



## Analysis of e-learning readiness level implementation in islamic senior high school south jakarta, indonesia: Review in biological learning

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### ABSTRACT

The utilization of E-Learning as one of the innovations in learning provides a richer and more flexible digital learning experience, where learning can be done anytime and anywhere without being limited by space or time. Its use requires good physical and mental readiness so that e-learning can run optimally. This study aims to determine the level of readiness for the implementation of e-learning in Islamic Senior High School South Jakarta, Indonesia. A survey method was used in this study, survey data were collected through a questionnaire adapted from the Aydin & Tasci ELR model which uses four factors of readiness namely human, self-development, technology, and innovation. The four factors are constructed from resources, skills, and attitudes. The sample in this research is Islamic Senior High School in South Jakarta, Indonesia. The results showed that Islamic Senior High School in South Jakarta was categorized as ready and could be continued in implementing e-learning ( $M_{total}=4.24 > 4.21$ ). There are two factors that are categorized as ready and can be continued, namely technology and innovation factors, the other two factors, namely human beings and self-development are categorized as ready but need a little improvement. The resource aspect is the main focus in human factors, self-development, and innovation that requires a little improvement. These factors can be the focus of attention. They can be used as a reference for Islamic Senior High School A in South Jakarta in making improvements and improvements in the implementation and utilization of e-learning.

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## INTRODUCTION

E-learning is a form of learning innovation that utilizes technology as a learning tool that allows learning to be accessed anywhere and anytime. E-learning learning is expected to enrich digital-based learning experiences for teachers and students. E-learning-based learning is also able to increase the independence of students to learn, because of easy access to learning media, it makes learning more flexible because learning materials can be accessed anytime and anywhere as long as they have internet access (S. Farisyi & Noer, 2021; Rusli, 2020). E-learning also provides an opportunity for students to determine their own study time, and the material to be studied first, and can easily repeat the material to be studied (Rusli, 2020). Another advantage is that educators will find it easier to make alternative up-to-date learning materials in accordance with the demands of scientific development, develop themselves or conduct research to increase their insight, and control student learning activities (Zufria, 2016). Richer learning experiences can increase students' knowledge and interest in learning.

Biology is a branch of natural science that has specific characteristics of matter. Biological material is not only related to scientific facts about concrete natural phenomena but also related to abstract objects. The nature of these material objects is very diverse, in terms of size, affordability, security, language, and others. Therefore, to design biology learning, various supporting tools are needed such as learning media and laboratory facilities (Sudarisman, 2015). E-learning is present as one of the innovations that can facilitate biology learning. E-learning can be used to support biology learning with various strategies, such as electronic modules, the use of interactive media, to learning with the help of applications such as the Learning Management System (LMS).

E-learning-based learning needs to pay attention to learning theory, teaching principles, and related resources so that learning can run well (Soler dkk., 2017). In the sense that to implement it into meaningful learning for students, it is necessary to review whether these things are already supportive or not. The application of a learning model, especially E-Learning, requires an ability to adapt, adopt, and accept science and technology which will affect the effectiveness of E-Learning learning (Setiaji & Dinata, 2020). Lack of adaptability, adoption, and acceptance of science and technology indicates unpreparedness in the application of e-learning-based learning, on the other hand, there are also factors that indicate the readiness to implement e-learning-based learning. This condition needs to be measured first as one of the preparation and evaluation steps in implementing e-learning-based learning.

E-learning-based learning currently implemented in Indonesia certainly still has gaps that allow failure in the learning process. Among them are signal problems, the ability to use devices or applications that are still lacking, and students who are not optimal in understanding and absorbing the material presented (Kurniati, 2022). In other research, it is stated that obstacles in e-learning learning such as human resources are not optimal in implementing e-learning learning, the availability of inadequate devices, the variety of student responses related to the level of understanding of the material, and the learning environment that is not sufficient enough to disturb students' concentration, as a result, the test scores and learning outcomes of most students decreased (Husna, 2021). In line with this, there are research results that show the obstacles in e-learning learning, namely: 1) The readiness of an educational institution to organize e-learning; 2) Internet connection problems; 3) limited availability of internet packages or quotas; 4) inadequate equipment; 5) obstacles in understanding the material being taught; 6) obstacles in the form of digitizing the content of the material to be taught (Albab, 2020).

Therefore it is important to examine in advance the level of readiness in implementing e-learning based learning. The readiness of educational institutions in applying e-learning including the readiness of teaching staff in preparing to learn, overcoming cheating in the teaching and learning process and examinations, and the readiness of educational institutions and the government to assist the learning process is one of the challenges in using e-learning as a learning medium (Agustina, 2016). Measuring the level of readiness is one of the first steps to overcoming these challenges, by knowing the initial data regarding this readiness, later can be used as consideration for what steps will be taken to maximize the implementation of e-learning.

