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Ensemble Measurement Model of E-Learning Implementation Readiness for Higher Education Institution

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ABSTRACT

The low level of student readiness in implementing e-learning can achieve not optimal benefits or even generate losses. In fact, its failures are able to impact on swelling of the institutional funds. Therefore, it is so important to measure the level of student readiness for avoiding the impact of e-learning implementation failures. In this study, we employed an ensemble model for measuring e-learning readiness level by using the model of Akaslan & Law and Aydin & Tasci. The data were obtained from questionnaires based on the factor of technology, people, content, institutions, acceptance for e-learning, and training for e-learning. With a questionnaire consisting of questions and five Likert scales, the survey was conducted in several departments who have implemented e-learning. We assessed the results by Akaslan & Law to measure the level of student readiness and Aydin & Law for determining its readiness By assessing the level of difficulty of e-learning implementation, we show a different way of assessment that the model of Akaslan & Law can also be used for the same variables related to Aydin & Tasci model in the measurement. We work in hand together between the model of Akaslan & Law and Aydin & Tasci for the sake of knowing the level of e-learning implementation readiness in such a different way. We observed e-learning of Institut Teknologi Sepuluh Nopember (ITS) or so-called ShareITS and found that ITS students are ready to implement e-learning.

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1. Introduction

The need of Information and Communication Technology (ICT) has now expanded to all areas included in education. The implementation of e-learning in universities is one of examples of ICT utilization [1]. Today, many colleges are starting to provide web-based lectures that complement classroom-based lectures [2], particularly in Institut Teknologi Sepuluh Nopember (ITS).

ITS is applying the Student-Centered Learning (SCL) curriculum as a standard, which means student-centered learning that encourages students to become active students [3] [4], ShareITS as e-learning being implemented by ITS becomes one of the tools of curriculum success the. Coupled with the turnover of ITS statistic that became State University - Legal Entity (PTN-BH), the quality of students, lecturers, and learning also cannot be separated from the monitoring as an assessment of academic performance to implement PTN-BH [5]. As quoted by Directorate General of Higher Education, Dr. Ir. Patdono Suwignyo, that as a PTN-BH has homework to be completed, one of them achieves international university's excellence, effective and efficient and builds the superiority of students' ability to international level and keeps conducive of campus [6]. We conducted the proposed model to ShareITS, Shareable & Reusable eLearning of ITS [7]. Thus, the successful application of ShareITS can have an impact on the level of ITS competitive advantage over other universities. To succeed in the application of ITS share, e-readiness measurement is required [8].

In this research, we use the e-readiness measurement model developed by Akaslan and Law [9]. The model from Akaslan and Law assumes that to assess the level of e-readiness of students, it is necessary to investigate the extent to which students believe that e-learning is not difficult and will improve their learning, as it is important to understand the needs of students in implementing e-learning [10]. So that the model of Akaslan and Law measure e-readiness of several factors and sub-factors of technology, people, content, institution, acceptance for e-learning, and training for e-learning [11]. By the obtained value from the survey, it will be assessed based on Aydin and Tasci's assessment model and comparing readiness of student e-learning based on some demographic data in order to make the strategy more detailed [12].

With the assessment of readiness on the implementation of e-learning, we expected to provide a picture of the readiness state of students to implement the e-learning. It can contribute to the successful implementation of information systems that are being implemented. Thus, by knowing the description of the readiness state of students towards e-learning implementation, we can understand what factors become a priority that needs to be prepared that effect to the success of e-learning implementation and can assist in evaluating ICT strategies and appropriate ICT planning to obtain benefits desired [13].

2. Literature Review

Several literature studies supporting the completion of this research are Akaslan and Law e-readiness models, validation tests, reliability tests, Aydin e-readiness and Tasci appraisal models. In Figure 1, it is a measurement model of Akaslan, and Law e-readiness. According to Akaslan and Law models, to measure the level of e-readiness, there are several variables that affect the level of e-readiness of students [14].

Figure 1 Readiness of Akaslan & Law Model [9]

There are several factors and subfactors required to measure e-readiness obtained based on the Akaslan and Law model. So that can be made a questionnaire. In making questionnaires, questionnaires in previous studies used as a reference in the manufacture of questionnaires in this study. The questionnaire has 4 sections, part 1 consists of some demographic data of respondents, including gender, education level, academic year, and majors chosen by the respondents. Section 2 contains statements to measure the extent of e-readiness of respondents. Section 3 contains statements to measure the extent to which respondents believe e-learning will facilitate and enhance learning. And section 4 contains statements to evaluate whether respondents need training for e-learning.

