

Learner Satisfaction with Distance Education Programs at Thai Nguyen University of Technology

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Abstract : The rapid development of digital technologies has accelerated the expansion of distance education in higher education institutions. However, the growth of distance education programs across disciplines remains uneven, highlighting the importance of learner satisfaction in maintaining program quality and sustainability. This study aims to examine the factors influencing learner satisfaction with distance education programs at Thai Nguyen University of Technology (TNUT).

The proposed research model includes teaching quality, curriculum content and assessment, support services, interaction, LMS and technology quality, learning experience and perceived value, and learner satisfaction. Data were collected from 400 learners enrolled in distance education programs at TNUT using a structured questionnaire and analyzed through Cronbach's Alpha, EFA, CFA, and SEM.

The findings indicate that teaching quality, curriculum content and assessment, support services, interaction, and LMS and technology quality positively influence learning experience and perceived value. In turn, learning experience and perceived value have a significant positive effect on learner satisfaction. Among the examined factors, teaching quality shows the strongest impact. The study provides important implications for improving the quality and sustainability of distance education programs in Vietnamese higher education institutions.

Keywords – learner satisfaction, distance education, higher education, LMS, SEM.

I. INTRODUCTION

The rapid advancement of digital technologies has significantly transformed higher education systems worldwide. Distance education has emerged as a strategic approach to expanding access to education, enhancing flexibility, and meeting the demands of lifelong learning. In Vietnam, the adoption of distance education has accelerated in recent years, particularly in response to the COVID-19 pandemic and the broader trend of digital transformation.

Thai Nguyen University of Technology (TNUT) has actively implemented distance education programs to provide learning opportunities for diverse groups of learners since 2023 through Education Technology And Learning Institute (Etali). TNUT is currently implementing five key distance learning (E-learning) programs: Industrial Management; Industrial Economics; English Language; Civil Engineering; and Computer Engineering. However, ensuring the quality of these programs remains a critical challenge, especially in terms of learner satisfaction.

TABLE 1
Number of distance students

Fields of Study	2023	2024	2025
Civil Engineering	43	719	527
Industrial Economics		35	29
Computer Engineering			75
Industrial Management		134	245
English Language		28	99
Sum	43	916	975

(Source: Etali -Tnut)

Table 1 presents the number of students enrolled in distance education programs across different fields of study at the institution over the period from 2023 to 2025.

Overall, the total number of distance learners shows a significant upward trend, increasing from 43 students in 2023 to 916 in 2024 and 975 in 2025. This sharp growth between 2023 and 2024 indicates a rapid expansion of distance education programs, driven by institutional strategies and increasing demand for flexible learning modes. By specialization:

Civil Engineering experienced the strongest growth, increasing from 43 students in 2023 to 719 students in 2024, before declining to 527 students in 2025. Despite the sharp decline in 2025, this specialization still has the highest number of enrolled students, indicating high demand and increasing competition from distance learning programs in the same field offered by other universities.

Industrial Management demonstrates steady growth, increasing from 134 students in 2024 to 245 in 2025, indicating rising interest in this field.

English Language also shows a strong upward trend, from 28 students in 2024 to 99 in 2025, reflecting growing demand for language skills in flexible learning environments.

Only Industrial Economics shows a declining trend, with enrollment decreasing from 35 students in 2024 to 29 in 2025. This may indicate lower attractiveness or competitiveness of this program in the distance learning format.

The rapid expansion of distance education in recent years has significantly increased access to higher education; however, this growth has not been uniform across academic disciplines. Besides the different demand depending on the nature of the discipline, one critical factor underlying this disparity is learner satisfaction. In the context of distance education, satisfaction reflects how well programs meet learners' expectations in terms of instructional quality, technological support, interaction, and overall learning experience. Programs that provide a more effective and engaging learning environment are more likely to attract and retain students, whereas those that fail to deliver satisfactory experiences may struggle to sustain enrollment.

