

Online Learning Infrastructure: Does it Strengthen the Effect of Service Quality on Student Satisfaction?

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	ABSTRACT
ARTICLE INFO <i>Article history:</i> Received December 27, 2021 Revised September 14, 2022 Accepted September 23, 2022	<p>One of the main obstacles to online learning is learning infrastructure and the availability of internet facilities, i.e., internet quotas. Universitas Negeri Surabaya (UNESA) students regularly receive internet quota assistance from the Minister of Education and Culture and Universitas Negeri Surabaya. Therefore, it is expected that the online learning process will run well. The study aimed to determine 1) the impact of the online learning service quality on student satisfaction and 2) the moderation effect of Infrastructure to strengthen the effect of service quality on student satisfaction in online learning. The subjects of this study were students of the UNESA, Indonesia, with 250 students as research samples. Data collection was done by distributing online questionnaires using google forms. The data analysis technique used moderated regression analysis. The results proven that 1) the online learning service quality affects student satisfaction, 2) infrastructure as the moderator variable not proven as a moderator model, but infrastructure has a direct influence on student satisfaction in online learning.</p> <p>Keywords: <i>Online Learning Infrastructure, Students Satisfaction, Learning Quality</i></p>
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INTRODUCTION

In 2019, the world was shaken by the Corona Virus Disease 2019 (Covid-19). The fast transmission and difficulty detecting this virus make the whole community highly concerned. To anticipate the spread of this virus, the Indonesian government does not implement a lockdown like other countries in the world (Roisatin, et al., 2021; Said & Muslimah, 2021). However, it executes the Large-Scale Social Restrictions (PSBB) policy, social and physical distancing. It aims to limit social interaction with other people, reduce outdoor activities and stay active at home.

All sectors get the impact, including education. Since early March 2020, all educational institutions, including schools, colleges, and Islamic boarding schools, have conducted online learning. The government prohibits universities from working face-to-face (conventional) lectures and orders them to hold classes or learn online (Kemendikbud Dikti Circular Letter No. 1 of 2020). The prohibition aims to increase awareness and the process of stopping the spread of the Covid-19 virus through direct

interaction among large crowds.

The Rector of Unesa is also fast and responsive to all problems faced by students, especially in the online learning process. The university issued a policy by fulfilling learning infrastructure in the form of internet quota provision to all students in rotation with high capacity according to the provider used by students. Before, the Ministry of Education and Culture (Kemendikbud) was one step ahead in providing official internet quota assistance since the beginning of the Covid 19 Pandemic in March 2020 or online learning for the even semester of 2019/2020. This policy is taken with the hope that the online learning process during the pandemic will not be hampered, and there is no reason for students not to take online lectures by complaining about internet quota problems. Kemendikbud provides internet quota subsidies for students, teachers, and lecturers following Secretary-General Regulation 14 of 2020 about the technical specifications for the 2020 Internet Data Quota Assistance. To facilitate remote learning during the pandemic, this technical guideline serves as instructions for allocating internet data quota assistance to educators and students. The Kemendikbud offers support through internet data allotments split into general and educational assignments. The general quota is the quota that can be used to access all pages and applications, and Learning Quotas are quotas that can only be used to access learning pages and applications, with a list listed on <http://kuota-learning.kemdikbud.go.id/>. Students have used the internet quota assistance facility from Kemendikbud and Unesa.

The lives of both students and teachers have been improved by online learning. The quality of education has increased due to the growing usage of technology in the classroom (Kulal & Nayak, 2020; Rochanah & Nabila, 2022; Sari, et al., 2022). However, e-learning must offer sufficient and trustworthy technical infrastructures (Eze et al., 2018). Online learning has bought a positive impact on the lives of students as well as teachers (Rahimah, et al., 2020). The increasing use of technology in learning has improved the quality of education (Kulal & Nayak, 2020; Basir & Amer, 2022). However, e-learning must provide adequate and reliable technical infrastructures (Eze et al., 2018). One of the main obstacles to online learning is learning infrastructure and internet facilities' availability, especially internet quotas. The obstacle in the learning process can reduce student interest in education. A facility and infrastructure are essential to support the success of learning activities (Rahayu & Haq, 2020). The instruments that encourage student-to-student connection were the least significant, most unsatisfying, and least meeting student expectations (Small et al., 2012).

