Education Service at Hue University

The results of testing the student satisfaction model with education service at Hue University include 22 observed variables. The five-dimension model has the overall Chi-square value = 823.390 with 192 degrees of freedom, p-value <.001. According to Hair, Black, et al. (2014), that fit is to be expected given the large sample size (N > 250). The other fit indices are shown in Table 4.

Table 4. Five-Dimension Model Fit Indices

	χ^2/df 4.288	GFI .975	TLI .970	CFI .975	RMSEA .033
Cutoff criteria (Hair, Black, et al., 2014)	≤ 2: good ≤ 5: acceptable	≥ .90	> .92	> .92	≤ .07

Note. Df=degree of freedom, GFI=Goodness-of-fit index, TLI=Tucker-Lewis index, CFI=Comparative fit index, RMSEA=Root mean squared error of approximation.

To match the acceptability thresholds of Hair, Black, et al. (2014) model fits with a large sample, the number of observed variables ranging from over 12 to below 30, $\chi^2/df = 4.288 < 5$ was acceptable. RMSEA = .033 was below the cutoff threshold of .07. This value fell within 90% of the confidence interval for this RMSEA [.031 ~ .036], so it was acceptable. Several others fit indices, such as GFI, TLI, CFI of the five-dimension model, appeared good. Indicators were indicative of an acceptable fit between the hypothetical model and the sample data. Thus, the actual data confirmed the five-dimension model of this study. In other words, student satisfaction with education service of Hue University includes (1) access to education service; (2) facilities and teaching equipment; (3) educational environment; (4) educational activities; and (5) educational outcomes.

Table 5. Descriptive Statistics of Independent and Dependent Variables

	Independent variables				Dependent variable
	AES	FTE	EE	EA	EO
Mean	3.92	3.54	3.92	3.73	3.77
Median	4.00	3.50	4.00	3.75	3.80
Std. Deviation	.581	.674	.574	.618	.566
Skewness	-.175	-.058	-.204	-.097	-.004
Kurtosis	.225	-.196	-.019	.100	.256
Minimum	1	1	1	1	1
Maximum	5	5	5	5	5

Note. AES: Access to education service, FTE: Facilities and teaching equipment, EE: Educational environment, EA: Educational activities, EO: Educational outcomes

The data in Table 5 shows that means of all variables were approximately equal to their respective median. According to Kim (2013), for sample sizes greater than 300, normality of distribution can be checked “depending on the histograms and the absolute values of skewness and kurtosis without considering z-values” (p. 53). Those values in this research were close to 0, indicating the distribution of all variable scores appeared to be nearly symmetrical. Means of all variables were > 3, showing that Hue University students were relatively satisfied with all dimensions of education service. The max and min scores of the distribution spanned from 1 to 5, suggesting that every score on the scale was valid for the student sample. However, data distributions of all variables indicated that the rate of students choosing level 1 (very dissatisfied) was minimal.

Prediction of Education Service Quality to Educational Outcomes of Hue University

Table 6. Multiple Linear Regression Statistics

	B	Beta	t	Sig.	VIF
(Constant)	.821		14.761	.000	
AES	.089	.092	5.474	.000	1.750
FTE	.086	.102	5.924	.000	1.847
EE	.224	.227	12.071	.000	2.215
EA	.380	.415	21.603	.000	2.311

Note. AES: Access to education service, FTE: Facilities and teaching equipment, EE: Educational environment, EA: Educational activities

Results of the multiple linear regression suggest that the overall regression model was a good fit for the data ($F(4.2928) = 830.577, p < .001$). This means that the student satisfaction with education service quality statistically significantly predicted student satisfaction with educational outcomes. The whole model could explain 53.1% for the variance of education outcomes (adjusted $R^2 = .531$).

The individual predictors were examined further. Access to education service, facilities and teaching equipment, educational environment, and educational activities were statistically significant predictors of the model. With the coefficients $B > 0$, assuming other variables in the model were held constant, access to education service significantly positively predicted educational outcomes ($t = 5.474, p < .001$). Likewise, other factors were positive predictor of educational outcomes: facilities and teaching equipment ($t = 5.924, p < .001$), educational environment ($t = 12.071, p < .001$), and educational activities ($t = 21.603, p < .001$).

Beta coefficient also indicated that educational activities was the highest contributor in predicting educational outcomes ($Beta_{EA} = .415$), followed by educational environment ($Beta_{EE} = .227$). Meanwhile, access to education was the weakest predictor variable for educational outcomes ($Beta_{AES} = .092$).

Discussion

Testing Hypothesis 1

The results confirm the five-dimension model of satisfaction with education service of Hue University students, including (1) access to education service; (2) facilities and teaching equipment; (3) educational environment; (4) educational activities; and (5) educational outcomes. This is the first study using the CFA technique to confirm the theoretical model on a large sample of Hue university students in Vietnam, although Nguyen et al. (2014) scale was used in the study of Truong and Nguyen (2021). Research results are significant in confirming an appropriate theoretical model and a reliable and valid measuring tool to examine the perceived quality of education service in HE. This theoretical model is suggested to be applied to the entire education system in Vietnam. However, it is critical to verify the measurement tool when applying it to different samples. This is the first step to confirm its implication when measuring student satisfaction with education service quality at the tertiary level.

