



The Influence of E-Learning Implementation and The Quality of Virtual Interaction as Determining Factors of Student Learning Satisfaction

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Abstract: : Literature Review of the influence of E-Learning implementation and the quality of virtual interactions as determining factors of student learning satisfaction is a scientific article with the **aim** of analyzing whether the implementation of E-Learning and the quality of virtual interactions affect student learning satisfaction. This research **method** uses a literature review method by examining national and international journal articles relevant to the implementation of E-Learning, the quality of virtual interactions, and student learning satisfaction. The **results** of this article are: 1) E-Learning implementation affects student learning satisfaction; 2) The quality of virtual interactions affects student learning satisfaction. Apart from these 2 exogenous variables that affect the endogenous variable, namely student learning satisfaction, there are still many other factors including learning facilities, lecturer performance, technological readiness.

Keyword: E-Learning Implementation, Virtual Interaction Quality, Student Learning Satisfaction.

INTRODUCTION

The development of information and communication technology has brought significant changes to the world of higher education, particularly through the implementation of e-learning as an alternative or complement to conventional learning. E-learning enables flexible learning processes without the constraints of space and time by utilizing internet networks and digital devices. The implementation of e-learning has become increasingly widespread since the COVID-19 pandemic, which has encouraged universities to adopt comprehensive online learning systems (Dhawan, 2020). In this context, student learning satisfaction has become a crucial indicator for assessing the success of e-learning implementation.

Student learning satisfaction in online learning is influenced by various factors, one of which is the quality of the e-learning implementation itself. System quality, platform ease of use, clarity of material, and adequate technical support have been shown to significantly

influence student satisfaction levels (Al-Fraihat et al., 2020). Students tend to be satisfied if the e-learning system they use is easily accessible, stable, and effectively supports the learning process. This demonstrates that e-learning implementation is not only related to the availability of technology, but also to how that technology is used to meet students' learning needs.

In addition to technical factors, the quality of virtual interactions also plays a crucial role in determining student learning satisfaction. Virtual interactions include interactions between students and lecturers, interactions between students, and student interaction with learning content. (Moore, 2016) explains that interaction in online learning is an essential element in creating meaningful learning experiences. Effective interactions can increase student engagement, strengthen student understanding of the material, and reduce feelings of isolation often experienced in online learning.

Numerous empirical studies have shown that the quality of virtual interactions has a positive and significant impact on student learning satisfaction. Research by (Kuo et al., 2014), corroborated by (Martin & Bolliger, 2018), found that student-lecturer and student-student interactions significantly contribute to perceived satisfaction and learning motivation in online learning. Responsive, communicative, and collaborative interactions encourage students to be more actively involved in the learning process, thus positively impacting their learning satisfaction.

It can be concluded that the implementation of e-learning and the quality of virtual interactions are two important, interrelated factors in determining student learning satisfaction. Therefore, this study aims to analyze the effect of e-learning implementation and the quality of virtual interactions on student learning satisfaction. The results are expected to serve as a basis for developing more effective online learning strategies in higher education.

This study aims to determine the effect of e-learning and the quality of virtual interactions on student learning satisfaction. Based on the previously explained research questions, the literature review article questions are as follows:

1. Does e-learning implementation affect student learning satisfaction?
2. Does the quality of virtual interactions affect student learning satisfaction?

METHOD

This study used a literature review method by examining national and international journal articles relevant to e-learning implementation, virtual interaction quality, and student learning satisfaction. Data sources were obtained from scientific databases such as Google Scholar and Scopus with publication years limited to 2015–2025. Data were collected through keyword searches for e-learning, virtual interaction, and student satisfaction, then analyzed using content analysis to synthesize the research findings. (Snyder, 2019).

RESULTS AND DISCUSSION

Results

The results of this article based on problem background, objectives, and methods are as follows:

Learning Satisfaction

(Al-Fraihat et al., 2020) defines student learning satisfaction as the level of positive perception of the learning experience gained through a particular learning system, which is influenced by system quality, information quality, and service quality. In the context of e-learning, learning satisfaction reflects the extent to which the system is able to meet students' academic needs. (Martin et al., 2020) defines student learning satisfaction as the result of

students' evaluation of the quality of the online learning experience, particularly regarding interaction, clarity of instructions, and instructor support. This satisfaction is an important indicator of the success of online learning.