Despite the recognized importance of learner satisfaction, there remains a lack of empirical evidence explaining how satisfaction influences enrollment patterns across different disciplines, particularly in the context of Vietnamese technical universities. The observed imbalance in program growth raises important questions about whether differences in perceived quality and learning experience contribute to variations in learner satisfaction, and consequently, to the uneven development of distance education programs.

Therefore, this study seeks to address this gap by examining the role of learner satisfaction in shaping the effectiveness and attractiveness of distance education programs, thereby providing insights into how institutions can achieve more balanced and sustainable program development.

This study aims to measure the level of learner satisfaction with distance education programs at Thai Nguyen University of Technology (TNUT), identify the key factors influencing learner satisfaction, and propose practical recommendations to enhance program quality and improve the overall learning experience.

II. LITERATURE REVIEW

2.1. Learner Satisfaction

Learner satisfaction is a central construct in higher education research and is widely regarded as a key indicator of educational quality, institutional effectiveness, and long-term sustainability (Elliott & Healy, 2001; Douglas et al., 2006). In general, learner satisfaction refers to the extent to which students' expectations, needs, and learning experiences are fulfilled by the educational services provided by an institution.

From a theoretical perspective, learner satisfaction is often grounded in expectation–confirmation theory (ECT), which posits that satisfaction is formed by comparing initial expectations with perceived performance (Oliver, 1980). When perceived performance meets or exceeds expectations, satisfaction is achieved; otherwise, dissatisfaction occurs.

In higher education, learner satisfaction is considered a multidimensional construct, encompassing academic quality, administrative services, learning environment, and institutional support (Hill et al., 2003). In distance education, additional dimensions such as system quality, online interaction, and accessibility of digital resources are particularly important (Eom et al., 2006).

Previous studies have consistently demonstrated that learner satisfaction plays a crucial role in shaping educational outcomes. High levels of satisfaction are associated with increased engagement, improved academic performance, and higher retention rates (Tinto, 1993; Kuo et al., 2014). Conversely, dissatisfaction can lead to dropout and reduced institutional reputation.

2.2. Service Quality in Higher Education

Service quality has become an important issue in higher education as universities increasingly compete to attract and retain learners. In this context, students are often considered primary stakeholders who evaluate educational services based on their expectations and learning experiences. Therefore, improving service quality is essential for enhancing institutional reputation, educational effectiveness, and learner satisfaction.

One of the most widely used frameworks for evaluating service quality is the SERVQUAL model developed by Parasuraman et al. (1988). The model includes five dimensions: reliability, responsiveness, assurance, empathy, and tangibles. Reliability refers to the institution's ability to provide dependable and accurate services, while responsiveness reflects the willingness to support learners promptly. Assurance relates to the professionalism and competence of instructors and staff, whereas empathy emphasizes individualized attention to learners' needs. Tangibles refer to physical and technological facilities supporting the learning process.

In distance education environments, traditional SERVQUAL dimensions are often expanded to include additional factors such as system quality and interaction quality because online learning heavily depends on digital technologies and communication platforms. These dimensions are considered important determinants of learner satisfaction in modern higher education contexts.

2.3. Distance Education and Learning Management System (LMS)

Distance education has become an increasingly important mode of learning in higher education due to its flexibility and accessibility. Unlike traditional face-to-face learning, distance education relies heavily on digital technologies to deliver instructional content and facilitate communication between learners and instructors.

A key component of distance education is the Learning Management System (LMS), which serves as the primary platform for course delivery, communication, assessment, and learning management. LMS platforms enable learners to access course materials, submit assignments, participate in discussions, and receive feedback regardless of time and location constraints.

The effectiveness of the LMS significantly influences learner engagement and satisfaction. A well-designed LMS can improve accessibility, enhance communication, and support interactive learning experiences. In contrast, technical problems, poor usability, or unstable systems may negatively affect learners' perceptions and reduce satisfaction levels.

Previous studies have shown that system quality, ease of use, and accessibility are important predictors of satisfaction in online learning environments (Eom et al., 2006; Sun et al., 2008). Therefore, LMS quality is considered a critical factor in evaluating the effectiveness of distance education programs.

