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# Analysis of the quality of e-learning systems to achieve Sustainability Development Goals in Education in the digital era

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## ABSTRACT

**The quality of the implementation of e-learning lectures at the Universitas Mercu Buana (UMB) Graduate Program is a breakthrough learning method to answer the challenges of the times that lead to sustainability development goals in the world of education to improve independent learning systems in the digital era. This research was carried out with a qualitative descriptive approach. The required information was collected using questionnaires on respondents totaling 100 graduate students who were users of e-learning courses, and 25 e-learning lecturers. The questions asked refer to aspects of managing an e-learning system. The data obtained were analyzed in a descriptive comparative analysis. The results showed that in general there are similar perceptions between students and lecturers on the dimensions of learning with the e-learning system, although there are differences in terms of the percentage of assessment. Facility Readiness, HR Readiness, learning process, Constraints in Using E-learning, Response to E-Learning Facilities Availability, and Facility Required for E-learning Development are discussed in this study.**

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## 1. INTRODUCTION

E-learning or online lectures at Universitas Mercu Buana (UMB) is a development of conventional learning systems aimed at improving the quality of teaching and learning. With the online lecture system, students can study without the time and place limits [1]. Universitas Mercu Buana calls this lecture the Learning Without Limits. The seamless learning system began in 2008. This system, which has been going on for quite a long time, has become one of the competitive forces for UMB among National Private Universities and even State Universities in Indonesia.

Learning systems using electronic learning (e-learning) in universities have developed very rapidly along with the development of information technology [2], [3]. Various factors have been identified for the success of information systems because the success of e-learning systems is not measurable with a single factor such as user satisfaction [4]–[9]. The learning process using e-learning has become a trend. It is even one of the advantages of universities that make it competitive in the competition for the quality of education at the university level. E-learning has caused many changes in higher education, as it emerged as a modern new paradigm in education and has changed the concept of previous learning [10].

In the conventional learning system, lecturers have a central role in disseminating knowledge to their students. While in 'e-learning' students become a central role in the learning process. Students become independent at certain times and are responsible for the learning process e-learning will condition students to play a more active role in the learning process with creative efforts and initiatives To complete assignments, social interaction with classmates, manage e-learning systems, and interact with teachers for academic purposes [5].

E-learning is a learning activity that utilizes the internet, teachers and students interact to achieve learning objectives in accordance with the curriculum as a face-to-face complement so that students can access learning materials anytime and from anywhere so that the active role of students can improve learning outcomes [1], [7], [8], [11]–[16]. Quality assessment and evaluation of the e-learning system always need to be carried out to find out whether students are satisfied with this learning system in accordance with the quality indicators of the e-learning system and follow technological developments [5], [15], [17].

Higher Education Institutes (HEIs) should stand up and lead the Sustainable Development Goal 4 agenda to engage integrally in achieving outcomes related to the quality of Education [18], This is the goal of the whole country by providing high-quality education for academic progress, economic growth, community welfare, and environmental sustainability, where every indicator used is related to each other [18]–[25]

From the background of the above problems, this study is focused on analyzing the quality of e-learning in the Postgraduate Program at UMB. Research is only conducted for students who have attended e-learning lectures and e-learning lecturers.

## 2. METHOD

This research uses an exploratory approach to find initial information related to the implementation of e-learning lectures in the UMB Postgraduate Program. The variable used is the quality of e-learning which is outlined in the corresponding indicator and further derived into question items in the research instrument. The object of study is the UMB e-learning facility. Another research object is courses that have been registered in UMB e-learning. The subjects of the study were UMB lecturers and students. E-learning lecturers and postgraduate students who carry out lectures using the e-learning system. Primary data was collected through surveys using questionnaires to lecturers and students, especially in the UMB Graduate Program. In addition to primary data, this researcher also uses secondary data that supports this research such as the number of courses carried out by e-learning, the list of lecturers supporting e-learning courses, and the list of students participating in e-learning courses. The research population is lecturers and students who carry out e-learning lectures. The population of e-learning lecturers in the UMB Postgraduate Program is 25 people. The number of lecturers who became the research sample amounted to 25 people and each lecturer supervised two e-learning courses. The population of Postgraduate Program students who carry out e-learning lectures is 500 people and each student takes two courses. Because the student population is quite large (more than 100), the student sample can be taken between 20% and 100 people [26]. This research data is analyzed descriptively so that the problems found can be solved.