The learning infrastructure adds value to the organization along many dimensions (Finerty et al., 1997). The quality of an institution's (higher education) service that is felt directly by students is one of the critical factors in the success of higher education (Kitchroen, 2002). In the context of "students as consumers," where satisfaction is a crucial component of a service product, it is vital to work to increase student satisfaction (Small et al., 2012). Student satisfaction is critical to assisting institutions' or universities' development. Student satisfaction is an institution's barometer in its pursuit of competitive advantage. Public and private higher education institutions consistently strive to provide quality services to their students. It is intended to develop and maintain the reputation of their institution. Hanaysha et al. (2011), service quality dimensions are a part that every educational institution should not ignore. Therefore, this study was essential to analyze the effect of online learning service quality on student satisfaction and analyze the learning infrastructure as a

moderator variable whether or not it strengthens the influence of service quality on student satisfaction in online learning.

Kulal & Nayak (2020) highlighted how successfully adopting online learning built infrastructure, improved internet connectivity, developed rural areas, improved student and teacher attitudes, etc. Additionally, colleges and other educational institutions must offer teachers and students appropriate guidance and support about using online classes to boost their comfort. Data from this study were analyzed by using descriptive statistics. Mishra et al. (2020) state that governments must ensure the availability of infrastructure and promote technology-enabled learning for students. The researcher used quantitative and qualitative methodologies to study the perceptions of stakeholders based on the online teaching-learning process. Eze et al. (2018) Describe how poor internet infrastructure, insufficient user training, and user attitude affect successful adoption. The study suggests that colleges train their personnel consistently to keep up with the constant improvements of the e-Learning facilities to maximize usage and that e-learning facilities be continuously upgraded. Using 15 semi-structured interviews with members of the academic staff at M-University, the study used a qualitative technique to evaluate how lecturers in a private tertiary institution in Nigeria accepted and used e-learning resources.

Regarding the lack of digital infrastructure, the MOE needs to establish an online learning unit to handle online learning matters and update all content yearly (Alhouti, 2020). Furthermore, effective online learning needs specific professional development programs that include pedagogical and technological support (Fatimawati et al., 2020). The study uses descriptive analysis and a quantitative approach. Ho et al. (2020) used several variables with system interactivity as a moderator variable in their research about online learning. The outcomes of the structural model demonstrate that perceived usability is positively influenced by computer self-efficacy. Additionally, there is a clear correlation between perceived ease of use and system interactivity. The authors found that perceived ease of use has little effect on students' attitudes. However, the findings indicate that system interaction can only have a minor impact on students' attitudes.

Last but not least, it should be highlighted that social factor directly influences students' opinions. The researcher opted for the quantitative approach since the primary component of this method is the use of controlled surveys with coded response options. Wyk (2020) conducted a study utilizing e-tools for online support while mapping a pragmatic research methodology and using an explanatory mixed methods design. The results demonstrate that academic help can contribute to online learning's success. Furthermore, the educational support tools were well-received by both students and teachers, who saw a favorable impact on their online learning.

The adoption of online learning successfully also needs the improvement in the service quality, i.e., educational infrastructure, lecture tools, and teaching media (tangibles), the reliability of lecturers and employees (reliability), responsiveness and treatment of students (assurance), and understanding of student interests (empathy), to increase the student satisfaction. This study not only counts heavily on computers and networks as infrastructure, but the availability of internet quotas can also be an obstacle to implementing online learning. Therefore, a good database is needed to organize and ensure internet quota assistance from Kemendikbud and Unesa can be appropriately distributed. In addition, monitoring, evaluation, and follow-up activities related to student satisfaction with the institution's services must be carried out

regularly to guarantee and continuously improve quality. This study uses a quantitative research approach. Data analysis used moderated regression analysis to find the direct effect of online learning and infrastructure on student satisfaction and the indirect impact of online learning on student satisfaction with infrastructure as a moderator variable.