2.4. Learner Satisfaction with Distance Education

Learner satisfaction with distance education has attracted increasing attention in higher education research, especially in the context of digital transformation and the rapid expansion of online learning. In distance education, learner satisfaction refers to learners' overall evaluation of their learning experience, based on the extent to which the program meets their expectations regarding teaching quality, curriculum content, technological systems, interaction, and support services.

International studies have shown that learner satisfaction in online and distance education is influenced by both academic and non-academic factors. Jiménez-Bucarey et al. (2021) found that instructor quality, technical support, and management services significantly affected student satisfaction with online learning. Similarly, Darawong and Sandmaung (2019) emphasized the importance of responsiveness, empathy, and support services in enhancing student satisfaction in higher education. Gunarto and Hurriyati (2020) also indicated that student engagement and learning experience play an important role in building satisfaction. These findings suggest that learner satisfaction in distance education is not determined solely by course content, but also by the quality of interaction, institutional support, and the technological environment.

In Vietnam, several studies have examined learner satisfaction and service quality in distance and online education. Nguyen Kim Phuoc (2020) investigated students' perceptions of distance education service quality at Ho Chi Minh City Open University. The study used data from 642 distance learning graduates and identified three key factors affecting students' perceptions: lecturers, curriculum, and service capacity. The results confirmed that all three factors had positive effects, with service capacity and curriculum playing important roles in improving the quality of distance education.

Bui Kien Trung (2016) studied the relationship between training service quality, student satisfaction, and student loyalty in E-learning distance education. The dissertation identified three major dimensions of training service quality: online information system quality, instructor quality, and training support service quality. The findings showed that these factors positively influenced student satisfaction, while satisfaction further contributed to student loyalty in distance education. This study provides an important theoretical foundation for examining learner satisfaction in Vietnamese E-learning contexts.

More recently, Truong Anh Tuan and Le Thi Giang (2022) examined student satisfaction with online training service quality at universities in Ho Chi Minh City. Based on a survey of 658 students, the study found seven factors affecting satisfaction, including interaction, lecturers and teaching methods, training management and support, curriculum and learning materials, technology, training programs, and system interface. Among

these, interaction and lecturer quality were highlighted as particularly important factors for improving online training quality.

Overall, previous studies consistently indicate that learner satisfaction with distance education is shaped by a combination of pedagogical, technological, and support-related factors. Teaching quality, curriculum relevance, LMS or system quality, learner–instructor interaction, and support services are frequently identified as key determinants. However, empirical evidence on learner satisfaction with distance education programs at technical universities in Vietnam remains limited. Therefore, this study focuses on distance education programs at Thai Nguyen University of Technology to provide further evidence and practical recommendations for improving program quality and learner experience.

III. METHODOLOGY

3. Research Framework

Based on the literature review and previous studies on learner satisfaction in distance education, this study proposes a research framework in which learner satisfaction is influenced by several dimensions related to educational quality, technological systems, interaction, and support services.

The proposed framework includes the following *independent variables*:

Teaching Quality (TQ)

Teaching Quality refers to learners' perceptions of lecturers' professional competence, teaching methods, clarity of instruction, responsiveness, and ability to facilitate effective learning in distance education environments.

Curriculum Content and Assessment (CCA)

Curriculum Content and Assessment refer to learners' perceptions of the relevance, organization, workload, learning materials, and assessment methods of the distance education program. This construct reflects the extent to which the curriculum aligns with learning objectives, learners' abilities, and expected learning outcomes, while also ensuring fairness and transparency in the assessment process.

Support Services (SS)

Support Services refer to the effectiveness and responsiveness of academic, administrative, and technical support provided to learners throughout the learning process. This construct reflects the institution's ability to assist learners in administrative procedures, learning guidance, and problem resolution

Interaction (INT)

Interaction refers to the level of communication, collaboration, and engagement between learners and lecturers as well as among learners themselves in the distance learning environment. This construct reflects the extent to which learners can actively participate in discussions and learning activities.