The student respondent data by gender showed that the percentage of male students was more, namely 67% with a total of 67 students, compared to female students by 33% with a total of 33 female students. It can be concluded that the ratio between male students and female students is 2:1. This means that students who use e-learning are more male than female. The respondents of the most E-learning lecturers came from the Master of Management Study Program. This is in line with the largest number of Postgraduate students also coming from management study programs. The percentage of female lecturers is 75%, compared to male lecturers at 25%. It can be concluded that the ratio of the number of female lecturers to male lecturers is 3:1.

To measure students' opinions, I gave a questionnaire with 36 statements consisting of 6 dimensions namely; Facility Readiness Dimensions, HR Readiness Dimensions, Learning Dimensions, Dimension of

Constraints in Using E-learning, Dimensions of Response to E-Learning Facilities Availability, Facility Dimensions Required For E-learning Development. The questionnaire for lecturers consists of 39 statements developed from 6 dimensions developed from e-learning quality measurements [27], [28]

## 3. RESULT

### A. Evaluation and Mapping of E-learning quality implementation: Student perspective.

### 3.1. Facility Readiness Dimensions

The dimensions of facility readiness are divided into 5 components that are incorporated into 5 statement items. Table 1 below shows the results of student answers to each dimension.

**Table 1. Facility Readiness**

| No. | Statement | Percentage (%) | |
|---|---|---|---|
| | | **Yes** | **No** |
| X1 | Has provided e-learning facilities for student | 100 | 0 |
| X2 | Access the e-learning that has been provided | 98.9 | 1.1 |
| X3 | Computer setup | 75.8 | 24.2 |
| X4 | Internet network | 84.6 | 15.4 |
| X5 | Enough time available to access | 85.7 | 14.3 |
| | **Average** | **89.2** | **10.8** |

Table 1 shows that out of 5 statements regarding the dimensions of the Supporting Facility Component, an average score of 89.2% was obtained for the answer YES. Only 10.8% of graduate students answered NO. It can be concluded that most UMB Postgraduate students assess that UMB already has the readiness of e-learning facilities. Based on the dimension of facility readiness, all students agree that UMB has provided e-learning facilities for students. Based on the dimension of accessing e-learning facilities provided by UMB, it was still found that 1.1% of students answered NO. This is likely because the student is a new student who at the time of the research has not started lectures. YES's answer regarding the provision of computers got the lowest percentage. This is because almost all students use personal computers to carry out e-learning lectures. The internet network gets quite good answers from students. This is in line with UMB's efforts to continue to improve the internet network on campus. The provision of time to access is also quite high. This is because, since the time of registration, it has been conveyed that some lectures at UMB are delivered by e-learning, and prospective students are required to carry them out. Therefore they have also allocated time to access. Indeed, there is still a small number of students who feel that there is not enough time to access e-learning. This opinion is likely due to students' busy activities with other activities because almost all postgraduate students are workers.

### 3.2. HR Readiness Dimensions

The HR readiness dimension is divided into 6 components that are included in 6 statement items. Table 2 below presents student opinions on HR readiness.

**Table 2. HR Readiness Dimension**

| No. | Statement | Percentage (%) | |
|---|---|---|---|
| | | **Yes** | **No** |
| X1 | Computers and the Internet to access information | 98.9 | 1.1 |
| X2 | Internet to communicate via e-mail | 98.9 | 1.1 |
| X3 | Internet to access e-learning | 98.9 | 1.1 |
| X4 | E-learning applications for courses | 98.9 | 1.1 |
| X5 | Computer use since high school / vocational school | 92.3 | 7.7 |
| X6 | Internet use since high school / vocational school | 93.4 | 6.6 |
| | **Average** | **96.9** | **3.1** |

Table 2 shows that from 6 points of statements regarding HR Readiness, on average, UMB graduate students rated HR as ready because 96.9% answered YES, and only 3.1% of graduate students answered NO. This shows that as Human Resources who will use, utilize, and access e-learning, almost all UMB graduate students are ready. Their readiness is supported by the availability of computers and the Internet to access information. The internet has become a part of student life in this digital era. The Internet is widely used both for email and for conducting e-learning lectures. Student answers decreased slightly when the readiness of human resources in using computers and the internet was carried out since high school / vocational school. As explained in the previous section, almost all Postgraduate students are workers, and in this digital age, the use of computers and the Internet is almost a necessity. This is different from the conditions when they were still in high school / vocational school.