Measurement of this level of readiness can be measured by several models, one of which is the e-learning readiness model or e-learning Readiness (ELR) developed by Aydin and Tasci. This model

measures the level of readiness based on 4 aspects, namely technological, human, innovation, and self-development factors (Aydin & Tasci, 2005). Based on these factors, the level of readiness to implement e-learning can be measured. This level of readiness will be a reflection of an educational institution's ability to improve several factors that are still lacking and maintaining factors that are already good. The use of science and technology in education, with the increasing use of e-learning without prior analysis, its readiness is also feared to cause unexpected failures, human potential that is not maximized, slow acceptance of innovation, and unmonitored self-development can also be the cause of unexpected failures. . The category of ready and not ready in the application of this model is important as an evaluation in the learning process carried out. Therefore, it is necessary to analyze the readiness of learning based on E-Learning before it is applied in a lesson.

As in Arif Kurniawan's research (Kurniawan, 2014) which measured the readiness level of implementing e-learning at Muhammadiyah High Schools in Yogyakarta using the Aydin & Tasci ELR model, it was found that five Muhammadiyah High Schools in Yogyakarta were in the ready category with several factors that needed to be improved, namely human factors and self-development. As well as in Hidayat's research (Hidayat dkk., 2019), found that the level of readiness for implementing e-learning in the special talent class for sports at SMA Muhammadiyah 1 Klaten is in the unprepared category and requires improvement in human factors, innovation, and self-development. There is also no data or research results that discuss the level of readiness for the implementation of e-learning at Islamic Senior High School in South Jakarta, Indonesia, especially in Biology learning, so there is a need for an analysis of E-Learning-based learning readiness before it is implemented in a lesson.

## METHODS

### Research Design

This research is included in the evaluation research. Evaluation research is an activity of collecting and analyzing data about the quality, effectiveness, achievement, and value of programs, products, or practices that are carried out systematically. Evaluation has the main focus in making decisions about the program, product, or practice (Gay dkk., 2012). In this study, a decision was made regarding the level of readiness for implementing e-learning in an educational institution. The results of the research can be used as feedback for related parties to improve the process of implementing e-learning learning so that the potential for failure in learning can be reduced and anticipated.

A quantitative approach with a descriptive method is used in this research. Quantitative data in the form of numbers will be analyzed and produce a generalization about how ready an institution is to implement e-learning. The results of the analysis produce a description of the level of readiness, factors that are still weak, and factors that are already in the ready category. Readiness measurement was carried out using the Aydin and Tasci ELR model which has been adjusted and developed so that it can be used in this study. This model is used to measure the level of readiness for e-learning implementation in developing countries using four readiness factors, namely technology, innovation, people, and self-development. The ELR score that has been obtained will be analyzed and measured by the Aydin & Tasci e-learning readiness index so that it can be seen which factors are still weak and need improvement or which are ready for implementation (Aydin & Tasci, 2005).

### Population and Samples

The population in this study were five public and twenty-three private Islamic Senior High Schools in the city of South Jakarta, Indonesia with several criteria. These criteria are in the form of a school located in the city of South Jakarta, Indonesia, has implemented or is currently implementing e-learning based learning, have experts in the IT field, have a computer network, have a computer lab or place used as a place for e-learning learning, some education and educational staff school with an S1 diploma, and registered in the Jardiknas connection. Some schools that grant research permits and meet the criteria are assigned school codes.

Table 1 shows the schools that were sampled in this study. Five public Islamic Senior High Schools are MAN 13 Jakarta Selatan (code A), MAN 11 Jakarta Selatan (code B), MAN 4 Jakarta Selatan (code C), MAN 7 Jakarta Selatan (code D), and MAN 19 Jakarta Selatan (code E). And for private Islamic Senior High School that grant research permits, meet the criteria, and provide feedback is MAS Miftahul Umam (code F).

**Table 1.**

The School Code that Became the Research Sample

School Code	School's Name	Status	Respondent
A	MAN 13 Jakarta Selatan	Public School	1. School principals
B	MAN 11 Jakarta Selatan	Public School	2. Vice principals for curriculum,
C	MAN 4 Jakarta Selatan	Public School	3. vice principals for public relations,
D	MAN 7 Jakarta Selatan	Public School	4. vice prinsipasls for student affairs, 5. vice prinsipasls for facilities and infrastructures, and 6. e-learning admin
E	MAN 19 Jakarta Selatan	Public School	1. School principals. 2. vice principals for curriculum, 3. vice principals for public relations, 4. vice prinsipasls for student affairs, 5. vice prinsipasls for facilities and infrastructures, and 6. teacher
F	MAS Miftahul Umam	Private School	1. School principals. 2. vice principals for curriculum, 3. vice principals for public relations, 4. vice prinsipasls for student affairs, teacher, and 5. administration staff

The sample is determined by the purposive sampling technique. This technique involves researchers selecting their own respondents for their research, researchers using their judgment to select participants with specific characteristics to be used in research (Lankshear & Knobel, 2004). The sample was chosen because it has a lot of information needed for research (Makki, 2019). Research respondents were determined based on several criteria with considerations related to the implementation of e-learning readiness, namely respondents who were seen as able to provide clear descriptions and conclusions about the data owned by the school, were seen as having broad views and knowledge about the data owned by the school, were seen as having competence in implementing e-learning -learning, and is seen as having experience in implementing e-learning in schools.