Before the questionnaire was distributed, validity and reliability were tested to determine whether the questionnaire was valid and reliable or not. Once valid and reliable, the questionnaire is distributed to the respondents. thereafter, validity and reliability test are performed, after the survey results have been valid and reliable using SPSS, a mean test is performed, by searching for the average of the total score of each statement and each factor consisting of several statements.

The analysis phase consists of four stages, namely the average score analysis with the Aydin and Tasci scoring model (Figure 2), where the average score is obtained from the questionnaire question type Likert scale. The scale consists of values ranging from 1 which is defined as a "strongly disagree" option to 5 which is defined as a "strongly agree" option. According to Aydin and Tasci's assessment model that to be declared ready to implement e-learning, at least the average score has a value of 3.4. Which means if the average score lower than 3.4 then declared not ready to apply e-learning.

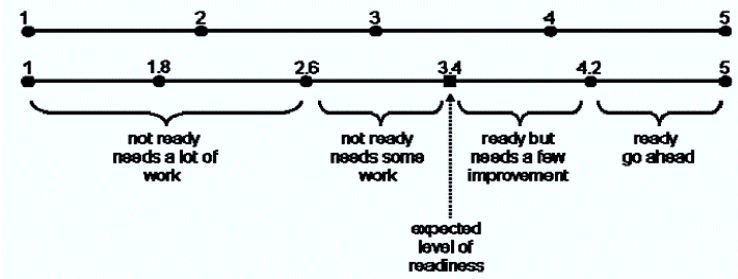

Figure 2 Measurement of Aydin & Tasci [11]

After the average score is obtained, compare the mean scores based on the respondent's demographic data, make suggestions for recommendations, and make conclusions and suggestions.

3. Methodology

The questionnaire was distributed in 411 respondents who are active students in ITS who have used e-learning ShareITS. Demographic data were obtained from questionnaires that have been disseminated [15]. Based on the result, the majority of respondents were male with 244 respondents (61%), while female respondents were 167 respondents (39%). Based on Table 1, respondents of the 2015 class consisted of 148 respondents (36%), respondents class of 2014 consisting of 171 respondents (41%), respondents force of 2013 consisted of 81 respondents (20%), and respondents class of 2012 consisted of 11 respondents (3%).

Table 1 Total and percentage of respondent demographics

Gender	N	%
Male	244	61
Female	167	39
Year	N	%
2015	148	36
2014	171	41
2013	81	20
2012	11	3

The Akaslan and Law e-readiness model was chosen as the basis for this research work in the preparation stage, several factors and subfactors needed to measure e-readiness were obtained. So that can be made the questionnaire. In making questionnaires, questionnaires in previous studies used as a reference in the manufacture of questionnaires in this study [16]. The questionnaire has 4 sections, part 1 consists of some demographic data of respondents, including gender, education level, academic year, and majors chosen by the respondents. Section 2 contains statements to measure the extent of e-readiness of respondents. Section 3 contains statements to measure the extent to which respondents believe e-learning will facilitate and enhance learning. And section 4 contains statements to evaluate whether respondents need training for e-learning. Before the questionnaire was distributed, validity and reliability were tested to determine whether the questionnaire was valid and reliable or not. Once valid [17] and reliable [18], the questionnaire is distributed to the respondent. thereafter, validity and reliability test are performed, after the survey results have been valid and reliable using SPSS, a mean test is conducted, by searching for the average of the total score of each statement and each factor consisting of several statements [19].

From the average obtained results can be seen whether the level of e-readiness of respondents has met the standards of the assessment model Aydin and Tasci. Then by its result, comparisons of average scores based on respondents' demographic data have been obtained. So, the proposed recommendations can be more accurate based on each variable. Based on the calculation of the average scores obtained from each variable and done the analysis, can be made making recommendations.

4. Results and Discussion

4.1. Validation Test Using r-Table

The validation test was conducted using Pearson of correlation coefficient and two-tailed as a test of significant consideration. Based on Table 2, all the indicators have a higher value than the minimum limit value of table r, so that the indicators are valid.