### 3.3. Learning Dimensions

The dimensions of student perception regarding the use of e-learning for learning are divided into 8 components, which are included in 8 statement items. Table 5 shows that of the 8 items of statements regarding the dimensions of student perceptions regarding the use of e-learning for learning, on average, UMB Postgraduate students answered agree, with a percentage of 36.7%. The category with the second largest percentage is neutral answers, with a percentage of 33.7%. These two categories already cover about 70% of student opinions. Answers strongly agree delivered by 18% of students. While those who answered on the categorization of disagree and strongly disagree were 8.3% and 3.4%. The last

two categories (disagree and strongly disagree) are relatively small, at around 12%. Although the number is relatively small, this needs attention, because there are still students who disagree with e-learning as a learning medium.

**Table 3. Student Perception Dimensions for Learning**

| No. | Statement | Percentage (%) | | | | |
|---|---|---|---|---|---|---|
| | | **Strongly Agree** | **Agree** | **Neutral** | **Disagree** | **Strongly Disagree** |
| X1 | Assisting with learning activities | 29.7 | 51.6 | 12.1 | 4.4 | 2.2 |
| X2 | Make it easier to access course materials | 16.5 | 69.2 | 8.8 | 3.3 | 2.2 |
| X3 | Effectively improve the quality of the learning process | 14.3 | 19.8 | 56 | 7.7 | 2.2 |
| X4 | Improve the quality of interaction and communication with lecturers | 14.3 | 23.1 | 44 | 15.4 | 3.3 |
| X5 | Easy to use | 23.1 | 63.7 | 7.7 | 4.4 | 1.1 |
| X6 | Facilitate understanding and work on coursework | 15.4 | 33 | 37.4 | 8.8 | 5.5 |
| X7 | Make it easy to get feedback from lecturers | 15.4 | 18.7 | 48.4 | 9.9 | 7.7 |
| X8 | Can be used to carry out remediation and enrichment | 15.4 | 14.3 | 54.9 | 12.1 | 3.3 |
| | **Average** | **18** | **36.7** | **33.7** | **8.3** | **3.4** |

In the view of students, answered only at the level of agreeing that e-learning can help to learn activities, make it easier to access subject matter, improve the quality of the learning process, improve the quality of interaction and communication with lecturers, and make it easier to get feedback from lecturers, easy to use, facilitate understanding and work on lecture assignments and function as an implementation of remediation and Enrichment.

### 3.4. Dimension of Constraints in Using E-learning

The dimension of constraints in using e-learning for student learning is divided into 6 components that are included in 6 statements. Table 4 below presents a recapitulation of student opinions.

**Table 4. Constraints in Using E-learning**

| No. | Statement | Percentage (%) | |
|---|---|---|---|
| | | **Yes** | **No** |
| X1 | Lack of information about how to use e-learning | 25.3 | 74.7 |
| X2 | Technically do not know how to use e-learning | 15.4 | 84.6 |
| X3 | Lazy to access e-learning lecture materials | 15.4 | 84.6 |
| X4 | Not mastering how to interact with lecturers through e-learning | 24.2 | 75.8 |
| X5 | Insufficient computers available | 35.2 | 64.8 |
| X6 | The available internet network is inadequate | 38.5 | 61.5 |
| | **Average** | **25.7** | **74.3** |

Table 4 shows that on average most students (74.3%) do NOT face any obstacles in using e-learning. It can be concluded that the ratio between students who choose the answer NO with the answer YES is 3:1. This shows that more than half of UMB graduate students as users of e-learning, do not experience significant obstacles in using e-learning. Most of them do not experience obstacles such as a lack of information in the use of e-learning. They generally argue that they do not face obstacles because they technically know how to use e-learning and are not lazy to access e-learning lecture materials. Kedua dimensi ini mendapat persentase jawaban tertinggi, yaitu masing-masing mencapai 84,6%. Referring to the 6 points of statements regarding obstacles in implementing e-learning, the dimension of *internet network availability* received the highest assessment as an inadequate dimension. This needs attention from the internet network manager at UMB. Please note that UMB continues to increase internet bandwidth capacity. Currently, 23 Mbps/student is available. This figure is far above the provisions of Higher Education and the minimum required is 1.87 Mbps per student. The possibility of network availability is enough, but when students access simultaneously, the availability becomes disrupted.