Based on these criteria, the respondents who will be used as research samples are school principals, vice principals for curriculum, vice principals for public relations, vice principals for student affairs, vice principals for facilities and infrastructure, and e-learning admin/teachers. The selected respondents are administrators from related institutions or agencies, with the hope of being able to confirm the readiness of e-learning based on the factors prepared by the educational institution.

### Instrument

The research instrument used was a questionnaire that had been adapted and developed based on the Aydin & Tasci ELR (2005) model instrument. The questionnaire is a written list of questions that must be answered by respondents (Hidayat dkk., 2019). This questionnaire includes 30 questions

formulated from four factors, namely technology, innovation, people, and self-development, the questions are also constructed from the side of resources, skills, and attitudes.

Table 2 shows the ELR factors and ELR constructs from the adjusted ELR Aydin & Tasci (2005) model. After the adoption and adjustment process is carried out, the instrument is tested to determine its validity and reliability. Based on the results of the instrument trial, 29 valid questions were obtained with 1 invalid question item, while the instrument reliability value was 0.961. The results of the instrument trials show that the adopted and adapted instruments can be used.

**Table 2.**

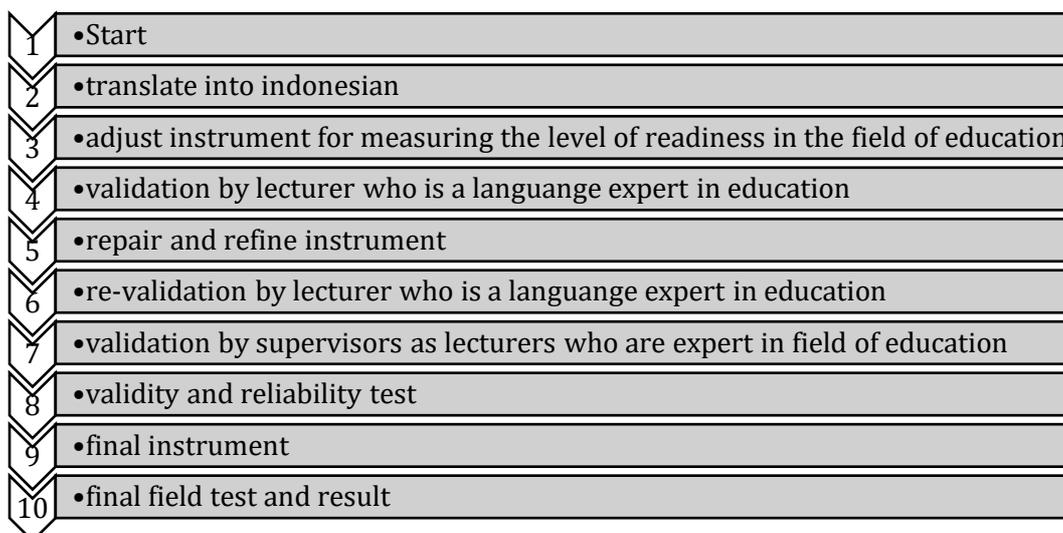
ELR Factors and Construct from Aydin & Tasci's adjusted ELR Model

	<b>Resources</b>	<b>Skills</b>	<b>Attitudes</b>
<b>Technology</b>	Access to computers and the internet	Ability to use computers and the internet	Positive attitude towards the use of technology in online learning (e-learning)
<b>Inovation</b>	Barriers to online learning (e-learning)	Ability to follow new changes/innovations	Openness to new changes/innovations
<b>Human</b>	<ul style="list-style-type: none"> <li>• Teacher education level*</li> <li>• Experienced teachers</li> <li>• Experts/pioneers in online learning (e-learning)</li> <li>• Service provider and external parties</li> </ul>	Ability to learn with/use technology	
<b>Self-development</b>	<ul style="list-style-type: none"> <li>• Internal budget for online learning</li> <li>• External budget for online learning</li> </ul>	ability to manage time	Believe in self-development

The method of filling out the questionnaire with the checklist method on the questionnaire sheet. The rating scale used is a Likert scale (1-5) with an answer score of 5 = strongly agree; 4 = agree; 3 = undecided; 2 = disagree; 1 = strongly disagree. Answer descriptions are adjusted based on the context of the question for each question point, each factor, and each question construct. Several descriptions of the answers that have been adjusted are in the form of 5 = all, 4 = most, 3 = half of, 2 = less than, and 1 = none. Others are adjusted according to the answers in the form of 5 = very ready, 4 = ready, 3 = quite ready, 2 = not ready, and 1 = not ready.