LMS and Technology Quality (LMS)

LMS and Technology Quality refers to learners' perceptions of the usability, accessibility, reliability, and effectiveness of the Learning Management System and supporting technologies used in distance education. This construct reflects how well the technological system supports learning activities.

Mediating Variable: Learning Experience and Perceived Value (LEV) - Learning Experience and Perceived Value refer to learners' overall perceptions and feelings regarding the benefits, usefulness, and value gained from participating in distance education programs at Thai Nguyen University of Technology. This construct reflects the extent to which learners perceive that the learning process enhances their knowledge, skills, confidence, and practical application abilities relative to the effort, time, and cost invested.

In the context of distance education, learning experience encompasses learners' cognitive and emotional experiences during the learning process, while perceived value reflects learners' evaluation of the benefits received from the program compared with their expectations and resources spent.

The dependent variable is: Learner Satisfaction (LS) - Learner Satisfaction refers to learners' overall evaluation of their experiences with distance education programs at Thai Nguyen University of Technology. This construct reflects the extent to which learners feel satisfied with teaching quality, curriculum, learning systems, interaction, and support services.

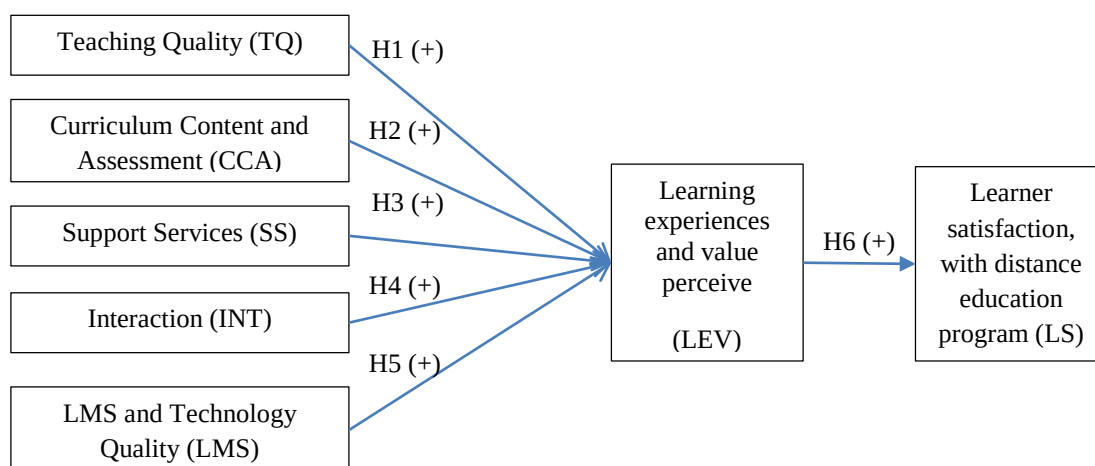


Figure 1: Research model

Research Hypotheses

H1: “Teaching Quality” positively affects Learning Experience and Perceived Value.

H2: “Curriculum Content and Assessment” positively affects Learning Experience and Perceived Value.

H3: “Support Services” positively affect Learning Experience and Perceived Value.

H4: “Interaction” positively affects Learning Experience and Perceived Value.

H5: “LMS and Technology Quality” positively affect Learning Experience and Perceived Value.

H6: “Learning Experience and Perceived Value” positively affect Learner Satisfaction with Distance Education.

4. Sample

The target population of this study consists of learners currently enrolled in distance education programs at Thai Nguyen University of Technology (TNUT), with a total population size of 975 learners in 2025. To ensure representativeness across different training programs, the study applies a stratified sampling method based on fields of study. This approach helps improve the representativeness and reliability of the collected data because enrollment in distance education programs differs significantly among disciplines.

The minimum sample size was initially determined using Slovin’s formula with a 5% margin of error; $N=975$ (total population); $e=0.05$ (acceptable sampling error). The calculated minimum sample size is approximately 284 respondents. However, because this study employs multivariate statistical techniques such as Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM), a larger sample size is required to ensure statistical reliability and model stability.