### 3.5. Dimensions of Response to E-Learning Facilities Availability

The dimension of student perception regarding responses to e-learning facilities that have been available consists of 5 components that are included in 5 statement items. Table 5 below presents a recapitulation of student opinions.

**Table 5. Response of E-Learning Facilities**

| No. | Statement | Percentage (%) | | | | |
|---|---|---|---|---|---|---|
| | | **Strongly Agree** | **Agree** | **Neutral** | **Disagree** | **Strongly Disagree** |
| X1 | E-learning that exists today has a pretty good quality | 11 | 67 | 15.4 | 5.5 | 1.1 |
| X2 | The available e-learning can be easily used | 17.6 | 65.9 | 14.3 | 2.2 | 0 |
| X3 | E-learning currently still needs to improve service quality | 65.9 | 20.9 | 12.1 | 1.1 | 0 |
| X4 | E-learning is quite helpful in developing learning | 12.1 | 24.2 | 60.4 | 3.3 | 0 |
| X5 | E-learning that exists today needs to be simplified facilities | 17.6 | 25.3 | 17.6 | 39.6 | 0 |
| | **Average** | **24.8** | **40.7** | **24** | **10.3** | **0.2** |

Table 5 shows that on average 40.7% of students agree and 24.8% strongly agree with the e-learning facilities available. Both answer categories reached about 65% of students. The answer with the third largest percentage is neutral with 24% only 0.8% different from the strongly agreeing category. There are still about 10% of UMB graduate students who disagree and strongly disagree with the availability of e-learning facilities. It can be concluded that students have different views about the facilities that UMB has provided in accessing e-learning. In the view of students, the facilities currently available to support e-learning access are considered to have good quality and are quite easy to use. However, students are of the view that the quality of service still needs to be improved.

### 3.6. Facility Dimensions Required For E-learning Development

The dimensions of facilities required for e-learning development consist of 12 components or indicators that are embodied into 12 statement items. Table 6 shows that on average of the 12 indicators regarding e-learning development facilities, 94.5% answered YES and only 5.5% answered NodaK. This means that Postgraduate Program students assess the facilities needed for the development of e-learning at UMB in general are very good. One indicator that needs further attention is the availability of lecture administration. In this predictor, there are still 36.3% of students stating that there is NO availability of lecture administration.

**Table 6. E-learning Development Facility Dimensions**

| No. | Statement | Percentage (%) | |
|---|---|---|---|
| | | **Yes** | **No** |
| X1 | Provide general course information | 98.9 | 1.1 |
| X2 | Provide Lecture Materials | 98.9 | 1.1 |
| X3 | Provide course administration | 63.7 | 36.3 |
| X4 | Provide links to other Web learning resources | 95.6 | 4.4 |
| X5 | Provide a Discussion Forum for lecture participants | 96.7 | 3.3 |
| X6 | Provide a means of assigning tasks | 97.8 | 2.2 |
| X7 | Provide online exam/quiz facilities | 97.8 | 2.2 |
| X8 | Provide a means of input to Lecturer | 96.7 | 3.3 |
| X9 | Provide a means of announcement in lectures | 96.7 | 3.3 |
| X10 | Provide a means of reporting student activities in lectures | 98.9 | 1.1 |
| X11 | Provide a means of assessment | 95.6 | 4.4 |
| X12 | Provide a means of displaying assessment results | 96.7 | 3.3 |
| | **Average** | **94.5** | **5.5** |

Some of the inputs conveyed by UMB Postgraduate Program students are 1) it is hoped that there will be additional facilities for the development of e-learning in the future, 2) it is hoped that in the future general information material will be provided, administration regarding lectures, 3) the University will be able to provide links to various learning resources, 4) there is a discussion forum for lecture participants and the provision of assignment facilities, 5) UMB postgraduate students also expect developments in the field of facilities, such as assignment facilities, on-line quizzes, input to lecturers, lecture announcements, student activity reports, as well as assessment facilities and assessment results.