The theoretical model is built based on the SERVQUAL model but overcomes the limitations of SERVQUAL as suggested by Kashif et al. (2016) and Latif et al. (2019). This model covers more comprehensively dimensions of service quality in HE than the SERVQUAL since it focuses on both the dimensions of process quality (the first four dimensions) and outcome quality (educational outcomes) (Cronin & Taylor, 1992; Nguyen et al., 2020; Postema & Markham, 2018; Richard & Allaway, 1993). Besides, the items contents have also been adjusted, renewed and supplemented to suit the Vietnamese HE context. For example, the connotation of the items related to the state policy to support students with special circumstances (under the access to educational service scale) and the student fulfilling civic obligations (belonging to the scale of educational outcomes) are characteristic features of socialist education in Vietnam.

Testing Hypothesis 2

The research results indicate that the model of student satisfaction with education service process quality significantly impacts their satisfaction with educational outcomes with the predicted rate of 53.1%. Thus, to improve student satisfaction with educational outcomes, member Universities of Hue University need to improve education service process quality.

The results of analyzing the impact of each dimension of education service process quality are consistent with the general model, indicating that each dimension has a role and meaning in improving student satisfaction with educational outcomes. Thus, member Universities should have measures to improve the quality of all education service process dimensions synchronously.

Research results reveal that all dimensions of education service process affect educational outcomes, in which satisfaction with educational activities has the most significant impact. Education outcomes are the professional

qualities and competencies that students achieve via the learning process (Nguyen et al., 2014, 2020). Satisfaction with educational activities refers to factors such as teaching methods, evaluation methods, and emphasis on student capability development. These factors have much to do with the teacher's role in the classroom. The quality of education is closely related to the quality of the lecturers. This is probably why the satisfaction with educational activities has the most significant impact on the satisfaction with educational outcomes. Previous studies have also shown that teacher quality considerably impacts students' educational outcomes (Ambussaidi & Yang, 2019; Dinh et al., 2021; Gichuru & Ongus, 2016; Ngo & Nguyen, 2016; Sirait, 2016). Our study's results suggest that university administrators should pay attention to improving the quality of educational activities, especially lecturers, to increase student satisfaction with educational outcomes.

Other dimensions of student satisfaction (satisfaction with facilities and teaching equipment, access to education service, and the educational environment) do impact educational outcomes; however, it is not as strong as the satisfaction with educational activities. Such results are consistent with previous studies to some extent, which cite that school facilities are related to educational outcomes (Dawabsheh et al., 2020; Nguyen et al., 2020; Nkong et al., 2016; Stemmer & Mahan, 2016; Usen, 2016). They also agree with Douglas et al. (2006), who claimed that the impact of facilities factors is not as vital as those related to teaching and learning on educational results. However, to the best of our knowledge, we have not found any studies that explicitly look at the relationship among each dimension of education service process advocated by Nguyen et al. (2014) model on educational outcomes. Additionally, dimensions related to satisfaction with facilities and teaching equipment, access to education service, and the educational environment may create favorable conditions for better educational activities, thereby improving educational outcomes. Thus, future studies could examine the mediating role of the dimensions in the relationship between educational activities and educational outcomes.

Conclusion

The research results show that Nguyen et al. (2014) model of measuring the student satisfaction with education services provided by Hue University fits well with the proposed theoretical model, which includes five elements: (1) access to education service; (2) facilities and teaching equipment; (3) educational environment; (4) educational activities; and (5) educational outcomes. Our study has proved that it is entirely reasonable to incorporate educational outcomes into the model of measuring student satisfaction with HE services. Being consistent with the results of previous studies, this study also shows a close relationship between the education service process quality and the educational outcomes. The student satisfaction with education service process quality can predict the satisfaction of educational outcomes. Among the dimensions of education service process, educational activities have the most significant impact on educational outcomes.

Recommendations

A number of recommendations can be drawn from this research results. First, the study results have helped to provide essential recommendations and foundations in developing solutions to improve the quality of education service provided by the four universities of Hue University in Vietnam, and to improve the satisfaction of students at Hue University, in a particular case. Hue University should organize regular assessments of student satisfaction with education service. To improve student satisfaction with educational outcomes, managers of Hue University should take measures to improve the quality of education service process, especially the quality of educational activities. In addition, testing this model at other education levels in Vietnam is necessary to determine the suitability of the model in practice. Furthermore, in the broader contexts of Vietnamese HEIs, this research's results will provide critical considerations and implications for different levels of leaders to find measures to enhance the education service quality for attracting and retaining more students.

Limitations

The study has several limitations. First, it is only aimed at examining students' perceived quality of education service, not a formal quality assessment of education service. Second, this study only conducted surveys of students from four member Universities, not from all member Universities, School, and Faculties of Hue University. Third, this study follows the cross-sectional survey design. Future studies could take a longitudinal approach on larger samples and interview the participants to have more detailed and specific explanations. Future research could also focus more on a broader sample of participants from more HEIs from different parts of Vietnam for a better generalisation.

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Authorship Contribution Statement

Hong-Van Thi Dinh: Conceptualization, design, data collection, data analysis, writing, secure funding, critical revision of the manuscript. Quynh Anh Thi Nguyen: Conceptualization, design, drafting manuscript, data analysis, writing, critical revision of the manuscript. Mai-Huong Thi Phan: Conceptualization, design, statistical analysis, writing, critical revision of the manuscript. Kien The Pham: Data collection, statistical analysis and interpretation. Tham Nguyen: Conceptualization, design, supervision. Hung Thanh Nguyen: Data collection, data analysis.

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