### Procedure

The instrument was adapted from Aydin & Tasci's ELR model using a questionnaire consisting of 30 questions. As described in Figure 1, the instrument was first translated into Indonesian and adjusted for the purposes of measuring the level of readiness in the field of education. Then the instrument is in the form of factors and each question point is validated by a lecturer who is a language expert in education. Instruments that have been validated will then be repaired and refined again. The results of the improvements will be validated again by lecturers who are experts in the field of education and by supervisors as lecturers who are experts in the field of education. After the instruments are declared valid and meet the requirements, the instruments are tested to determine the value of validity and reliability. The instrument in the form of a questionnaire was given to respondents using a Google form which can be filled out online and also in printed form for documentation purposes.



**Figure 1.** Research instrument development procedures

### Data Analysis Techniques

Descriptive statistical analysis techniques were used in this study. The data that has been collected is analyzed by adding up the scores from the questionnaires that have been filled out by the respondents. The total score for each factor, each question construction, and the total score for each number of respondents is then calculated by the final average value using the formula  $\bar{x} = \frac{\sum x}{n}$ , with information  $\bar{x}$  = final average;  $\sum x$  = total score (each question point, each respondent, and each question for each factor);  $n$  = number of respondents or number of question points.

Calculation of the score of each questionnaire is assisted by using the Microsoft Excel application. The average score of each question, the average score of questions for the same factor, and the total average score of all questions will be assessed and categorized according to the level of readiness based on the readiness measurement scale of the Aydin & Tasci ELR model. Based on the readiness level category of Aydin & Tasci, the average score of 3.41 is the minimum score for the level of readiness for implementing e-learning, so a score with an average value below 3.41 is considered not ready to implement e-learning based learning. To see the range of values and categories of the Aydin & Tasci ELR model (2005) as shown in the Table 3.

**Table 3.**

Aydin & Tasci's Range of Values and ELR Model Categories (2005)

Interval	Readiness Category
$1,00 \leq \underline{x} \leq 2,60$	Not ready, needs a lot of improvement
$2,61 < \underline{x} \leq 3,40$	Not ready, needs a little of improvement
$3,41 < \underline{x} \leq 4,20$	Ready, but needs a little of improvement
$4,21 < \underline{x} \leq 5,00$	Ready, and can be continued

### RESULTS AND DISCUSSION

The analysis was carried out based on a questionnaire that was filled in by 36 respondents from 6 schools. Analysis was carried out for each readiness factor, each question item in the same factor, question construction, and the level of readiness for each school and the factors as a whole. The level of readiness for implementing e-learning is obtained from the average value of each questionnaire distributed to each respondent. The level of readiness is seen from the average score for each factor, and the average score of the entire instrument score filled out by the respondents.

Table 4 shows the level of readiness for the implementation of e-learning in the Islamic Senior High School South Jakarta in terms of each readiness factor. Based on the data obtained from the overall results of the questionnaire, the level of readiness in terms of human factors and self-development is categorized as ready but requires a little improvement (scores 4.16 and 4.00 < 4.21), and technology and innovation factors are categorized as ready and can be continued (scores 4.39 and 4.42 > 4.21 ). From the scores obtained from each factor, the level of readiness for implementing e-learning in the city of South Jakarta, Indonesia is categorized as ready and can be continued with an average score of 4.24 > 4.21.

**Table 4.**

Level of Readiness for Implement of E-Learning Islamic Senior High School in South Jakarta

No	Factors	score	Readiness Category
1	Human	4.16	Ready, but needs a little improvement
2	Self-development	4.00	Ready, but needs a little improvement
3	Technology	4.39	Ready, and can be continued
4	Inovation	4.42	Ready, and can be continued
<b>Total overall score</b>		4.24	Ready, and can be continued

Table 5 shows that the resources and skills of teachers, mentors, and learning service providers still need to be slightly improved. The increase in this element includes the number of teachers, mentors, or professional learning service providers and the skills of teachers in planning, implementing, and evaluating e-learning based learning (scores A2, A4, and A5 < 4.21). The number of teachers who are experienced in online learning or e-learning is sufficient and can be continued (A1=4.33>4.21). With regard to skills in using various e-learning learning media, the ability of students to use various e-learning learning media is in the ready category and can be continued with a fairly high score (A3 = 4.56> 4.21).

**Table 5.**

The Level of Readiness for the Implementation of E-Learning in Islamic Senior High School South Jakarta in terms of Human Factors

Code	Question	Respondent	Readiness Score	Readiness Category
A1	How many teachers are experienced in managing and evaluating online-based learning?	36	4.33	Ready, and can be continued
A2	Are there teachers/mentors/models/pioneers in online learning at your school?	36	3.75	Ready, but needs a little improvement
A3	Are the majority of students in your school able to use various online learning media?	36	4.56	Ready, and can be continued
A4	Are the majority of teachers in your school able to use various online learning media?	36	4.17	Ready, but needs a little improvement
A5	Is the assistance offered by professional e-learning service providers from outside the school sufficient for the implementation of e-learning at your school?	36	3.97	Ready, but needs a little improvement

Next, in Table 6 it discusses the level of readiness seen from self-development factors, including each school's trust in e-learning development, budget allocation for implementation, to confidence in the implementation of e-learning. Overall, self-development factors that are already in the ready and can be continued category consist of three question points (B6, B8, and B9), and points that are in the ready category but need a slight increase are five question points (B1, B2, B3, B4, and B7), and one point in the unprepared category and needs a lot of improvement (B5).

