



Original Article

E-Service Quality and Its Impact on User Satisfaction and Loyalty in Online Education

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Abstract:

The rapid expansion of digital education platforms has changed how students access learning materials, making the quality of e-services, user satisfaction, and loyalty essential for maintaining user engagement. This study examines these connections within the framework of the XYZ online learning platform, which aims to support academic achievement for high school and pre-university students. Data were gathered from 219 participants through a structured survey, and the relationships among the variables were analyzed using structural equation modeling (SEM). The results show that the quality of e-services has a significant impact on user satisfaction ($\beta = 0.749$, $t = 12.372$, $p < 0.05$), with efficiency being the most influential factor. However, the direct link between e-service quality and e-loyalty was not significant ($\beta = 0.101$, $t = 1.289$, $p > 0.05$), indicating that user satisfaction fully mediates this connection ($\beta = 0.530$, $t = 9.021$, $p < 0.05$). These findings highlight the crucial role of user satisfaction in promoting loyalty behaviors, such as repeat usage, a willingness to pay more, and positive referrals. Although satisfaction ratings were high, issues related to reliability, privacy, and merchandising were noted, suggesting areas for strategic enhancement. Recommendations for improvement include bolstering system reliability, implementing flexible pricing strategies, encouraging emotional engagement, and utilizing user feedback for ongoing service optimization. This research adds to the growing knowledge base on digital education by emphasizing practical strategies for enhancing user retention and engagement.



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Keywords: E-service quality, e-satisfaction, e-loyalty, online learning, digital education platforms

Introduction

The rapid digital transformation in education has significantly impacted learning systems globally, including in Indonesia. The COVID-19 pandemic served as a major

triggered, compelling educational institutions to adopt online learning as a primary mode of delivery. In 2020, the Indonesian Ministry of Education, Culture, Research, and Technology reported that approximately 68 million students transitioned to remote learning following the closure of over 530,000 schools ([UNICEF, 2021](#)). This paradigm shift spurred the development of digital platforms, such as Merdeka Mengajar, Rapor Pendidikan, and Kampus Merdeka, aimed at creating a robust digital education ecosystem ([Ilmiah.id, 2023](#)).

Despite these advancements, challenges persist in maintaining user satisfaction (e-satisfaction) and loyalty (e-loyalty) in online learning platforms. According to projections by Statista, the number of users of online learning platforms in Indonesia is expected to grow by 25.3% from 2024 to 2028, reaching 20.77 million users ([Statista, 2023](#)). However, the competitive nature of digital learning requires platforms to deliver consistent quality in electronic services (e-service quality) to ensure user retention. Previous research highlights that e-service quality plays a critical role in shaping e-loyalty through e-satisfaction. For instance, Blut, Chowdhry, and Mittal (2015) demonstrated that superior e-service quality significantly enhances satisfaction and loyalty in digital contexts.

Moreover, emerging technologies such as artificial intelligence (AI) for personalized learning experiences are anticipated to dominate the education sector in the near future ([Kompas, 2023](#)). Nevertheless, disparities in technological access remain a pressing issue in Indonesia. The 2022 PISA report indicates that less than half of Indonesian students have access to computers for schoolwork at home, posing a barrier to equitable educational outcomes ([Digital Society, 2024](#)).

In this context, it is imperative to investigate the factors influencing the success of online learning platforms, particularly focusing on e-service quality, user satisfaction, and loyalty. This study aims to address these gaps by exploring the relationship between e-service quality and e-loyalty, with e-satisfaction as a mediating variable. The findings of this research are expected to provide valuable insights for improving the competitiveness and sustainability of online learning platforms in Indonesia.

To guide this investigation, the following research questions are proposed:

1. How does e-service quality affect e-loyalty among users of online learning applications in Indonesia?
2. Does e-satisfaction mediate the relationship between e-service quality and e-loyalty among users of online learning applications in Indonesia?

By addressing these questions, this study seeks to contribute to the growing body of literature on digital education and provide actionable recommendations for improving the performance and competitiveness of online learning platforms in Indonesia.