The existence of internet quota assistance aims to support quality improvement of online learning services by maintaining student satisfaction with the academic services provided. With the provision of free internet quotas, it is possible for students to feel satisfied directly. However, some problems arise in the distribution of internet quotas to students, e.g., uneven distribution and low speeds internet networks that lead to a long loading process so that students choose to use their internet quota. Based on this policy, it can be said that the institution has fulfilled the learning infrastructure, but the infrastructure provided is still not optimal. It can be assumed that some students have obtained appropriate learning infrastructure to meet the quality of online learning, so they already feel satisfied. However, many students have not obtained learning infrastructure (internet quota), which causes a lack of student satisfaction with the services provided by the university. Following Susanto's (2014) opinion, the higher the service quality, the higher the pride students feel.

All academics at Unesa must continuously improve the online learning service quality to achieve student satisfaction. The improvement of the elements of service quality, i.e., educational infrastructure, lecture tools, and teaching media (tangibles), the reliability of lecturers and employees (reliability), responsiveness and treatment of students (assurance), and understanding of student interests (empathy), can affect the increase in student satisfaction. The biggest obstacles to the digitalization of education are a lack of instructors' enthusiasm for embracing new pedagogy and a lack of training on how to use new technologies (Chowdhury, 2018). In learning activities, facilities and infrastructure are needed to support the smooth process of the activities. Every agency, especially universities, needs the management of facilities and infrastructure. Knowledge and learning management infrastructure is required to realize every knowledge organization as a learning organization capable of exploiting organizational knowledge wealth (Lytras & Pouloudi, 2003). An interactive database for working will contribute to the future profitability of the industry by addressing the multiple needs of responding to competitive challenges, developing managers' ability to manage change, and allowing managers the skill to make reliable and valid decision choices based on actual organizational data (Preston et al., 2001). New technological tools used in conjunction with traditional learning management-based discussion forums may offer opportunities to reach various learners and provide differing levels of engagement (Montelongo & Eaton, 2020). In addition, to organize and ensure that internet quota assistance from Kemendikbud and Unesa can be distributed properly, a good database is needed. In addition, monitoring, evaluation, and follow-up activities related to student satisfaction with the institution's services must be carried out regularly to guarantee and continuously improve quality. Finally, technologies need a solid pedagogical foundation to match student needs and generate new use-learning real case scenarios. Facilitating deeper student engagement in learning and advocating inclusive teaching with new technologies can support future trends in education and instructional design (Fisher & Baird, 2021).

Based on the explanation above, the purpose of this study is to determine 1) the effect of online learning service quality on student satisfaction and 2) whether learning

infrastructure is a moderator variable and whether or not it strengthens the influence of service quality on student satisfaction in online learning.

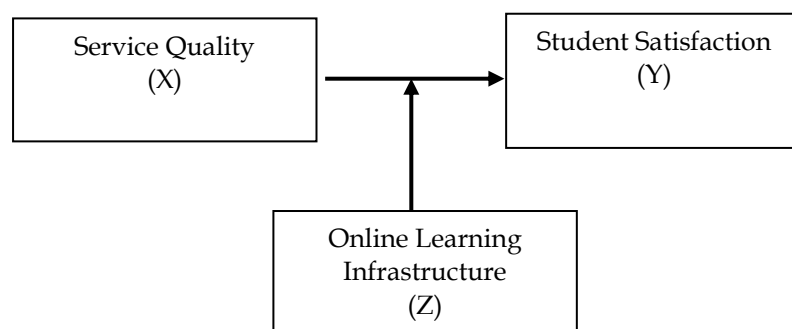
METHOD

This study uses a quantitative research approach. The subjects of this study were students of Unesa by taking a sample of 250 respondents with an accidental sampling technique. Data were collected utilizing an online questionnaire via a google form.