**Table 6.**

The Level of Readiness for the Implementation of E-Learning in Islamic Senior High School South Jakarta in terms of Self-development Factors

Code	Question	Respondent	Readiness Score	Readiness Category
B1	Do your students enjoy participating in online/e-learning?	36	4.08	Ready, but needs a little improvement
B2	Can your students take their time (15, 30, or 60 minutes) to study online/e-learning?	36	4.19	Ready, but needs a little improvement
B3	Are the majority of your school committee members confident in using technological media to make students learn more effectively and improve their learning outcomes?	36	4.14	Ready, but needs a little improvement
B4	Is there a source of funds at your school to make a budget for implementing online learning/e-learning?	36	3.64	Ready, but needs a little improvement
B5	Is time allocated in each school board/committee meeting to discuss the budget for implementing online learning/e-learning?	36	2.94	Not ready, needs a little improvement
B6	Does your school have the potential to implement e-learning?	36	4.42	Ready, and can be continued
B7	Do teachers at your school believe that learning with e-learning can improve students' learning abilities?	36	3.81	Ready, but needs a little improvement
B8	Is your school ready to implement e-learning?	36	4.47	Ready, and can be continued
B9	Are the teachers at your school ready for online/e-learning?	36	4.31	Ready, and can be continued

Table 7 shows the level of readiness in terms of technological factors, these factors are related to the availability of access to computer equipment and internet networks, skills in using computer and internet devices, and positive attitudes toward using technology. The readiness level of the technological factor has a high average score and is in the ready and can be continued category, except for two points which are still in the ready category but need a little improvement (C1 and C11).

**Table 7.**

The Level of Readiness for the Implementation of E-Learning in Islamic Senior High School South Jakarta in terms of Technology Factors

Code	Question	Respondent	Readiness Score	Readiness Category
C1	Does your school provide a sufficient number of computers so that teachers and students can work/study individually?	36	3.58	Ready, but needs a little improvement
C2	Is there internet access available at your school?	36	4.39	Ready, and can be continued
C3	Can your students access the internet outside of school? (from home or other places, etc.)	36	4.28	Ready, and can be continued
C4	Do students at your school have basic computer skills (typing, accessing the internet, creating, saving, editing files, etc.)?	36	4.58	Ready, and can be continued

Code	Question	Respondent	Readiness Score	Readiness Category
C5	Do students at your school have basic skills in using the internet (e-mail, searching and downloading various information, etc.)?	36	4.72	Ready, and can be continued
C6	Are your students able to follow instructions on a computer screen when completing certain tasks?	36	4.61	Ready, and can be continued
C7	Are your students willing to use information technology such as in online learning/e-learning or completing their routine assignments?	36	4.67	Ready, and can be continued
C8	Do your students accept any technological innovations/updates (for example, using digital documents instead of hard copies)?	36	4.53	Ready, and can be continued
C9	Do the majority of your school board/committee members respond positively to the use of technology in completing their daily/routine tasks?	36	4.67	Ready, and can be continued
C10	Are any necessary changes in the use of technology to complete daily/routine assignments accepted by students?	36	4.39	Ready, and can be continued
C11	Do you agree that online learning/e-learning is a flagship program?	36	3.92	Ready, but needs a little improvement

The next factor relates to the ability of human resources or an organization in addressing the use of e-learning and the renewal of e-learning, namely the innovation factor (Table 8). This factor has the highest average score ( $M_{\text{innovation}} = 4.42 > 4.21$ ) so it is included in the ready and can be continued category, which contains obstacles in implementing e-learning, the ability to adapt and accept e-learning, and an open and positive attitude towards change and updates in the implementation of e-learning.

**Table 8.**

The Level of Readiness for the Implementation of E-Learning in Islamic Senior High School South Jakarta in terms of Innovation Factors

Code	Question	Respondent	Readiness Score	Readiness Category
D1	Do students at your school accept changes in completing their routine tasks when online learning/e-learning takes place?	36	4.53	Ready, and can be continued
D2	Has the majority of parties at your school (students, teachers and employees) accepted any changes to the management of online learning/e-learning?	36	4.44	Ready, and can be continued
D3	Are the teachers and staff at your school easily adaptable to new changes/innovations?	36	4.22	Ready, and can be continued
D4	Are there conflicts of interest, both internal and external, that might hinder the implementation of new innovations, such as online learning/e-learning?	36	4.47	Ready, and can be continued

Each question point for each factor is arranged based on the construction of resources, skills, and attitudes. Table 9 shows the level of readiness based on the construction, overall the level of readiness seen from resources, skills, and attitudes is in the ready category and can be continued ( $M_{\text{construction}} = 4.24 > 4.21$ ). As for the other constructions, they are in the ready category and can be continued ( $M_{\text{skills}}=4.44$ ;  $M_{\text{attitude}}=4.34 > 4.21$ ) except for resource construction ( $M_{\text{resource}}=3.93 < 4.21$ ). The level of readiness for skill construction relates to skills in using various e-learning media, the ability to access

computer equipment and internet networks, basic skills in using computer and internet devices, the ability to manage time, and the ability to adapt and accept. Attitude construction includes a confident attitude to be able to take advantage of e-learning, a positive attitude in the use and utilization of technology in learning, and an open attitude towards changes and updates that occur in the use of technology in education.