**B. Evaluation and Mapping of E-learning Quality Implementation: Lecturer Perspective.**

### 3.7. Facility Readiness Dimensions

**Table 7. Facility Readiness Dimensions**

| No. | Statement | Percentage (%) | |
|---|---|---|---|
| | | **Yes** | **No** |
| X1 | Has provided e-learning facilities | 100 | 0 |
| X2 | Never access the e-learning that has been provided | 100 | 0 |
| X3 | Computer setup | 83.3 | 16.7 |
| X4 | Internet network connected to computers at work | 91.7 | 8.3 |
| X5 | The number of computers available is sufficient for students | 16.7 | 83.3 |
| | **Average** | **78.3** | **21.7** |

Table 7 shows that on average, lecturers assess the readiness of facilities in organizing e-learning lectures at UMB as good. This conclusion was drawn because as many as 78.3% answered YES and 21.7% answered NO. All lecturers who were respondents considered that UMB had provided e-learning facilities. All lecturers who are respondents have also had access to the e-learning facilities that have been provided. The availability of computers and internet networks connected to computers at work is considered very good because the percentage who answer YES is greater than 80%. However, based on the indicator of the number of computers provided for students to access and utilize e-learning, it is considered still very lacking. Only 16.7% of lecturers stated that UMB provides enough computers for students. This condition is understandable because e-learning is indeed a distance education system. This system encourages students participating in e-learning to carry out the learning process from various locations, not necessarily on campus. Thus, the campus does not need to provide computers as a means for students to carry out learning.

### 3.8. HR Readiness Dimensions

**Table 8. Results of HR Readiness Dimension**

| No. | Statement | Percentage (%) | |
|---|---|---|---|
| | | **Yes** | **No** |
| X1 | Computers and the Internet to access information | 100 | 0 |
| X2 | Internet to communicate via e-mail | 100 | 0 |
| X3 | Internet to access e-learning | 75 | 25 |
| X4 | E-learning applications for courses | 83.3 | 16.7 |
| X5 | Use of the Internet to develop e-learning | 100 | 0 |
| X6 | Use of application software to develop e-learning | 50 | 50 |
| | **Average** | **84.7** | **15.3** |

Table 8 shows that of the 6 indicators of HR readiness, all lecturers who were respondents agreed that computers and the internet are used to access information, the internet is used to communicate through e-mail, and the internet is used to develop e-learning. This means that all lecturers as human resources and implementers of e-learning lectures have fully understood that computers and the internet are the main means and they are ready to use them. On average for all HR readiness indicators, lecturers assess that human resources are ready to carry out e-learning because more than 80% of respondents answered YES to HR readiness problems. Only 15.3% of UMB postgraduate e-learning lecturers answered NO.

Thus, it can be concluded that as Human Resources e-learning teachers, lecturers are ready to carry out activities to educate, teach, guide, direct, train, assess, and evaluate all students using e-learning.

The readiness is proven through the perception that they have been able to use supporting facilities such as computers and the Internet to access information, organize e-learning lectures, and communicate via e-mail. However, half of the respondents are still unable to use application software to develop e-learning. Finding this opinion, universities need to improve the skills of e-learning lecturers in using software. In addition, the readiness of lecturers to use the internet to access e-learning also needs further attention. There are still 25% of lecturers who say NO about using the internet to access e-learning.

### 3.9. Dimensions of Lecturer Perception for Learning

**Table 9. Results of Lecturer Perception Dimensions for Learning**

| No. | Statement | Percentage (%) | | | | |
|---|---|---|---|---|---|---|
| | | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
| X1 | Help develop learning | 0 | 75 | 8.3 | 16.7 | 0 |
| X2 | Make it easier to deliver course material | 0 | 41.7 | 41.7 | 8.3 | 8.3 |
| X3 | effectively improve the quality of the learning process | 8.3 | 33.3 | 25 | 25 | 8.3 |
| X4 | Improve the quality of interaction and communication with students | 0 | 33.3 | 33.3 | 8.3 | 25 |
| X5 | Easy to use | 16.7 | 58.3 | 8.3 | 8.3 | 0 |
| X6 | Facilitate the assignment of lectures | 16.7 | 58.3 | 8.3 | 16.7 | 0 |
| X7 | makes it easy to evaluate learning | 8.3 | 16.7 | 41.7 | 16.7 | 8.3 |
| X8 | Can be used for remediation and enrichment | 8.3 | 50 | 16.7 | 25 | 8.3 |
| X9 | Make it easy to communicate scientifically with other lecturers | 0 | 16.7 | 25 | 16.7 | 25 |
| X10 | Providing incentives for the development of e-learning | 50 | 41.7 | 0 | 33.3 | 0 |
| | **Average** | **10.8** | **42.5** | **20.8** | **17.5** | **8.3** |