This research questionnaire is structured into four parts. The first section is for demographics, which consists of gender, receiving internet quota assistance, internet quota aid providers, and the number of internet quota aid recipients. The service quality section is adapted from Parasuraman et al. (1985) with fourteen statement items. The third part on student satisfaction uses directly reported satisfaction adapted by Tjiptono & Chandra (2011) with five statement items. The fourth part is about online learning infrastructure adapted from (Riyanda et al., 2020) with six statement items. The total number of statements used in the research instrument is twenty-five items. A five-type Likert scale was used for alternative answer choices for the dependent, independent, and moderating variables ranging from 1 "Strongly disagree" to 5 "Strongly agree."

Data analysis in this study used moderated regression analysis, and for statistical analysis, the researcher used SPSS version 26. This study has three variables: service quality as an independent variable, student satisfaction as the dependent variable, and online learning infrastructure as a moderating variable.

Figure 1. Conceptual framework of online learning infrastructure as a moderating variable



RESULT AND DISCUSSION

Data was collected through an online questionnaire via google form on 250 students of Unesa. Table 1 summarises the demographic profile of the respondents. The majority of the subjects were female, almost 86.4%. On average, nearly all respondents receive internet quota assistance for online learning. They receive internet quota assistance from two institutions, the Kemendikbud and Unesa, which amounted to 52.6%. On average, respondents receive internet quota assistance once, as much as 42.2%, twice 14.9%, three times 22.7%, and more than 20.12%.

Table 1 Subject demographic (n = 250)

Measure and item		Frequency	Percentage
Gender	Man	84	33,6%
	Women	166	66,40%
Receive internet quota assistance	Yes	232	92,90%
	No	18	7,10%
Internet quota assistance agencies	Kemendikbud	91	36,40%
	University	28	11%
	Both	131	52,60%
Number of internet quota assistance receipt	1	106	42,20%
	2	37	14,90%
	3	57	22,70%
	≥4	50	20,10%

The following is the testing of Hypothesis 1, which states that the online learning service quality (X) affects student satisfaction (Y):

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29.457	2	14.729	72.188	.000b
	Residual	50.396	247	.204		
	Total	79.853	249			

a. Dependent Variable: Student Satisfaction

b. Predictors: (Constant), Service Quality

Based on the analysis of 250 respondents, the calculated F value is 72.188, with a significance value smaller than 0.05 at the specified significance level. It can be interpreted that the quality of online learning (X) affects student satisfaction (Y). The magnitude of the regression coefficient of the influence of the variable X on Y is as follows:

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
1 (Constant)	.692	.264		2.625	.009
Service Quality	.398	.064	.352	6.232	.000

a. Dependent Variable: Student Satisfaction

The results of a simple regression analysis of the X variable to Y get a coefficient value of 0.398 with a significance of 0.000, which is smaller than the specified significance level, which means that service quality (X) affects the Y variable (student satisfaction) with a coefficient of 0.398. However, before concluding the effect of X on Y, it is also necessary to look at the calculation results of the constant value. The constant value based on the calculation results obtained the result of 0.692 with a significance value of 0.009 < 0.05, which means that the value of the continuous/intercepts influences Y.

Based on the results of the regression analysis above, the regression equation formed is: $Y = 0.692 + 0.398X + e$

Information:

Y = student satisfaction

X = online learning service quality

E = error

Model Summary

Model	R	R Square	Adjusted Square	R Std. An error in the Estimate
1	.607 ^a	.369	.364	.45170

a. Predictors: (Constant), Service Quality

From the results of the simple linear regression equation above, it can be said that service quality positively influences student satisfaction. When the online learning service quality increases, student satisfaction will also increase. Furthermore, hypothesis testing is carried out as follows:

H0: There is no influence between the online learning service quality on student satisfaction

H1: There is an effect of the online learning service quality on student satisfaction

Based on the test results, it is known that the Sig. F value is $0.000 < 0.05$, then H0 is rejected. Thus, it can be concluded that online learning service quality has a positive and significant influence on student satisfaction. As the online learning service quality increases, student satisfaction will increase. The value of the coefficient of determination of the test results from service quality on student satisfaction is R Square 0.373, which means that the online learning service quality affects student satisfaction by 37.3%, while other variables influence the rest.