(Bolliger & Halupa, 2018) state that learning satisfaction is a student's affective response to the learning experience, including learning methods, interactions with instructors, and engagement in learning activities. Learning satisfaction is closely related to student motivation and continued participation in online learning.

(Pham et al., 2019) define learning satisfaction as the degree of congruence between student expectations and the learning experience they receive, with satisfaction increasing if the learning experience meets or exceeds students' initial expectations. (Saragih & Ananda, 2021) state that student learning satisfaction is a feeling of pleasure and satisfaction that arises after students participate in the learning process, which is influenced by learning methods, academic interactions, and a supportive learning environment.

(Al-Fraihat et al., 2020) states that student learning satisfaction in the context of learning (including e-learning) can be measured through the following key indicators: 1) Satisfaction with the quality of the learning system; 2) Satisfaction with the quality of information or learning materials; 3) Satisfaction with the quality of learning services; and 4) Satisfaction with the overall learning experience.

Learning satisfaction has been extensively studied by previous researchers, including: (Pham et al., 2019), (Al-Fraihat et al., 2020), (Saragih & Ananda., 2021), (Abdul Malik & Ismail, 2023), (Suciati, 2017), (Nahariani et al., 2022), (Rahmawati, 2013), (Lysitsa & Mavroeidis, 2023).

E-Learning Implementation

E-Learning implementation is a strategic process of implementing an information and communication technology-based learning system to support online teaching and learning activities. E-Learning is not simply understood as the use of digital media or online platforms, but as an integrated system encompassing planning, management, material delivery, learning interactions, and electronic evaluation of learning outcomes. Therefore, the success of e-Learning implementation depends heavily on the readiness of the technology, human resources, and the learning design used (Moore & Kearsley, 2019).

(Dhawan, 2020) states that e-Learning implementation is an effort by educational institutions to adapt digital-based learning models in response to changes in the educational environment, including the needs of distance learning. This implementation includes the development of digital content, the use of a Learning Management System (LMS), and the implementation of learning strategies that encourage active student participation. The success of e-Learning implementation is greatly influenced by the readiness of lecturers in managing online learning and the ability of students to use learning technology.

(Bond et al., 2020) emphasize that e-learning implementation is also related to how technology is used to support student engagement in learning. Effective implementation enables meaningful interactions between students, lecturers, and learning materials through discussion forums, video conferencing, and online collaborative activities. This demonstrates that e-learning implementation cannot be separated from the pedagogical and social interaction aspects of learning.

According to (Al-Fraihat et al., 2020), e-learning implementation can be measured through four main indicators: 1) System Quality; 2) Information Quality; 3) Service Quality; and 4) System Use and Learning Experience (System Use & User Satisfaction).

E-learning implementation has been extensively studied by previous researchers, including: (Al-Fraihat et al., 2020), (Bond et al., 2020), (Dhawan, 2020), (Shodikin et al., 2024), (Zachary & Palupi, 2024), (Sudiksa et al., 2025), (Handayani & Mahdalena, 2021),

(Qamal & Priyngasari, 2025), (Berlianto, 2017), (Zein Bastian et al., 2025), (Israwati et al., 2025), (Hanif et al., 2024), (Ota, 2025), (Rahmadani et al., 2022), (Fitriani et al., 2021).

Quality of Virtual Interactions

Interaction is a crucial component influencing the student learning process. Interaction in online learning can be understood as a reciprocal relationship that occurs between students and educators through virtual media, involving active student engagement in academic learning activities (Nurjanah et al., 2023). The quality of virtual interaction in online learning is often defined in Indonesian journals as the effectiveness of the communicative relationship built through digital media, reflecting how students and lecturers exchange information, provide feedback, and actively participate in learning activities without direct face-to-face interaction. This interaction includes aspects of discussion, Q&A, collaboration on assignments, and other academic communication that can impact the student learning experience. The quality of this interaction is also seen as a crucial factor influencing student learning satisfaction and engagement in the online learning process.