Table 9 shows that on average, only 42.5% of lecturers who teach e-learning courses say they AGREE that e-learning serves to support learning. There are still 38.3% who say they are neutral and disagree on the role of e-learning as a learning system. This perception can be understood because until now it is still felt that there is a difference in learning outcomes between courses delivered with a conventional system (full face-to-face) versus with an e-learning system. The same course lecturer, who originally delivered courses with a conventional system and now the course has changed to an e-learning system, feels that there are still differences in student mastery of understanding the course material. Taking into account 10 indicators of lecturer perceptions regarding the use of E-learning for learning, the highest percentage of lecturer approval is in terms of ease of use and ease of assignment of lectures. Each of these indicators received 58.3% agree. 50% of lecturers strongly agree that for the development of e-learning to occur, institutions need to improve the incentive system.

### 3.10. Dimension of Constraints in Using E-learning

**Table 10. Results of Constraint Dimensions in Using E-learning**

| No. | Statement | Percentage (%) | |
|---|---|---|---|
| | | **Yes** | **No** |
| X1 | Lack of information about the use of e-learning | 16.7 | 83.3 |
| X2 | Technically don't know how to use e-learning | 8.3 | 91.7 |
| X3 | lazy to develop e-learning lecture materials | 33.3 | 66.7 |
| X4 | Not mastering software for e-learning development | 41.7 | 58.3 |
| X5 | Computers are inadequate in number | 58.3 | 41.7 |
| X6 | The internet network is inadequate in number | 58.3 | 41.7 |
| | **Average** | **36.1** | **63.9** |

Table 10 shows that on average, around 36% of lecturers who teach e-learning courses face obstacles in using e-learning. The biggest obstacle is in terms of the number of computers and internet networks.

### 3.11. Dimensions of Response to E-Learning Facilities' Availability

**Table 11. Dimensional Availability of E-Learning Facilities**

| No. | Statement | Percentage (%) | | | | |
|---|---|---|---|---|---|---|
| | | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
| X1 | For now, the quality is pretty good | 0 | 66.7 | 25 | 8.3 | 0 |
| X2 | can be easily used | 8.3 | 75 | 8.3 | 8.3 | 0 |
| X3 | Still, Need to Improve Service Quality | 50 | 50 | 0 | 0 | 0 |
| X4 | It is enough to help develop learning | 0 | 66.7 | 25 | 0 | 8.3 |
| X5 | Need to simplify facilities | 25 | 25 | 8.3 | 33.3 | 8.3 |
| | Average | **16.7** | **56.7** | **13.3** | **10** | **3.3** |

Table 11 shows that on average from the 5 components of e-learning facilities, 56.7% of e-learning lecturers in the Postgraduate Program agree with the e-learning facilities provided by UMB. Although few (3.3%) there are still lecturers who rate the facilities provided very unsatisfactory (strongly disagree), and there are still 23.3% who say neutral and disagree. Taking into account these opinions, UMB still needs to continue to improve e-learning facilities so that the learning process is better. Opinions regarding the need to simplify e-learning facilities received a rating of 25% strongly agree and 33.3% disagree. This means that some lecturers consider the existing facilities at this time to be complicated and need to be simplified, while others consider the current facilities to be adequate so they do not agree to reduce or simplify. These differences of opinion need to be found at the root of the problem so that the best steps can be taken to develop and manage existing e-learning facilities.