According to Hair et al. (2010), the recommended sample size for SEM should be at least 5–10 times the number of observed variables. Since the proposed research model includes 45 observed variables, the recommended sample size ranges from 190 to 380 observations.

Based on both the Slovin calculation and SEM requirements, this study targets approximately 400 valid responses. This sample size is considered appropriate because it: exceeds the minimum requirement suggested by Slovin’s formula; satisfies recommendations for SEM analysis; improves the reliability and generalizability of the findings; and reduces potential errors caused by invalid or incomplete responses. Therefore, a target sample size of 400 learners is considered optimal for achieving the objectives of this study.

5. Collect, process and analyze data

Data are collected through an online questionnaire using a 5-point Likert scale distributed via Google Forms. After collection, the data are screened, coded, and cleaned before analysis. Statistical analysis is conducted using SPSS and AMOS software, including descriptive statistics, Cronbach’s Alpha reliability testing, Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM) to examine the relationships among variables in the proposed research model.

IV. RESULTS AND DISCUSSION

1. Respondents' characteristics

TABLE 1
Respondents' characteristics

Statistic	Number	Percentage (%)	Statistic	Number	Percentage (%)
Training Program	400	100	Education Level	400	100
Business Accounting	12	3.0	Undergraduate Program	156	39.0
Software Engineering	30	7.5	Bridging Program	153	38.3
Civil Engineering	216	54.0	Second-Degree Program	91	22.8
English Language	41	10.3			
Industrial Management	101	25.3			

Source: *Research result*

Table 1 presents the characteristics of the respondents participating in the study. Among the 400 respondents, Civil Engineering students accounted for the largest proportion (54.0%), followed by Industrial Management (25.3%), English Language (10.3%), Software Engineering (7.5%), and Business Accounting (3.0%). In terms of education level, undergraduate students represented the highest percentage (39.0%), while bridging program students accounted for 38.3% and second-degree students accounted for 22.8%. The distribution of respondents across different training programs and education levels indicates that the sample is relatively diverse and representative of the distance education population at TNUT.

2. Factors influencing the Employees' work motivation

Cronbach's Alpha value is used to test the reliability of the scales. Reliability analysis indicated acceptable to excellent internal consistency across all scales, with Cronbach's alpha coefficients ranging from 0.709 to 0.920.

TABLE 2
Item-Total Diagnostics

Coding	Variable	Number of items	Cronbach's Alpha	Results
LS	Dependent variable: Learner Satisfaction	4	0.926	- All Corrected Item Total Correlation of items are above 0,3 and Item Cronbach's Alpha are above 0,6, so all items remain.
LEV	Mediating Variable Learning Experience and Perceived Value	4	0.846	
	Independent variable			- Redundancy check – Every “ α if item deleted” value stays within ± 0.015 of the full-scale α , indicating that no item is overly redundant or detrimental.
TQ	Teaching Quality	6	0.921	
CCA	Curriculum Content and Assessment	8	0.912	
SS	Support Services	6	0.942	
INT	Interaction	4	0.898	
LMS	LMS and Technology Quality	6	0.908	

Source: *Research result*

The Item–Total Diagnostics table presents the results of the reliability analysis using Cronbach's Alpha for all constructs in the research model. Overall, all scales demonstrate high reliability and meet the required standards for subsequent factor analysis and regression analysis. Specifically:

The dependent variable, Learner Satisfaction (LS), consists of 4 observed items with a Cronbach's Alpha coefficient of 0.926. This very high value indicates strong internal consistency among the observed variables and confirms that the scale effectively measures learner satisfaction.

The mediating variable, Learning Experience and Perceived Value (LEV), includes 4 observed items with a Cronbach's Alpha of 0.845. Since this value exceeds 0.8, the scale is considered highly reliable, indicating that the observed items consistently measure perceived value and learning experience.