(Ridha et al., 2023) states that the quality of virtual interaction is the ability of an online learning system to facilitate active and meaningful two-way communication between lecturers and students, characterized by lecturer responsiveness, clarity of material delivery, and opportunities for students to actively participate in the learning process. Quality virtual interaction will create a conducive learning environment even without direct face-to-face interaction. (Saragih & Ananda, 2021) defines the quality of virtual interactions as the level of student satisfaction with the intensity and quality of academic communication that occurs during online learning, whether through discussion forums, video conferencing, or other digital learning platforms. Effective interactions can increase student motivation and strengthen student engagement in the learning process.

According to (Nurjanah et al., 2023), the quality of virtual interactions in online learning can be measured through the following indicators: 1) Student-Lecturer Interaction; 2) Interaction Between Students; 3) Activeness in Online Discussions; 4) Feedback.

The quality of virtual interactions has been extensively studied by previous researchers, including: (Nurjanah et al., 2023), (Saragih & Ananda, 2021), (Ridha et al., 2023), (Linggom, G. J., & Abraham, R. H., 2024), (Barbosa & Maciel, 2025), (Selvanathan et al., 2020), (Hardianti & Irmansyah, 2024), (Ilham, 2023), (Syara & Andayani, 2024).

Discussion

E-Learning Implementation Influences Student Learning Satisfaction

Based on a review of various previous studies published in Indonesian journals, it can be concluded that e-learning implementation has a significant impact on student learning satisfaction. Good e-learning implementation, characterized by ease of use of the system, clarity of material, and support from lecturers and institutions, can enhance the overall student learning experience.

Research conducted by (Nurjanah et al., 2023) shows that the implementation of online learning supported by an easily accessible and interactive e-learning system has a positive impact on student learning satisfaction. Students feel more satisfied when the online learning system facilitates flexible access to learning materials and supports effective academic communication. This confirms that the quality of e-learning implementation is a crucial factor in creating a satisfying learning experience.

In line with this research, (Ridha et al., 2023) found that the quality of e-learning implementation, particularly in terms of material delivery and lecturer support, has a significant impact on student satisfaction in online learning. Students tend to feel satisfied if the e-learning

system they use optimally supports the learning process, including ease of accessing materials, submitting assignments, and receiving feedback from lecturers.

Furthermore, research by (Saragih & Ananda, 2021) also shows that effective online learning implementation contributes to increased student learning satisfaction. The results revealed that students feel more satisfied when e-learning is implemented in a structured manner, with clear materials and a learning system that supports student engagement in the learning process.

Based on the findings of various previous studies, it can be concluded that good e-learning implementation has a positive impact on student learning satisfaction. E-learning not only functions as a medium for delivering material but also as a means of shaping students' learning experiences. Therefore, universities need to ensure that e-learning implementation is optimally implemented to improve student satisfaction and the quality of learning.

Therefore, it can be concluded that effective and high-quality e-learning implementation plays a crucial role in increasing student learning satisfaction. The better the e-learning implementation in an educational institution, the higher the level of learning satisfaction experienced by students.

This research aligns with research conducted by: (Nurjanah et al., 2023), (Saragih & Ananda, 2021), (Ridha et al., 2023), (Hamsar et al., 2025), (Rahsel & Gumanti, 2025), (Murcahyanto, 2025), (Nasiatin et al., 2024), (Bastian et al., 2025), (Sa'diyah & Nuryana, 2024).

The quality of virtual interactions influences student learning satisfaction.

Based on a review of various previous studies published in Indonesian journals, it can be concluded that the quality of virtual interactions has a positive and significant impact on student learning satisfaction in online learning. Effective virtual interactions, both between students and lecturers and between students, can create a more meaningful learning experience and increase students' positive perceptions of the learning process.