### 3.12. **Facility dimensions required for further e-learning development**

**Table 12. Facility Dimensions Required For E-learning Development**

| No. | Statement | Percentage (%) | |
|---|---|---|---|
| | | **Yes** | **No** |
| X1 | Provide general course information | 75 | 25 |
| X2 | Provide lecture materials | 66.7 | 33.3 |
| X3 | provide lecture administration | 83.3 | 16.7 |
| X4 | Provide links to other web learning resources | 83.3 | 16.7 |
| X5 | Provide a discussion forum for lecture participants | 75 | 25 |
| X6 | Provide means of assigning tasks | 66.7 | 33.3 |
| X7 | Provide online exam/quiz facilities | 75 | 25 |
| X8 | Provide input facilities to lecturers | 83.3 | 16.7 |
| X9 | Provide a means of announcement in lectures | 91.7 | 8.3 |
| X10 | Provide a means of reporting student activities in lectures | 75 | 25 |
| X11 | Provide a means of assessment | 66.7 | 33.3 |
| X12 | Provide a means of displaying assessment results | 66.7 | 33.3 |
| | **Average** | **75.7** | **24.3** |

Table 12 shows that on average, most (ie 75.7%) lecturers stated the need to develop e-learning facilities at UMB. The indicator that is considered the most necessary to be improved/developed is the means of announcement in lectures. At this time, there are still frequent misunderstandings about lecture schedules, exam schedules, and other academic calendars, especially for e-learning classes. There are still complaints from lecturers, as well as students, who do not know well that one week it turns out that e-learning lectures after examination have started, while for classes with other specifications, the lectures have not been restarted. Cooperation between the e-learning Bureau and the Lecture Operations Center in connection with this needs to be improved. Furthermore, on the perceptions that have been conveyed by students and lecturers regarding e-learning studies in the UMB Postgraduate Program, a comparison of perceptions between students and lecturers on the same dimension is presented.

**Table 13. Average Perception of Students and Lecturers on e-Learning System**

| No | Dimension | Perception (%) | |
|---|---|---|---|
| | | Student | Lecturer |
| 1 | Facility Readiness | 89,2 Yes | 78,2 Yes |
| 2 | HR Readiness | 96,9 Yes | 84,7 Yes |
| 3 | The use of e-learning as a learning medium | 36,7 Agree<br>33,7 Neutral | 42,5 Agree<br>20,8 Neutral |
| 4 | Obstacles to using e-learning | 74,3 No | 63,9 No |
| 5 | E-learning facilities that have been provided | 40,7 Agree<br>24,8 Strongly Agree | 56,7 Agree<br>16,7 Strongly Agree |
| 6 | Facilities for e-learning need to be developed | 94,5 Yes | 75,7 Yes |

Table 13 shows that in general there are similar perceptions between students and lecturers on the dimensions of learning with the e-learning system, although there are differences in terms of assessment percentages. In terms of facility readiness and HR readiness, students give a higher assessment than lecturers that UMB already has the readiness of facilities and human resources to hold lectures in e-learning. In terms of using e-learning as a learning medium, more lecturers agree than students. In terms of obstacles in carrying out e-learning, more students stated that there were obstacles than lecturers. In terms of e-learning facilities that have been provided, student assessments are similar to lecturers, which is around 65% agreeing with the facilities provided by the university. In terms of developing e-learning facilities, more students stated that development needs to be done than lecturers.

## 4. DISCUSSION

Online learning has been carried out at UMB since 2008, therefore when the COVID-19 pandemic occurred, UMB was ready for online learning. The factors that influence the acceptance and use of e-learning have been widely studied with urgent demands when the pandemic occurs. the results show that students prefer face-to-face compared to e-learning [29], even students have negative experiences with e-learning because they find it difficult to access learning centres, libraries, interact with professors, etc. [30]–[34]. The results of this study show that all indicators asked students and lecturers who already have e-learning experience have not fully received e-learning instruction as planned [35]–[39]. For this reason, e-learning, which is currently a necessity in response to the global crisis, needs to be developed so that its users can feel satisfaction [1], [7]–[9], [40]–[42].

After the pandemic that requires students and lecturers to carry out learning activities from home, the motivation for e-learning is higher than before [30]–[32], [35]–[39], [43].

E-learning motivation encourages cognitive engagement to complete specific tasks and interaction with lecturers is essential [9], [29], so lack of interaction with professors and students is a challenge for them.

Currently, UMB students have carried out hybrid learning for consideration of learning motivation and interacting with humans, not only with technology [43]–[45]. E-learning applied at UMB has been able to answer the challenges of today's education by utilizing technology to improve the learning experience through e-learning [13], [14], [17]. Therefore, the academic community must improve teaching materials based on multimedia content and adequate educational software [7], [46], [47]. E-learning strategies are pedagogical and instructional challenges (Ali, 2020), where online learning must be able to self-organize to complete academic tasks [39], [43]–[45], [48], [49] [16].