Regarding the independent variables: Teaching Quality (TQ) contains 6 observed items with a Cronbach's Alpha of 0.921, indicating excellent reliability. Curriculum Content and Assessment (CCA) includes

8 observed items with a Cronbach's Alpha of 0.912, reflecting good reliability. Support Services (SS) consists of 6 observed items with a Cronbach's Alpha of 0.942, which is extremely high and demonstrates very strong consistency among the observed variables. Interaction (INT) comprises 4 observed items with a Cronbach's Alpha of 0.898, which is above the acceptable threshold of 0.8 and therefore considered reliable. LMS and Technology Quality (LMS) contains 6 observed items with a Cronbach's Alpha of 0.908, indicating very good reliability of the scale.

All Corrected Item–Total Correlation values are above 0.3, indicating that all observed variables are well correlated with the overall scale and none should be removed. The Cronbach's Alpha values if items were deleted do not increase significantly (remaining within ± 0.015 of the overall alpha values), suggesting that no item is redundant or detrimental to the reliability of the scales.

Based on these findings, it can be concluded that all measurement scales in this study satisfy the reliability requirements and are suitable for further analyses such as EFA, CFA, and regression/SEM analysis.

TABLE 3
Rotated Component Matrix

Item	Component						
	1	2	3	4	5	6	7
CCA.8	.828						
CCA.6	.760						
CCA.2	.718						
CCA.4	.691						
CCA.3	.689						
CCA.5	.634						
CCA.1	.590						
CCA.7	.582						
SS.3		.753					
SS.2		.737					
SS.6		.725					
SS.5		.712					
SS.1		.698					
SS.4		.672					
LMS.5			.790				
LMS.1			.735				
LMS.3			.733				
LMS.4			.715				
LMS.6			.648				
LMS.2			.570				
TQ.3				.728			
TQ.6				.721			
TQ.2				.693			
TQ.5				.655			
TQ.4				.653			
TQ.1				.592			
LS.4					.801		
LS.3					.800		
LS.1					.738		
LS.2					.734		
INT.4						.736	
INT.1						.717	

INT.2						.688	
INT.3						.585	
LEV.3							.643
LEV.1							.641
LEV.2							.636
LEV.4							.547
KMO					0.960		
Approx. Chi-Square					13020.451		
Rotation Sums of Cumulative %					73.220%		
Bartlett's Test of Sphericity Sig.					0.000		

Source: Research result

The EFA results confirmed the suitability of the dataset for factor analysis, with KMO = 0.960 and Bartlett's Test of Sphericity being statistically significant ($p < 0.001$). Seven factors were extracted with a cumulative variance explained of 73.220%, exceeding the recommended threshold of 50%. All observed variables loaded significantly onto their corresponding constructs, with factor loadings ranging from 0.547 to 0.828. No substantial cross-loadings were observed, indicating satisfactory convergent and discriminant validity of the measurement scales. Therefore, the constructs were considered appropriate for subsequent CFA and SEM analyses.

TABLE 4
CFA Results

Model Fit Indices			
Fit Index	Value	Recommended Threshold	Result
Chi-square/df	2.683	< 3	Good
GFI	0.815	> 0.80	Acceptable
CFI	0.915	> 0.90	Good
TLI	0.907	> 0.90	Good
RMSEA	0.065	< 0.08	Acceptable
PCLOSE	0.000	> 0.05	Marginal

Based on the recommendation of Joseph F. Hair Jr. et al. (2010), the goodness-of-fit of the measurement model was evaluated using multiple fit indices, including Chi-square/df, GFI, CFI, TLI, RMSEA, and PCLOSE. The CFA results indicate that the measurement model achieved an acceptable level of goodness-of-fit. Specifically, the Chi-square/df value was 2.683, which is below the recommended threshold of 3.0, indicating a good model fit between the proposed model and the observed data. The Goodness-of-Fit Index (GFI) reached 0.815, exceeding the minimum acceptable threshold of 0.80. Although the value did not surpass the ideal level of 0.90, it still demonstrates an acceptable degree of model fit. In addition, the Comparative Fit Index (CFI = 0.915) and Tucker-Lewis Index (TLI = 0.907) were both higher than the recommended threshold of 0.90, suggesting that the measurement model fits the data well and possesses strong comparative fit. The Root Mean Square Error of Approximation (RMSEA) was 0.065, which is below the acceptable limit of 0.08. This result indicates that the model has a reasonable approximation error and acceptable overall fit.