Methods

The study employs a quantitative explanatory approach to analyze the relationships between e-service quality, e-satisfaction, and e-loyalty within the XYZ online learning application. A causal research design is adopted to examine the direct influence of e-service quality on e-loyalty, mediated by e-satisfaction. The population for this research consists of users of the XYZ application associated with a specific educational institution. The sample is selected using purposive sampling, targeting

secondary-level students who have actively used the XYZ application within the past several months. Data were collected from 219 respondents using an online questionnaire. The scale used was the Likert scale (1–5) to assess how respondents viewed the variables studied. Data analysis using the Structural Equation Modeling-Partial Least Squares (SEM-PLS) method was used to examine direct and indirect relationships between variables. Validity was examined using the KMO and Bartlett tests, while reliability was measured using Cronbach's Alpha. This approach aims to create a solid framework for understanding the relationship between service quality, satisfaction, and loyalty in the context of the XYZ application.

Result and Discussion

This section provides a detailed analysis of the research findings, structured to highlight key insights from the respondent data, variable analysis, and structural equation modeling (SEM). A total of 219 respondents took part in the study, representing a diverse sample of users of the XYZ online learning platform. The findings are categorized into three main areas: respondent characteristics, variable analysis, and structural model results.

1. Respondent Characteristics

The characteristics of the 219 respondents are used to determine the diversity of respondents based on gender, age, education, length of use, purpose of using the application and frequency of using the application. This is expected to provide a fairly clear picture of the condition of the respondents and their relationship to the problems and objectives of the study.

Table 1: Respondent Characteristics

Characteristic	Category	Percentage (%)
Gender	Female	64.84
	Male	35.16
Age	18 years or older	68.04
	Below 18 years	31.96
Education	High School	69.4
	Vocational School	22.83
	Alumni	7.76
Usage Duration	1 year	35.16
	2 years	43.84
	3 years or more	21.00
Purpose of Usage	University Preparation	68.04
	Other Purposes	31.96
Usage Frequency	Weekly	64.84
	Less Frequent	35.16

a. Gender Distribution

Female respondents represented 64.84% of the total sample, while male respondents represented 35.16%. This aligns with research by Ahsan et al. (2020), which indicated that female students are more likely to adopt online learning platforms due to their structured design and accessibility. The dominance of female users suggests that the XYZ platform may be better suited to their learning preferences, possibly through features like user-friendly navigation and collaborative tools.

b. Age

A significant portion of respondents (68.04%) were aged 18 years or older. This shows that the application's primary focus is on high school and pre-university students. Studies by Mahdyvian et al. (2021) and Oliver (2014) highlight the importance of targeting older students who are at critical academic stages, such as preparing for university entrance examinations.

c. Education Level

High school students made up the largest segment of the sample (69.4%), followed by vocational school students (22.83%) and alumni (7.76%). The smaller percentage of alumni indicates a drop in engagement after graduation, highlighting the need for retention strategies aimed at this group. Implementing features like career preparation modules or advanced skills courses could help attract and retain alumni users.

d. Usage Duration

Most users (43.84%) indicated they had been using the application for two years, while 35.16% reported using it for one year. A smaller group (21%) mentioned they had been using it for three or more years, suggesting there may be challenges in keeping users engaged over the long term. As Poon and Lee (2012) suggested, implementing strategies like loyalty rewards and personalized recommendations could help maintain user engagement over time.

e. Purpose and Frequency

The majority of respondents (68.04%) used the platform to prepare for college admissions, and 64.84% reported using it weekly. This trend suggests that the app aligns with students' academic goals and encourages regular habits of accessing learning.

2. Variable Analysis

2.1 E-Service Quality

The average value of all dimensions of e-service quality variables is more than 4.21, it can be concluded that all dimensions of e-service quality are included in the very high criteria. The dimension that describes the highest e-service quality variable is the efficiency dimension with an average value of 4.33. While the lowest dimension is in the reliability and privacy dimension and the usefulness of information. It can be concluded that efficiency is an advantage for the XYZ application while the reliability and privacy dimensions and the usefulness of information must be further improved so that users better understand the information obtained about using the application.

This is in line with the statement of Poon, Wai Ching & Lee, Christina (2012) which says that e-servqual depends on consumer perceptions of the efficiency of electronic service providers, websites must be well organized with concise and in-depth up-to-date information and instructions because this is physical evidence of efficiency. Hair et al. (2021) showed that efficiency in digital platforms minimizes user frustration and increases satisfaction, particularly in education, where uninterrupted learning is essential. Oliver (2014) also highlighted that efficiency plays a significant role in lowering user adoption barriers, particularly for time-sensitive tasks such as academic preparation.