In testing the second hypothesis, online learning infrastructure as a learning moderating variable, strengthening the influence of online learning service quality on student satisfaction by using Moderating Regression Analysis (MRA) analysis, the output results of this data analysis are as follows:

ANOVA

Model		Sum Squares	df	Mean Square	F	Sig.
1	Regression	29.774	3	9.925	48.752	.000 ^b
	Residual	50.079	246	.204		
	Total	79.853	249			

a. Dependent Variable: Student Satisfaction

b. Predictors: (Constant), Learning infrastructure, Service Quality

The results of the analysis show that the calculated F value is 177.578 with a significance of $0.000 < 0.05$, so it can be interpreted that the quality of service (X) and online learning infrastructure (Z) affect student satisfaction (Y). The magnitude of the influence coefficients of X and Z can be seen in the following table:

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-1.164	1.511		-.770	.442
X	.865	.380	.767	2.276	.024
Z	.825	.365	.795	2.258	.025
XZ	-.112	.090	-.724	-1.247	.213

a. Dependent Variable: Student Satisfaction

Based on the results of the table above, it can be seen that the significance value of service quality is $0.024 < 0.05$, which means that the service quality variable affects student satisfaction with a coefficient of 0.865. The learning infrastructure has a significance of $0.000 < 0.05$, so it can be interpreted that the online learning infrastructure variable affects student satisfaction with a coefficient of 0.005. The constant value in the previous calculation obtained a result of 0.009, which means that the constant value does not affect student satisfaction. In contrast, by adding the learning infrastructure variable, the constant value obtains a result of $0.442 < 0.05$, which means that the constant value influences the student's satisfaction.

Based on the results of the above calculations, it can be seen that by adding the variable Z (learning infrastructure), the influence of the X variable on Y becomes more significant than the results of the previous calculation, as evidenced by the increasing coefficient value of the X variable, which is 0.398 to 0.865. The significance value of the constant is 0.442, with a significance level of 0.05. Therefore, it can be interpreted that in the second regression calculation, the constant value does not affect changes in the Y variable. The significance value of the moderating variable Z is 0.213, with a significance level of 0.05, so it can be concluded that it is not proven to be a moderating variable. The effect of variable Z on Y is proven to have a direct effect with a coefficient of 0.825.

Based on the results of the MRA analysis, the regression equation is:

$$Y = 0.865X + 0.825Z + e$$

Information:

Y = Student Satisfaction

X = online learning service quality

Z = Learning Infrastructure

e = error

Model Summary

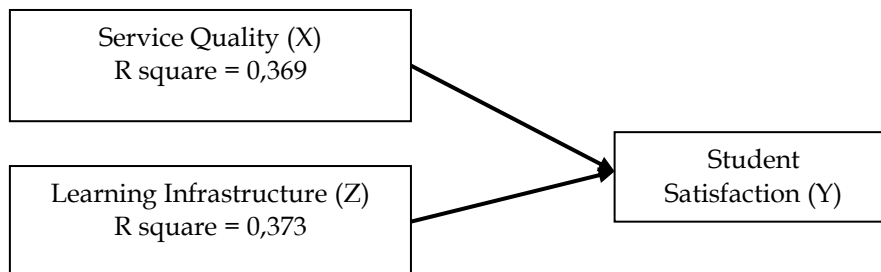
Model	R	R Square	Adjusted Square	R	Std. The error in the Estimate
1	.611 ^a	.373	.365		.45119

b. Predictors: (Constant), Service Quality

The equation shows that service quality and learning infrastructure positively influence student satisfaction. The simple linear regression and moderating results show that the learning infrastructure strengthens the relationship between online learning service quality and student satisfaction. Statistical calculations show that the Z

variable is not a moderator variable. The Z variable's influence on the Y variable is a direct effect, so it can be concluded that H2 is rejected and H0 is accepted.

Figure 2. Learning Infrastructure Model as a moderating variable strengthens the online learning service quality on student satisfaction



The online learning service quality affects student satisfaction

The quality of online learning services affects student satisfaction, and the increasing quality of service results in increased student satisfaction with service quality. Annamdevula & Bellamkonda (2016) stated that the quality of services such as the teaching process, administrative services, academic facilities, campus infrastructure, support services, and internationalization are the primary keys to student satisfaction. Therefore, the institution/organization can control the level of satisfaction from customers by prioritizing the quality of service provided to users.