The PCLOSE value was 0.000, which is lower than the recommended threshold of 0.05. This suggests that the model did not achieve a "close fit" according to the PCLOSE criterion. Nevertheless, many studies in SEM research consider the model acceptable when other major fit indices such as CFI, TLI, and RMSEA satisfy the recommended standards.

Overall, the CFA results confirm that the measurement model demonstrates an acceptable and adequate fit with the empirical data. Therefore, the constructs used in the study are considered appropriate for subsequent Structural Equation Modeling (SEM) analysis.

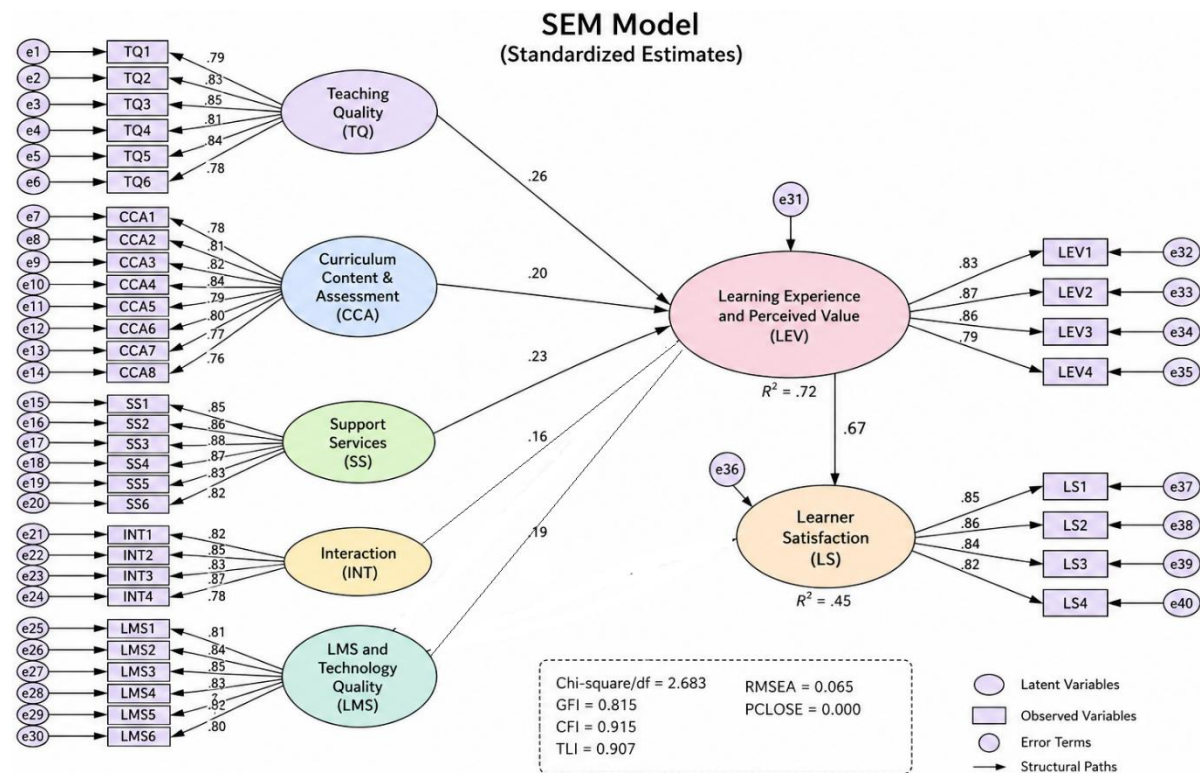


FIGURE 1
SEM model

The SEM analysis conducted using AMOS demonstrated that the proposed structural model achieved an acceptable level of goodness-of-fit with the empirical data. Furthermore, the coefficient of determination (R^2) showed that the independent variables, including Teaching Quality (TQ), Curriculum Content and Assessment (CCA), Support Services (SS), Interaction (INT), and LMS and Technology Quality (LMS), jointly explained 72% of the variance in Learning Experience and Perceived Value (LEV). In addition, LEV explained 45% of the variance in Learner Satisfaction (LS). These findings indicate that the proposed research model possesses strong explanatory power in predicting learners' experiences and satisfaction in the online learning environment.