**Table 9.**

The Level of Readiness for the Implementation of E-Learning in Islamic Senior High School South Jakarta in terms of Resources, Skills, and Attitudes

No	Construction	Respondent	Readiness Score	Readiness Category
1.	Resources	36	3.93	Ready, but needs a little improvement
2.	Skills	36	4.44	Ready, and can be continued
3.	Attitude	36	4.34	Ready, and can be continued
<b>Overall Average</b>			4.24	Ready, and can be continued

Table 10 shows the readiness level scores were obtained from all the instruments obtained for each school, consisting of 6 questionnaires distributed to each school, and the overall results were averaged and categorized by readiness level. Based on the results of converting the instrument scores that have been filled in, the readiness level out of a total of 6 schools, there are 3 schools in the ready category and can be continued and 3 schools in the ready category, but needing a little improvement.

**Table 10.**

Level of Readiness to Implement E-Learning for Each Islamic Senior High School

No	Schools Code	Readiness Score	Readiness Category
1.	A	4.15	Ready, but needs a little improvement
2.	B	4.22	Ready, and can be continued
3.	C	4.41	Ready, and can be continued
4.	D	4.46	Ready, and can be continued
5.	E	4.07	Ready, but needs a little improvement
6.	F	4.08	Ready, but needs a little improvement

The level of readiness for each factor of the whole school shows different levels of readiness (table 11). Every school is ready to continue implementing e-learning, but there are several factors that need a little improvement. Readiness factors that require improvement consist of human factors and self-development, except for school code F which requires improvement in other factors, namely innovation.

**Table 11.**

The Readiness Level of Each Islamic Senior High School is seen from the Readiness Factor Aspect

No	Schools Code	Factor	Readiness Score	Readiness Category
1.	A	Human	4.17	Ready, but needs a little improvement
		Self-development	3.87	Ready, but needs a little improvement
		Technology	4.30	Ready, and can be continued
		Inovation	4.30	Ready, and can be continued
2.	B	Human	3.94	Ready, but needs a little improvement
		Self-development	4.17	Ready, but needs a little improvement
		Technology	4.21	Ready, and can be continued
3.	C	Inovation	4.75	Ready, and can be continued
		Human	4.17	Ready, but needs a little improvement
		Self-development	4.21	Ready, and can be continued
		Technology	4.74	Ready, and can be continued

No	Schools Code	Factor	Readiness Score	Readiness Category
4.	D	Inovation	4.29	Ready, and can be continued
		Human	4.50	Ready, and can be continued
		Self-development	4.15	Ready, but needs a little improvement
		Technology	4.68	Ready, and can be continued
5.	E	Inovation	4.54	Ready, and can be continued
		Human	4.14	Ready, but needs a little improvement
		Self-development	3.73	Ready, but needs a little improvement
		Technology	4.20	Ready, and can be continued
6.	F	Inovation	4.46	Ready, and can be continued
		Human	4.04	Ready, but needs a little improvement
		Self-development	3.89	Ready, but needs a little improvement
		Technology	4.23	Ready, and can be continued
		Inovation	4.17	Ready, but needs a little improvement

E-learning readiness describes how ready an organization is to implement e-learning seen from several aspects, this readiness is not only limited to teachers and students but the readiness of the organization itself (D. Doculan, 2016; Salmilah, 2019). Models to measure the level of readiness are very diverse, one of which is the Aydin & Tasci ELR model used in this study. The difference between the ELR models is the readiness factor used, but factors that are often used by each ELR model include infrastructure, human resources, content, culture, and students (Blacer-bacolod, 2022). There were 29 questions that were declared valid and could be used in research, 1 invalid question was removed and constructed to complete the respondent's biodata. The questions consist of 5 questions from the human factor, 9 questions from the self-development factor, 11 questions from the technology factor, and 4 questions from the innovation factor.

Based on the research results, two factors were ready and could be continued, namely technology and innovation. The readiness of technological factors includes technological resources, skills or abilities in using technology, and attitudes towards the use and utilization of technology. Technological resources include the availability of both hardware and software. Hardware availability includes computer availability, internet network, and internet connection. The software is in the form of a Learning Management System (LMS), teaching materials in the form of electronic books, electronic modules, to electronic-based exam devices (Delita dkk., 2022; Fu, 2013; Priyanto, 2008). Another factor that is included in the ready category is innovation. Aspects that determine the readiness of innovation factors include the absence of obstacles in the use of technology for implementing e-learning, the ability to adopt and adapt to the use of technology, and acceptance of changes and updates to e-learning. Based on these three aspects, in terms of innovation factors, Islamic Senior High School in South Jakarta Indonesia is in the ready category and can be continued.