Student satisfaction is a student's positive attitude towards the services provided by the institution or the match between the expectations of the service compared to the reality received by the student. Student satisfaction with the online learning service quality can be measured using tangible (physical evidence), reliability, responsiveness, assurance (guarantee), and empathy. Analysis of student satisfaction is necessary to measure the student appraisal of services provided by contrasting their expectation and reality. Consumer satisfaction is one of the service results for performance measurement that can be done through customer surveys. If the final result turns out that there is a mismatch between the outcomes resulting from service, in this case, the online learning service quality and student satisfaction, this shows that there is still a gap in expectations so that we conduct a screening of student aspirations to find out what students need.

Tangible aspects of physical evidence are related to the school's physical elements needed to support the teaching and learning process, including; buildings, environmental cleanliness, parks, laboratories, libraries, and others. Therefore, physical evidence can be seen in educational facilities and infrastructure. Educational facilities are equipment and supplies that directly support the educational process, especially the teaching and learning process, such as buildings and teaching tools/media. In contrast, educational infrastructure is indirectly used to achieve academic goals, such as laboratories and libraries. In this study, tangibles in online learning are related to online learning platforms and are based on the clarity of the lecturer in delivering the material in online learning. The majority of respondents to this statement item answered that they were satisfied with the online learning platform used by the lecturer and the clarity of the material presented in online learning.

The second determining factor is reliability, which is related to the ability to provide the promised service immediately, accurately, and satisfactorily. Finally, the teacher or lecturer is one of the determining factors for the success of the learning process. Apart from that, there are also infrastructure and environmental factors. The result showed that most respondents (more than 83%) were satisfied with the online learning platforms, digitizing services, and the clarity of information provided by lecturers, departments, faculties, and universities.

The third aspect is responsiveness, which is the willingness of institutional personnel to listen to and resolve student complaints. Based on the assessment of student satisfaction at Unesa on the responsiveness aspect, it can be concluded that students are satisfied with handling online learning complaints. In addition, students are also satisfied with the communication made by the lecturers because it creates good communication between lecturers and students, and lecturers at Unesa generally have high responsiveness to students' online learning problems. This aspect of responsiveness will also shape student satisfaction with the service quality provided by the university. In their research, DeShields et al. (2005) stated that students would assess academic aspects such as the ability of teachers to deliver lecture material, their ability to communicate with students, and their interactions with students.

The fourth aspect is assurance, a condition in which the institution provides guarantees of service certainty to students, which cannot be separated from the ability of institutional personnel, especially leaders, lecturers, and employees, to create confidence and trust in the promises of the institution and its services to the student. Based on this aspect, Unesa students are satisfied with the lecturers because they have relevant competencies in their expertise fields. In addition, Unesa also guarantees the quality of education, one of which is through monitoring online learning involving students.

The fifth aspect is empathy, a form of institutional attention to students who want to feel understood and essential for the institution in providing services. In the online learning process, lecturers have a significant role. Based on the answers, the students of Unesa are satisfied (more than 84% of respondents) with the lecturers in online learning because they provide convenience during online learning, can respond to student questions, and provide services regardless of student status.

According to Hanaysha et al. (2011), public and private higher education institutions consistently strive to provide quality services to their students in Malaysia. It is intended to develop and maintain the reputation of their institution. Based on this, service quality dimensions are a part that every educational institution should not ignore.