Finally, UMB must realize that the availability of facilities, readiness (knowledge, skills, and behaviour) of Human Resources, readiness of the learning process, overcoming e-learning challenges, and continuous development of e-learning technology are very important for a successful and satisfying e-learning learning experience.

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### Practical Implication

This research model can be used as a reference to enrich e-learning theory which has become a comprehensive part of the learning process in the digital era and after the Covid-19 pandemic. For this reason, continuous development of the e-learning system is needed to be easy to use for lecturers and students. The e-learning system as a way of organizing the teaching-learning process must produce the same learning outcomes as classes using conventional systems [11]–[15], [50]. The e-learning lecturers have different views on the facilities that UMB has provided for accessing e-learning. The supporting facilities for accessing e-learning that are currently available are of good quality and are quite easy to use. However, the lecturer is of the view that the quality of good service must continue to be improved [19]–[25], [51]–[53].

### Managerial Implication

Matters that are not a big obstacle for lecturers, and students are the technical ways of using e-learning and information about the use of e-learning. Taking into account this perception, e-learning bureaus that manage e-learning at UMB have carried out their duties well. Meanwhile, opinions about the constraints of mastering software require further training for e-learning lecturers. The opinion about the internet network is still inadequate and needs further attention

from the university, especially the Information Technology section, considering that UMB continues to grow and the number of e-learning classes continues to grow. This means that adequate network availability is increasingly needed in the future. The development of e-learning system infrastructure is also said to still require development to meet all e-learning quality standard indicators [5], [7], [17], [54]–[61].

**Limitation**

This e-learning investigation is only carried out in one semester for lecturers and students of the master's program, so the results cannot be generalized. For deeper mapping, the next research can be carried out over two semesters covering all strata and all faculties at UMB.

## 5. CONCLUSION

From the student side, graduate students already know that UMB has provided e-learning facilities and has accessed e-learning facilities, supporting facilities such as Internet and computers, and the provision of sufficient time to access and utilize e-learning. All UMB graduate students stated that they have been able to use supporting facility components such as the Internet and computers to access information and e-learning, communicating via e-mail. Students agree that e-learning can help learning activities, make it easier to access subject matter, improve the quality of the learning process, improve the quality of interaction and communication with lecturers and make it easier to get feedback from lecturers, easy to use, facilitate understanding and work on lecture assignments and function as an implementation of remediation and enrichment. UMB postgraduate students do not experience significant obstacles in using e-learning. Already know how to use e-learning diligently access e-learning course materials, be able to communicate with lecturers via e-learning, and have sufficient availability of computer facilities and internet networks. E-learning support facilities already have good quality and are easy to use. However, students are of the view that the quality of good service must still be improved. Many UMB graduate students expect additional facilities for the development of e-learning, hoping that in the future general information will be provided, material, and administration regarding lectures. Links to various learning resources, discussion forums for lecture participants, and the provision of assignment facilities, online quizzes, input to lecturers, lecture announcements, student activity reports, as well as assessment facilities and assessment results.

From the side of E-learning Lecturers, all respondents are aware of e-learning facilities and have previously accessed e-learning facilities. Supporting facilities such as the provision of personal computers and internet networks are qualified. However, the number of computers that UMB provides for students to access and utilize e-learning is still very lacking. Some of the lecturers can be said to be ready, and able to use supporting facility components such as computers and the internet to access information, e-learning, and communicate via e-mail. However, half of the respondents as UMB e-learning lecturers still feel unable to use application software to develop e-learning. Lecturers agree that e-learning can help learning activities such as making it easier to deliver subject matter, and lecture assignments, carrying out remediation and enrichment for students, and improving the quality of the learning process, such as the quality of interaction and communication with students. E-learning lecturers do not experience significant obstacles in using e-learning. However, some lecturers have not mastered enough e-learning development software, and computer facilities and internet networks as the main facilities to access e-learning need to be improved again. Facilities are considered to have good quality and are easy to use. However, lecturers are of the view that the quality of good service must still be improved. All UMB graduate e-learning lecturers expect additional facilities for the development of e-learning in the future to meet SDG in education requirements.

It is recommended that the quality of e-learning services still needs to be improved by increasing the capacity of computer units for students and lecturers and internet networks available throughout the campus area.

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