On the other hand, reliability, privacy, and usefulness of information received slightly lower scores (mean = 4.31). Concerns about consistent service delivery and data security are common in online platforms, as noted by Poon and Lee (2012). These elements are essential for building trust, which directly impacts user satisfaction and loyalty ([Fatmala & Irawan, 2022](#)). For example, ensuring that all materials meet academic standards and increasing transparency about data usage can help address this issue. Reliability and privacy can be improved by adding information provided by the application so that the quality of service can be relied upon. While the usefulness of information can be improved by making teachers and materials contained in the XYZ application quickly adapt to the learning materials available at the student's school.

These findings highlight the need to maintain high e-service quality to meet user expectations. Increased reliability and privacy can significantly increase user trust, creating a safer and more engaging environment. As Ahsan et al. (2020) note, even small gaps in service quality can have a major impact on user retention.

2.2 E-Satisfaction

The average value of all dimensions of the e-satisfaction variable is more than 4.21, it can be concluded that all dimensions of e-satisfaction are included in the very high criteria. The dimension that describes the highest e-satisfaction variable is the convenience

dimension with an average value of 4.35. While the lowest dimension is in the merchandising dimension with an average value of 4.26.

Fatmala and Irawan (2022) recognized convenience as a crucial element in creating positive user experiences, especially in education, where easy access to resources directly affects learning outcomes. Platforms that reduce technical barriers are more likely to encourage ongoing engagement ([Hair et al., 2021](#)). However, merchandising received the lowest score (mean = 4.26), suggesting dissatisfaction with pricing strategies or promotional offers. Mahdyvian et al. (2021) found that affordability is a vital factor affecting satisfaction in educational platforms, particularly for price-sensitive users. Implementing flexible subscription plans or targeted discounts could help address these issues and attract a larger user base. Satisfaction is essential for fostering user loyalty and repeat engagement. As Oliver (2014) suggested, satisfied users are more inclined to associate positive feelings with the platform, which enhances the chances of continued usage and recommendations to others. For XYZ, improving merchandising strategies could complement its strengths in convenience, leading to a boost in overall satisfaction.

2.3 E-Loyalty

E-loyalty received a positive overall rating, with the willingness to pay more achieving the highest score (mean = 4.29). This indicates that users recognize the platform's value and are willing to invest more. Ahsan et al. (2020) pointed out that perceived value is a significant predictor of loyalty, especially in platforms where users perceive a direct link between their investment and the outcomes they receive.

On the other hand, the repeat purchase score (mean = 4.17) was lower, indicating that not all users are consistently renewing their subscriptions or engaging on a regular basis. This observation is in line with Mahdyvian et al. (2021), who noted that loyalty behavior often relies on emotional connections and consistent positive experiences. Implementing features such as loyalty rewards or personalized notifications can help bridge this gap.

The data highlights the important role of satisfaction as a precursor to loyalty. Platforms that do not meet user expectations, despite providing good service quality, may struggle to retain users in the long term ([Hair et al., 2021](#)). For XYZ, encouraging emotional engagement through community features or sharing success stories can strengthen loyalty behavior.

3. Structural Model Analysis

The results from the structural equation modeling (SEM) offer valuable insights into how e-service quality, e-satisfaction, and e-loyalty are interconnected. This analysis

highlights the direct impacts of each variable and underline the crucial role of satisfaction in influencing loyalty behaviors.

3.1 Evaluation of Measurement Model or Outer Model

3.1.1 Convergent Validity

To evaluate the convergent validity of reflective constructs, researchers must consider the outer loadings of indicators and the average variance extracted (AVE). A high Outer loading value on a construct indicates that the related indicators have many similarities, which are captured by the construct. The minimum value of outer loading is 0.6, while a value of 0.5 to 0.6 can be considered with the exception that the indicator is not the only indicator from a construct so that there is a comparative indicator. In addition, the value of AVE for each construct must be ≥ 0.50 .