Online learning infrastructure strengthens the influence of service quality on student satisfaction

The quality of an institution's (higher education) service that is felt directly by students is one of the critical factors in the success of higher education (Kitchroen, 2002). The satisfaction felt by students towards the institution's services can be seen from the compatibility between expectations and actual performance that occurs in the institution's environment. Student satisfaction is a crucial factor in assisting institutions or university's development. Universities must properly listen to student suggestions and complaints to improve their services (Shauchenka & Busłowska, 2010). The existence of quality services can lead to satisfaction for students, and the effect leads to the desire of individuals (students) to behave in specific ways. This

behavior can manifest in positive or negative recommendations to institutions among students and lead to the community. The data analysis results show a relationship between service quality and student satisfaction, so increasing service quality will affect student satisfaction. Student satisfaction depends on the institution's quality of teaching and learning environment, as well-qualified students demand learning and faculty experience for their academic and professional development (Malik, 2010). The role of customer satisfaction is critical, especially in building student loyalty in the future. Even with satisfaction, it can create a marketing mechanism through word of mouth, which will benefit the institution (Setiawardani, 2018)

Based on the research data, it can be concluded that the improvement of (tangibles), the reliability of lecturers and employees (reliability), responsiveness and treatment of students (assurance), and understanding of student interests (empathy) can affect the increase in student satisfaction. Learning infrastructure is equipment and supplies directly or indirectly to support teaching and learning activities. In learning activities, facilities and infrastructure are needed to support the smooth process of the activities. Therefore, the management of facilities and infrastructure is required by every agency, especially schools (Darmastuti, 2014). In this study, the facilities are infrastructure in online learning, such as laptops, internet quota, credit, smartphones, and learning applications. According to (Riyanda et al., 2020), the indicators for measuring online learning infrastructure are the availability of internet facilities, laptop facilities, and electricity network facilities. The Rector of Unesa made a policy by providing regular internet quota assistance to all students. In addition, to aid institutions, students also get internet quota assistance from the Kemendikbud of 50 GB per month with details of 5 GB of general quota and 45 GB of learning quota. With the help of the internet quota, it is expected that the online learning process during this pandemic will not be hampered. There will be no more reason for students not to take online lectures or complaint about internet quotas. Most students at Unesa (92.9%) received internet quota assistance. Moreover, 20.1% of students received internet quota assistance more than three times during this pandemic. The internet quota assistance came from Kemendikbud and Unesa. 52.6% of students receive internet quota assistance from Kemendikbud and Unesa. Based on the answers from respondents, it is known that 40.3% of students are satisfied with the facilities provided by the university in the form of internet quota assistance for online learning, and 24.7% of students feel very satisfied with the facilities provided by the university in the form of internet quota assistance for online education. As for internet quota assistance from the Kemendikbud, 37.7% of students were satisfied, and 30.5% of students were delighted with the Kemendikbud facilities in internet quota assistance for online learning. Furthermore, 54.5% of students strongly agreed with the internet quota assistance to support online learning.

The study reveals that the online learning service quality positively influences student satisfaction and the increasing quality of service results in increased student satisfaction with service quality. Therefore, student satisfaction will also increase when the online learning service quality increases. The primary keys to student satisfaction are the quality of services such as the teaching process, administrative services, academic facilities, campus infrastructure, support services, and internationalization. In addition, student satisfaction with the online learning service quality can be measured using tangible (physical evidence), reliability,

responsiveness, assurance (guarantee), and empathy.

Analysis of student satisfaction is necessary to measure the student appraisal of services provided by contrasting their expectation and reality. Consumer satisfaction is one of the service results for performance measurement that can be done through customer surveys. If the final result turns out that there is a mismatch between the outcomes resulting from service, in this case, the online learning service quality and student satisfaction, this shows that there is still a gap in expectations so that we conduct a screening of student aspirations to find out what students need. The improvement of the elements of service quality, i.e., educational infrastructure, lecture tools, and teaching media (tangibles), the reliability of lecturers and employees (reliability), responsiveness and treatment of students (assurance), and understanding of student interests (empathy), can affect the increase in student satisfaction.