H1: Teaching Quality positively affects Learning Experience and Perceived Value

The results show that Teaching Quality (TQ) positively affects Learning Experience and Perceived Value (LEV) with a standardized coefficient of $\beta = 0.26$. This indicates that better teaching quality enhances students' learning experiences and perceived value. $\Rightarrow$ H1 is supported.

H2: Curriculum Content and Assessment positively affect Learning Experience and Perceived Value

Curriculum Content and Assessment (CCA) positively influence LEV with $\beta = 0.20$. This finding suggests that appropriate curriculum design and assessment methods improve students' learning experiences. $\Rightarrow$ H2 is supported.

H3: Support Services positively affect Learning Experience and Perceived Value

Support Services (SS) have a positive effect on LEV with $\beta = 0.23$. This result indicates that learning support services play an important role in improving students' perceived value and learning experiences. $\Rightarrow$ H3 is supported.

H4: Interaction positively affects Learning Experience and Perceived Value

Interaction (INT) positively affects LEV with $\beta = 0.16$. This finding demonstrates that interaction among students, instructors, and learning systems contributes positively to the learning experience. $\Rightarrow$ H4 is supported.

H5: LMS and Technology Quality positively affect Learning Experience and Perceived Value

LMS and Technology Quality (LMS) positively influence LEV with $\beta = 0.19$. This result indicates that the quality of the LMS platform and supporting technologies significantly enhances online learning experiences. $\Rightarrow$ H5 is supported.

H6: Learning Experience and Perceived Value positively affect Learner Satisfaction

LEV has a strong positive effect on Learner Satisfaction (LS) with $\beta = 0.67$. This is the strongest relationship in the model, indicating that positive learning experiences and high perceived value substantially increase learner satisfaction. $\Rightarrow$ H6 is supported.

V. CONCLUSION

This study examined the factors influencing learner satisfaction with distance education programs at Thai Nguyen University of Technology within the context of digital transformation in higher education. Based on a survey of 400 learners enrolled in distance education programs, the study employed Cronbach's Alpha, Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM) to evaluate the proposed research model.

The findings confirm that teaching quality, curriculum content and assessment, support services, interaction, and LMS and technology quality all positively influence learners' learning experiences and perceived value. Among these factors, teaching quality demonstrated the strongest effect, highlighting the critical role of lecturers in enhancing online learning effectiveness. In addition, learning experience and perceived value were found to have a strong positive impact on learner satisfaction, confirming their important mediating role in the relationship between service quality factors and overall satisfaction.

The study contributes to the literature on distance education by integrating educational, technological, and experiential dimensions into a comprehensive research framework. The findings also provide empirical evidence for understanding learner satisfaction in the context of technical universities in Vietnam, where research on distance education remains relatively limited.

From a practical perspective, the results suggest that universities should prioritize improving teaching quality, enhancing LMS performance, strengthening learner support services, and promoting interaction in online learning environments. Universities should also focus on creating positive learning experiences and increasing the perceived value of distance education programs in order to improve learner satisfaction and maintain sustainable program development.

Despite these contributions, the study has several limitations. The research was conducted at a single institution, which may limit the generalizability of the findings. Future studies may expand the research scope to multiple universities and explore additional factors such as learner motivation, self-efficacy, or digital competencies. Longitudinal studies may also provide deeper insights into changes in learner satisfaction over time.

Overall, this study provides important implications for improving the quality and effectiveness of distance education programs in Vietnamese higher education institutions and contributes to the ongoing development of sustainable online learning environments.

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