Research conducted by (Nurjanah et al., 2023) shows that online learning interactions have a significant impact on student learning satisfaction. The results revealed that students feel more satisfied when lecturers actively communicate, provide opportunities for discussion, and provide clear and timely feedback. Intense and high-quality interactions help students understand the material better and feel more engaged in the online learning process.

In line with these findings, (Ridha et al., 2023) found that the quality of virtual interactions, particularly in the form of two-way communication and lecturer responsiveness, significantly influences student satisfaction. Students tend to feel satisfied when online learning allows them to actively participate, express opinions, and receive feedback from lecturers and fellow students. This indicates that virtual interactions serve not only as a means of communication but also as a determining factor in the quality of the learning experience.

Furthermore, research by (Saragih & Ananda, 2021) also states that student learning satisfaction in online learning is influenced by the quality of academic interactions that occur during the learning process. Good interactions can reduce students' feelings of isolation in online learning and increase motivation and learning comfort. Therefore, the quality of virtual interactions is a crucial factor in creating a conducive online learning environment.

Based on the results of previous research, it can be concluded that the better the quality of virtual interactions in online learning, the higher the level of student learning satisfaction. Therefore, universities and lecturers need to design online learning strategies that encourage active and communicative interactions to increase student learning satisfaction.

This research aligns with research conducted by: (Nurjanah et al., 2023), (Saragih & Ananda, 2021), (Ridha et al., 2023), (Wibawa et al., 2023), (Sany & Sudarjo, 2024), (Jaya, 2024).

Conceptual Framework

Based on the formulation of the problem, theoretical studies, relevant previous research and discussion of the influence between variables, the framework for thinking in this article is as follows..

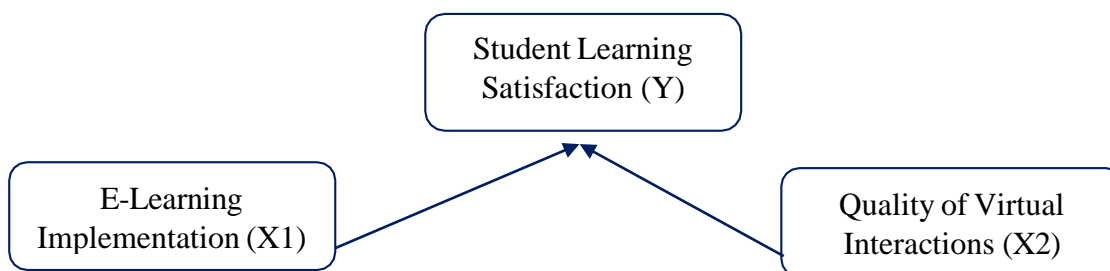


Figure 1. Conceptual Framework

And there are many other factors that influence Student Learning Satisfaction (Y), including:

- a) Learning facilities : (Maulana & Rizqi, 2024), (Utaminingsih et al., 2024), (Suprianto et al., 2024), (Muna et al., 2025), (Saputri et al., 2023), (Junanda & Suryani, 2025), (Ardana et al., 2025), (Hidayatullah et al., 2024).
- b) Lecturer performance : (Muslimin, 2024), (Fajduani et al., 2023), (Syamsuar et al., 2024), (Siregar & Harahap, 2023), (Putri & Lestari, 2022), (Rahman & Yuliana, 2022), (Saragih & Ananda, 2021), (Handayani & Subekti, 2021), (Hidayat & Prasetyo, 2020), (Wibowo & Nugroho, 2019).
- c) Technological readiness : (Panday, R., 2020), (Nugroho, 2022), (Syafie, 2022), (Nugroho, M. A., 2022), (Iswari, K., 2012), (Dewi, 2019), (Lestari, A., & Kholis, N. (2020), (Suharyanto et al., 2025).

CONCLUSION

This study aims to determine whether the implementation of e-learning and the quality of virtual interactions are determining factors for student learning satisfaction. Based on the article's questions, the following conclusions can be drawn from this study: 1) E-learning implementation influences student learning satisfaction; 2) The quality of virtual interactions influences student learning satisfaction.

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