Infrastructure as a moderator variable is not proven as a moderator model, but infrastructure directly influences student satisfaction in online learning at Unesa. In learning activities, facilities and infrastructure are needed to support the smooth process of the activities. Therefore, every agency, particularly universities, needs facilities and infrastructure management. In this study, the facilities are infrastructure in online learning, such as laptops, internet quota, credit, smartphones, and learning applications. Technological tools such as discussion boards, video conferencing, and synchronous opportunities influence student engagement and learning (Montelongo & Eaton, 2020). Knowledge and learning management infrastructure is required to realize every knowledge organization as a learning organization capable of exploiting organizational knowledge wealth (Lytras & Pouloudi, 2003). Teachers face difficulties in conducting online classes due to a lack of proper training and development for online classes. Technical issues are the major problem for the effectiveness of online classes (Kulal & Nayak, 2020). The learning infrastructure is adding value to the organization along many dimensions. Establishing a learning culture supported by powerful knowledge systems can transform the rate and quality of learning (Finerty et al., 1997). Effectively online learning needs specific professional development programs that include pedagogical and technological support (Fatimawati et al., 2020). Ho et al. (2020) used several variables with system interactivity as a moderating variable in their study about online learning. The outcomes of the structural model demonstrate that perceived usability is positively influenced by computer self-efficacy. Wyk (2020) conducted a study using online support e-tools to show that academic support can drive the success of online learning. The academic support tools were well-received by both students and teachers, who saw a favorable impact on their online learning.

The quality of online learning services affects student satisfaction, and the increasing quality of service results in increased student satisfaction with service quality. It is in line with Annamdevula & Bellamkonda (2016) stated that the quality of services such as the teaching process, administrative services, academic facilities, campus infrastructure, support services, and internationalization are the primary keys to student satisfaction. The improvement of the elements of service quality, i.e., educational infrastructure, lecture tools, and teaching media (tangibles), the reliability of lecturers and employees (reliability), responsiveness and treatment of students (assurance), and understanding of student interests (empathy), can affect the increase in student satisfaction. Learning infrastructure is equipment and supplies directly or indirectly to support teaching and learning activities. In learning activities, facilities

and infrastructure are needed to support the smooth process of the activities. Therefore, the management of facilities and infrastructure is required by every agency, especially schools (Darmastuti, 2014).

This study presents implications for educational institutions to analyze how online learning service quality and infrastructure influence students' satisfaction. Analysis of student satisfaction needs to be carried out as a benchmark to see how far students assess a product to service and measure student satisfaction from what is expected with its realization. Consumer satisfaction is one form of the results of a service. Performance measurement can be done through customer surveys (students). Suppose the final result is a mismatch between the outcomes of a service, namely the quality of online learning services and student satisfaction. In that case, this indicates that there is still a gap in expectations. All the academic community of Unesa must work together to continuously improve and improve the quality of online learning services so that later, students can feel high satisfaction with the quality of online learning services. In addition, a good database is needed to organize and ensure that internet quota assistance from the Minister of Education and Culture and Unesa can be adequately distributed. The existence of monitoring, evaluation, and follow-up activities related to student satisfaction from the services the institution has provided must be carried out periodically to improve quality continuously. In addition, a good database is needed to organize and ensure that internet quota assistance from Kemendikbud and Unesa can be appropriately distributed. The existence of monitoring, evaluation, and follow-up activities related to student satisfaction from services that the institution has provided must be carried out regularly to improve quality continuously.

Further research should gather and compile a lot of data to enable more accurate generalization. Further research could use larger populations using the others method to find the complex generalization. This study has three variables: service quality as an independent variable, student satisfaction as the dependent variable, and online learning infrastructure as a moderating variable. This study requires more variables in the learning process, such as parents' economic and lecture skills in technology, to find the complex generalization. To fully utilize e-learning facilities, the university needs to ensure that the facilities are working; and that the lecturers are trained to use e-learning facilities.

CONCLUSION

The conclusions of this study are 1) the online learning service quality affects student satisfaction and 2) infrastructure as a moderator variable is not proven as a moderator model, but infrastructure has a direct influence on student satisfaction in online learning at Universitas Negeri Surabaya. Therefore, all academics at Unesa must continuously improve the online learning service quality to achieve student satisfaction. In addition, to organize and ensure that internet quota assistance from Kemendikbud and Unesa can be distributed properly, a good database is needed. In addition, monitoring, evaluation, and follow-up activities related to student satisfaction with the institution's services must be carried out regularly to guarantee and continuously improve quality.

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AUTHOR CONTRIBUTION STATEMENT

All authors have contributed and participated in conducting research, and approved the final version of the manuscript

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