There are two other factors that are categorized as ready but need a little improvement, namely the human factor and self-development. These two factors are arranged based on the aspects of resources, skills and attitudes. Improvements that can be made to increase the readiness of the human factor are increasing experienced and professional human resources, absorbing and properly utilizing the assistance provided by professional service providers in e-learning learning, and increasing the ability to use and develop various online learning media. The efforts to make these improvements can be in the form of outreach programs for teachers regarding the use and application of e-learning in learning, and for students in the form of using and getting used to using laptops in learning as a form of implementing e-learning (Cheok, 2017; Mailizar dkk., 2020; Oktaviana dkk., 2021). Habituation efforts will bring about the ability of both teachers and students to use and utilize technology in learning, thus professional human resources with the ability to use good technology will increase, and the level of readiness for implementing e-learning will also get better.

And improvements that can be made to increase the readiness of self-development factors include maximizing and planning the use of budgets for implementing e-learning properly, increasing time management skills for e-learning learning, and increasing confidence in the use of e-learning in learning.

Other efforts to increase this factor include increasing the allocation of funds related to increasing internet capacity and providing infrastructure such as computer labs. In addition, positive support is needed from various parties such as banks or financial institutions to maintain the smooth implementation of e-learning (Al-Ihwanah, 2016; Chang, 2016; Qazi dkk., 2022). With proper budget allocation and utilization, infrastructure needs as well as access to computers and the internet will be met. This procurement will have implications for increasing the level of readiness for self-development in implementing e-learning.

Among the elements that are already in the ready category but need a little improvement, human resources are one of the factors that influence the readiness to implement e-learning. Human resources include teachers and students who are both subjects and objects of e-learning. Human resources are one of the important factors because human resources are energy that functions as work input that will run the learning model. However, human resources are also determined by other elements such as the environment, infrastructure, and support from the environment (Hashim & Tasir, 2014; Hendrastomo, 2008). The readiness of the human factor is also determined by other factors, the determining factors for the successful use of e-learning are the collaboration of teachers and students, support from educational institutions, technology, environment, and teaching materials (Agustina, 2016; Saekow, 2011). human resources are influenced by other factors, as well as human resources will affect other factors (Darab & Montazer, 2011; Demir & Demir, 2015).

The human factor that still needs improvement focuses on the existence of professional mentors or teachers who can act as mentors and pioneers in e-learning which is an aspect of human resources. Efforts to increase teacher competence in implementing online learning can be carried out through implementing e-learning training activities, forming a special team that focuses on assisting the implementation of e-learning learning, and ongoing supervision activities from the school (Adiyarta dkk., 2018; Mosa dkk., 2016; Werdiningsih, 2021). This effort can be collaborated with by maximizing the use of e-learning such as budget planning and maximizing budget planning in board/committee meetings. Careful budget planning will provide good and maximum e-learning implementation results (Ghavifekr, 2012; Wahyudi, 2021).

Likewise the use of e-learning in biology learning, there needs to be special attention so that e-learning can be maximized properly. A study found problems that could hinder the use of e-learning in biology learning, such as the lack of willingness and ability of teachers to use ICT-based media, this was caused by a lack of teacher skills in managing and mastering these learning media (Ritonga, 2017). In other research, it was mentioned that the obstacles were in the form of internet networks and learning that was not optimal due to ineffective practicums (Budiyono Saputro dkk., 2020; Dhani, 2021). There is also a lack of student motivation in studying biology using e-learning and minimal teacher control in learning activities (Sholihan, 2021). Then from a student perspective, it was found that the level of student response regarding e-learning which facilitated discussion activities was quite low, which was caused by the teacher's lack of use of e-learning for discussion space (Setiawan dkk., 2022). In addition, in studying biology material there are still some obstacles such as students' difficulties in learning biology material, the development of High Order Thinking Skills (HOTS) in learning activities that are not optimal, and the involvement of students in learning activities that still need improvement (Andriyatno dkk., 2023; Nisak, 2021).

Of course, these obstacles can be reduced and minimized by utilizing and maximizing e-learning as well as possible. Because theoretically e-learning allows for an active, constructive, collaborative, enthusiastic, dialogical, contextual, reflective, multisensory, and high-order thinking skills training process (Chaeruman, 2018). Internet devices and technologies have the potential to enhance meaningful learning (Zulfiani, 2023). The learning process can be said to be successful. If the success factors for e-learning learning can be fulfilled, the success factors are grouped into three major groups, namely: 1) system-related factors including the infrastructure supporting the system; 2) factors related to content and information or content given in learning; 3) factors related to self-readiness in implementing e-learning including management and staff who support the system (Budhianto, 2020).