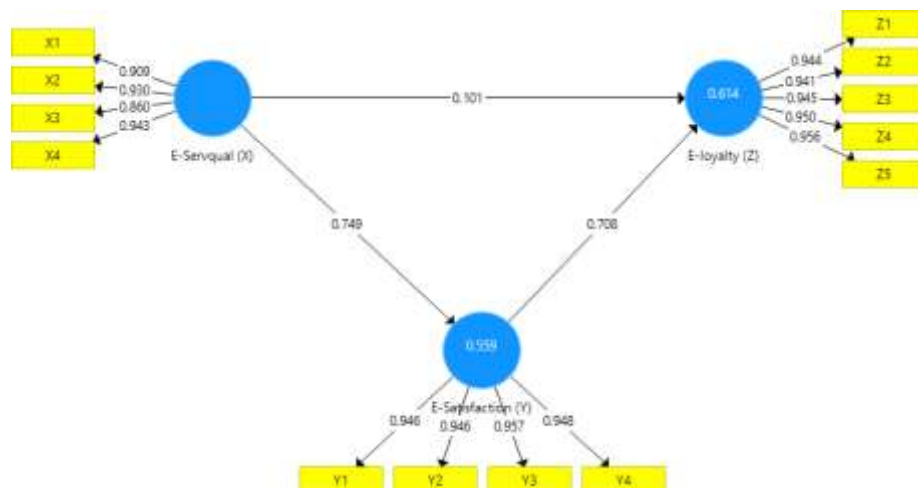


Figure 1 Outer Loading

Based on the figure 1, it can be seen that all dimension indicators have an outer loading value of more than 0.6 with the lowest value of 0.860. Furthermore, the value of $AVE \geq 0.50$ can be seen with the lowest value of 0.830. So it can be said that all indicators are valid as measuring instruments for the concept that should be measured.

3.1.2 Internal Consistency

Internal consistency measurement is measured using cronbach's alpha and composite reliability. The minimum value of cronbach's alpha and composite reliability is 0.70 for each construct.

Table 2 *Construct reliability and Validity*

	Cronbach's Alpha	Composite Reliability
E-Satisfaction (Y)	0.963	0.973
E-Servqual (X)	0.931	0.951
E-loyalty (Z)	0.971	0.978

Based on table 2, the Cronbach's alpha value in this study has the lowest value of 0.931 for the e-servqual variable while the highest is 0.971 for the e-loyalty variable, which has met the minimum value of 0.70. Then the lowest composite reliability value is 0.951 for the e-servqual variable and the highest is 0.978 for the e-loyalty variable. These values have met the minimum value of 0.70. Therefore, it can be concluded that all constructs are reliable.

3.1.3 Discriminant Validity

Discriminant validity measurement can be done by using the cross loadings value of the indicator variables. The value of the outer loading on all indicators must be statistically significant with a minimum value of 0.6. In addition, the outer loadings value of an indicator variable must be greater than all the outer loadings values of the variable to the other constructs. From the results of data processing, it can be seen that all outer loading values of the indicators of each construct are greater than the outer loading value of the indicator to the other constructs. Thus, all indicators of each variable in this study have met discriminant validity.

Furthermore, at the construct level, discriminant validity is tested using the Fornell-Larcker criterion by comparing the root of the AVE value or Square root of AVE of each construct with the correlation of the construct to other constructs. The square root of each AVE of a construct must be higher than its correlation with other constructs.

Table 3 *Fornell-Larcker Criterion*

	E-Satisfaction (Y)	E-Servqual (X)	E-loyalty (Z)
E-Satisfaction (Y)	0.949		
E-Servqual (X)	0.749	0.911	
E-loyalty (Z)	0.783	0.631	0.947

Based on table 3, the value of the square root of AVE of each indicator is higher than the correlation of the variable itself to other constructs. So the discriminant validity for the dimension construct has been achieved.