Table 2 Total and percentage of respondent demographics

Indicator	Correlation Index		R-table	Category
	Lowest-limit	Highest-limit		
Factor of Technology				
T02, T03, T05, T06	0.582 (T06)	0.707 (T03)	0.0965	Valid
Factor of Experience with ICT				
U01, U02, U03, U04, U05, U06	0.457 (U02)	0.666 (U05)	0.0965	Valid
Factor of Confidence with ICT				
U07, U08, U09, U10, U11	0.653 (U11)	0.821 (U08)	0.0965	Valid
Factor of Attitude Towards E-Learning				
U12, U13, U14, U15, U16, U17	0.684 (U12)	0.834 (U14)	0.0965	Valid
Factor of Attitude Towards Others				
U18, U19, U20, U21, U22, U23	0.775 (U18)	0.850 (U21)	0.0965	Valid
Factor of Traditional Skills				
U24, U25, U26, U27, U 28, U29, U30, U31, U32, U33, U34, U35, U36, U37, U38, U39, U40, U41, U42, U43, U44, U45, U46, U47	0.427 (U33)	0.755 (U40)	0.0965	Valid
Factor of Content				
C01, C02, C03, C04	0.664 (C01)	0.842 (C04)	0.0965	Valid
Factor of Acceptance				
A01, A02, A03, A04, A05, A06, A07, A08	0.675 (A07)	0.795 (A01 and A02)	0.0965	Valid
Factor of Training				
P01, P02, P03, P04, P05	0.684 (P05)	0.866 (P03)	0.0965	Valid

4.2. Validation Test Using Cronbach's alpha

The reliability test is performed to measure how stable, reliable, and consistent a test is in measuring the same thing every time [20]. In this research, the reliability test is done by looking at the value of Cronbach's alpha in each research variable. To measure reliability, the Cronbach's alpha criterion is acceptable and is considered reliable if the value is greater than 0.6 [21]. In the following Table 3, the results of the reliability test from the research data that has been obtained from the questionnaires have been disseminated on the research respondents. Reliability test results from technological, user, content, acceptance, and training variables have a Cronbach's alpha value of 0.703 for technology variables, 0.908 for user variables, 0.768 for content variables, 0.896 for acceptance variables, and 0.855 for training variables. Based on the minimum limit of acceptance of Cronbach's alpha value in testing the reliability of a data, that is 0.6, all of the variables in the table are reliable.

Table 3 Total and Percentage of Respondent Demographics

Variable	Cronbach Alpha	Category
Technology	0.703	Reliable
User	0.908	Reliable
Content	0.768	Reliable
Acceptance	0.896	Reliable
Training	0.855	Reliable

4.3. Findings on Technology Variable

The technological variables have limitations that are not measured on the hardware side, the measurement of the technological variables is only done on the stability side and the speed of internet access owned by the respondents both at the residence and on campus.

Table 4 Mean score of technology variable

Code	Indicator	Score
T02	I am satisfied with the stability of internet access at home	3,1
T03	I am satisfied with the speed of internet access at home	3,1
T05	I am satisfied with the stability of internet access on campus	3,0
T06	I am satisfied with the speed of internet access on campus	3,1

In terms of technological variables, it indicates that the respondents considered the availability of internet access at the residence as well as on campus is still insufficient, even some respondents do not have internet access at home. It can be seen in Table 4 that each indicator on the technology variable has an average score lower than 3.4. So, it is necessary to increase the infrastructure of internet access to improve the level of e-readiness in variable technology.

4.4. Findings on People Variable

Respondents were asked about the experience of respondents to the use of ICT, the belief of respondents using ICT, attitudes of respondents to e-learning, and traditional skills of respondents.

Table 5 Mean score of people variable

Code	Indicator	Score
U01-U06	Student experience in using various ICT for learning: Internet (U01), e-mail (U02), office software (U03), social media (U04), instant messaging software (U05), and engineering software (U06)	3,9
U07-U11	Students' beliefs in using various ICTs: computer (U07), web browser (U08), search engine (U09), digital file management tools (U10), and authoring tools to create learning materials (U11).	4,1
U12-U23	Student attitudes toward e-learning: information about e-learning (U12, U18, U19), ICT competence for e-learning (U13), ease of e-learning (U14), have enough time for e-, supports e-learning (U16, U20, U21), and likes e-learning (U17, U22, U23).	3,6
U24-U47	Traditional skills of students: writing skills (U24-26), ability to record (U27-29), group work skills (U30-32), reading ability (U33-U35), classroom attendance (U36-38), time- U39-41), independence ability (U42-44) and self-motivation (U45-U47).	3,4

Based on Table 5, it can be seen that the average score of the people variables on each factor has scored higher or equal to 3.4, respectively 3.9 for the respondent experience sub-factor using ICT, 4.1 for subfactor of respondent's belief using ICT, 3,6 for sub-factor of respondent attitude toward e-learning, and 3,4 for sub-factor of traditional skills of respondent.