As reported adopting modern learning technologies such as Augmented Reality (AR), technology in universities in the Saudi Arabia has become a demand to improve teaching and learning performance and motivate students to obtain an effective learning process. However, the readiness of universities to adopt modern learning technologies, such as AR applications, in developing countries, especially in

Saudi Arabia, is considered one of the critical issues in ensuring the success of AR systems (Alahmari, 2023).

It was further stated that there is a need for more attention to the social, technological, organizational, and personal aspects of building an e-learning environment. Educational institutions and their expert staff need to work together with the finance department, and IT experts to complete e-learning learning facilities, there is also a need for commitment from teachers and teaching staff to organize e-learning learning. Because only with these steps can effective learning using e-learning be achieved (Mustofa & Riyanti, 2019). One step that can be taken is to utilize technology in e-learning, using technology-based learning media, using digital teaching materials, and using a Learning Management System (LMS).

There are three main functions of information and communication technology in learning, namely information technology as a learning aid, information technology as knowledge, and information technology as material as well as a tool for mastering learning (Agustian & Salsabila, 2021). Based on research, it is stated that the technology that is often used in biology learning is the ICT or multimedia model, the ICT model is used as a function of external requirements, while other media such as still images and sound are used as a function of stimulus and ability transfer (Primasari dkk., 2015). The use of ICT-based media is one of the steps that can be taken to maximize the function of technology in learning while reducing the obstacles that occur in learning biology.

In line with this, there are various kinds of learning innovations that can be developed, some of which are biology learning innovations using the Articulate Studio program to create ICT-based learning media, biology learning innovations using Youtube, biology learning innovations using android applications such as Cell Structure, Skeleton/3D Anatomy, and Human Anatomy, other learning innovations such as distance learning using e-learning and the use of Virtual Reality (VR) technology (Jayawardana & Gita, 2020). These innovations are used by utilizing digital technology and the internet which can improve the quality of biology learning.

With the visualization of biological materials using digital media, it is hoped that students will more easily understand these materials. In addition, digital learning can increase student learning activities which will have a positive influence on learning outcomes (Jayawardana, 2017). With a good attitude of adoption and acceptance, a willingness to use technology in e-learning can pave the way for improving skills in its use. Skills in mastering technology-based media will also make a positive contribution to biology learning (Agustian & Salsabila, 2021). Jayawardana continued that the teacher's paradigm in managing biology learning must begin to change, from managing conventional learning to managing learning that utilizes advances in technology and the internet in the form of e-learning. With a change in the paradigm of managing digital-based learning, the potential for utilizing e-learning can be maximized as much as possible, so that it is not impossible that the level of readiness for implementing e-learning can achieve a maximum score.

Of course, the paradigm shift in learning management as part of the human factor is also influenced by other readiness factors. Efforts that can be made to maintain human factor readiness such as teacher training in the use of digital-based learning media are needed to provide insight and motivation to teachers. The mentoring program is also a strategic effort to provide teacher competency development services (Rasyid dkk., 2021). By continuing to strive for things to increase readiness in the human factor, and by continuing to improve other readiness factors, e-learning based learning can be carried out properly.

This e-learning readiness model can be used as an evaluation instrument. From the results of the evaluation, it will be known whether the implementation of e-learning is successful or fails, seen from the increase in scores or not. From the results of the evaluation, it can be seen which areas are weak and which can be improved. The results of this evaluation can then be used as a recycling decision for the improvement process in the next period (Priyanto, 2008). Assessing e-learning readiness is critical for educational institutions to identify areas within their e-learning systems that need improvement and develop strategies to increase student readiness (Zine dkk., 2023). Factors that still require improvement are known which aspects are the focus of attention for improvement programs, with this data it can be used as a reference for Islamic Senior High School in South Jakarta, Indonesia in making improvements and improvements in the application and utilization of e-learning. Later the results of

these improvements can be analyzed again for improvement in order to maintain the continuity of the e-learning adoption process.

## CONCLUSION

Based on the results of the research and discussion of the research that has been described in the previous chapter, there are several conclusions, including the level of readiness for the implementation of e-learning in Islamic Senior High School of South Jakarta Indonesia is in the ready category and can be continued. Factors that are in the ready category include technology and innovation factors, while factors that are in the ready category but need a little improvement include human factors and self-development. The entire research data shows that human factors, self-development, and innovation are aspects that need to be improved. There are several suggestions related to this research, including the need for further evaluation to improve aspects of human resources, resources in the form of computer and internet access, and resources in the form of no obstacles in implementing e-learning. The results of the evaluation are used as the basis for the improvement plan for the next e-learning implementation program. The use of ELR is carried out in stages and continues to maintain the continuity of e-learning implementation. To complement other factors that are considered incomplete, further research and measurements can be carried out with a more complete ELR model while still paying attention to the practicality and accuracy of the measurement results. The results of this study can be used as a basis for decision-making for the use of technology in education for the purposes of educational programs such as independent curriculum development. Further research can be directed at the responses of students, teachers, etc. to obtain comprehensive information.

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