3.2 Evaluation of Structural Model (Inner Model) and Hypothesis

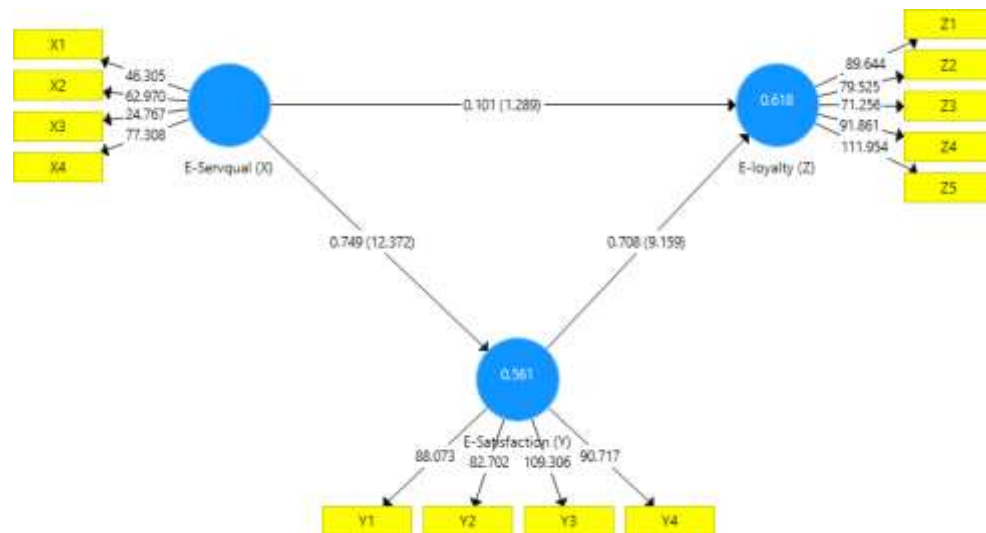


Figure 2 Bootstrapping

3.2.1 Coefficient of determination

The next evaluation looks through the coefficient of determination (R^2) to assess the size of the variance value originating from endogenous variables with causes by all connected exogenous variables. The R^2 assessment is R^2 0.67 (strong/substantial), 0.33 (moderate) and 0.19 (weak).

Table 4 R Square

	R Square	R Square Adjusted
E-Satisfaction (Y)	0.561	0.559
E-loyalty (Z)	0.618	0.614

Based on Table 4 from the results of data processing, the R Square value is 0.561 for the e-satisfaction variable and the e-loyalty variable is 0.618. So it can be explained that the construct of the e-Servqual variable affects e-satisfaction by 0.561 or 56.1% and the rest is influenced by other variables. While the e-servqual and e-satisfaction variables simultaneously affect the e-loyalty variable by 0.618 or 61.8% and the rest is influenced by other variables. It can be concluded that the determination coefficient of the e-satisfaction and e-loyalty variables is included in the moderate criteria

3.2.2 Hypothesis Analysis and Significance of Path Coefficients

In the process of assessing the level of significance or probability of the structural equation model, the bootstrapping method is carried out with a subsample value of 5000 so that the results obtained are more accurate with an alpha (α) of 5% and a one-tailed test. According to Santosa (2018:92) structural testing of the sustainability model will be carried out by viewing a path coefficient value or β and its significance. The path coefficient will show a relationship between the variable gaps mentioned in the hypothesis. Values between -1 and +1 are standardized values. Values approaching +1 can indicate a positive relationship because the hypothesis proposed shows a positive relationship.

Next, in hypothesis testing, it can be shown as a t-statistic value and a probability value (p). The t-statistic criteria are observed by looking at the value of $t_{count} > t_{table}$ for alpha (α) 5% and a one-tailed test, the t-statistic value used is 1.66. While the p-value criteria must be < 0.05 .

Table 5 Path coefficients

	Original Sample (O)	T Statistics (O/STDEV)	P Values
E-Satisfaction (Y) -> E-loyalty (Z)	0.708	9.159	0.000
E-Servqual (X) -> E-Satisfaction (Y)	0.749	12.372	0.000
E-Servqual (X) -> E-loyalty (Z)	0.101	1.289	0.099

Based on hypothesis testing in the table, it is known that the e-service quality variable has a positive and significant effect on the e-satisfaction variable. These results are in line with research from Sri Suprpti and S. Suparmi (2020) on Go-Ride users in Semarang City which shows that e-service quality significantly affects e-satisfaction so that the better the e-service quality carried out can increase the e-satisfaction of its users.

Meanwhile, e-service quality variable does not have a significant effect on the e-loyalty variable directly. Likewise, research from Mahdyvian, Kultum and Ramdani, (2021) with a case study of PT. Eduka Teknologi Indonesia that e-service quality does not have a significant effect on the e-loyalty variable. This shows that e-service quality does not have a significant effect on e-loyalty directly, so improving e-service quality cannot directly increase e-loyalty.

The e-satisfaction variable has a positive and significant effect on the e-loyalty variable. These results are in line with the research of Dhimas Prakosa, Ari Pradhanawati, (2021) that e-satisfaction significantly affects the e-loyalty variable with a case study of tokopedia users in Semarang. So that the higher the perceived e-satisfaction can increase the e-loyalty of its users.

Furthermore, to determine the effect of e-service quality on e-loyalty through e-satisfaction can be seen the results of the specific indirect effect in the table.

Table 6 Specific indirect effect

	Original Sample (O)	T Statistics (O/STDEV)	P Values
E-Servqual (X) -> E-Satisfaction (Y) -> E-loyalty (Z)	0.530	9.021	0.000

E-satisfaction significantly mediates the effect of e-service quality on e-satisfaction with a mediation coefficient of 0.530 and a t-statistic value of 9.021 greater than the t-table value of 1.66 with a p-value of 0.000 has met the requirements smaller than 0.05. It can be concluded that e-satisfaction has a positive and significant effect on mediating the effect of e-service quality on E-satisfaction. In line with the research of Berliana Haza Fatikah, H. Albanna (2022) on users of Islamic Mobile Banking applications in Yogyakarta City. It is concluded that the e-service quality variable does not have a direct effect on the e-loyalty variable, therapy must go through e-satisfaction as a mediating variable. It can be seen in hypothesis 2 that e-service quality has no direct effect on e-loyalty so that a mediating variable is needed, so in this study the e-satisfaction variable is a full mediation variable. Based on Hair et al. (2021: 142) full mediation occurs when the mediated effect is significant but the direct effect is not significant. Therefore, the mediator variable fully explains the relationship between exogenous and endogenous latent variables.

Conclusion

Using data from 219 respondents, this study investigates the relationships between e-service quality, e-satisfaction, and e-loyalty in the context of XYZ online learning platform. The findings point out important areas for strategic improvement and provide insight into user perceptions:

1. E-service quality has a significant impact on e-satisfaction, with efficiency being the most important component. However, to address persistent user concerns and improve overall satisfaction, improvements in privacy, dependability, and relevance of the information provided are needed.
2. E-satisfaction plays a significant role in driving loyalty behavior by acting as a full mediator in the interaction between e-service quality and e-loyalty. Satisfied users tend to use the platform more frequently, express willingness to pay more, and recommend it to others.
3. Building loyalty requires social and emotional interactions in addition to e-service

quality and satisfaction. Long-term dedication and advocacy can be further encouraged by features such as value-added services, customized experiences, and peer collaboration.

Suggestion

1. Based on the research results, the e-service quality variable does not have a direct effect on e-loyalty but must go through e-satisfaction as a mediating variable. Good service does not directly make consumers loyal to the XYZ application service, but rather because of the evaluation of customer satisfaction with the services provided. For this reason, it is very important for service providers to ensure user satisfaction based on convenience, merchandising, site design and financial security to increase customer loyalty.
2. The level of e-service quality carried out by XYZ is included in the very good category. However, the Reliability and Privacy Dimension should be improved by adding information provided by the application so that the quality of service can be relied on. In addition, the Dimension of usefulness of information can be improved by making teachers and materials contained in the XYZ application quickly adapt to learning materials according to the curriculum in the students' schools.
4. The level of e-satisfaction among XYZ application users is very high. The convenience dimension is an advantage over customer satisfaction, while the merchandising dimension must be further improved by always providing a variety of attractive price promo offers, both for new users and those who are currently using the service to extend the service so that students are more interested and feel satisfied when subscribing continuously using the XYZ application.
5. The level of e-loyalty of XYZ application users is very high. The willingness to pay more dimension is an advantage over customer loyalty, which means that users are willing to pay more for all products and services provided. Meanwhile, the repeat purchase dimension must be further improved because the average value in this dimension is the lowest. There must be a stimulus that can be given to students, either in the form of daily assignments, more interesting video materials or push notifications that can stimulate students to use the application so that the level of loyalty can be increased.

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