4.5. Findings on Institution Variable

Respondents were asked whether e-learning was applied to the campus environment or not. Based on the results of the research shows that the respondents on FTIK faculty have been very friendly towards the implementation of e-learning. But on faculty other than FTIK is still quite foreign. Still a small part of the lecturers whom initiative to apply e-learning in the course.

4.6. Findings on Content Variable

Respondents were asked about the extent to which e-learning can improve the quality of learning both in terms of theory and practice and can be applied to the subjects of respondents.

Table 6 Mean Score of Content Variable

Code	Indicator	Score
C01	E-learning can be applied to the theory part of your course.	3,7
C02	E-learning can improve the quality of the theory part of your course.	3,6
C03	E-learning can be applied to the practical part of your course.	3,3
C04	E-learning can improve the quality of the practice part of your course.	3,3

Can be seen in Table 6, 2 indicators on content variables have an average score lower than 3.4. Namely the C03 indicator (e-learning can be applied to the practice part of the course) with a score of 3.3 and C04 (e-learning can improve the quality of the practice part of the course) with a score of 3.3. This indicates that respondents assumed that e-learning cannot or still not quite applicable and does not improve the quality of subjects in the practice section.

4.7. Findings on Acceptance Variable

Respondents were asked about the level of acceptance of respondents to the e-learning system.

Table 7 Mean score of acceptance variable

Code	Indicator	Score
A01	E-learning will improve the quality of my learning experience.	3,7
A02	E-learning will improve the quality of my results.	3,6
A03	E-learning will improve my productivity.	3,5
A04	E-learning will be useful for my learning.	3,7
A05	E-learning will allow me to complete my lectures more effectively than traditional classroom-based approaches.	3,5
A06	E-learning will be easy to use for me.	3,7
A07	E-learning will be easy to use for my lecturer.	3,6
A08	E-learning will be easy to use for my friends.	3,7

It can be seen in Table 7 that each indicator on the acceptance variable has an average score higher than 3.4. It is interpreted that respondents will not find difficulties in the application of e-learning and respondents assume that e-learning can improve learning outcomes.

4.8. Findings on Training Variable

Respondents were asked about the level of training needs of respondents to the e-learning system.

Table 8 Mean score of training variable

Code	Indicator	Score
P01	I need e-learning training.	3,2
P02	My lecturer needs e-learning training.	3,4
P03	My friend needs e-learning training.	3,3
P04	Staff and technician need e-learning training.	3,6
P05	Lack of facilities for implementing e-learning.	3,1

It can be seen in Table 8 that the average score on the P01 indicator (I need e-learning training), P03 (my friends need e-learning training), and P05 (insufficient campus facilities for e-learning) is lower than 3 , 4, indicating that the students felt that they did not need e-learning training and considered that the campus facilities were sufficient to implement e-learning. Instead, respondents assume that lecturers, technical and administrative staff need e-learning training.

4.9. The Result of All Variables

Table 9 Mean score of all variables

Factor	Total of Question	Score
Technology	6	3.1
Experience with ICT	6	3.9
Confidence with ICT	5	4.1
Attitudes towards e-learning	6	3.7
Attitudes towards others	6	3.5
Traditional skills	24	3.4
Institution	3	3.0
Content	4	3.5
Acceptance	8	3.6
Training	5	3.3
Total	73	3.6

Based on Table 9, it can be seen that based on the total average score of the entire variable, yielding an average score higher than 3.4, ie 3.6. It is interpreted that overall, ITS students are ready to implement e-learning. However, it still needs to be improved on certain variables that still have scores lower than 3.4 to improve the e-readiness level so that the application of e-learning can be applied optimally.

Based on the results of the average score of readiness of students in implementing e-learning obtained from Aydin and Tasci assessment model, interpreting that ITS students are ready to implement e-learning, although there are still some indicators that require improvement. This readiness can be seen from the average score obtained higher than 3.4 as the standard score for the implementation of e-learning, which is 3.6.

Based on research variables that affect the readiness of e-learning implementation obtained from Akaslan and Law model, ITS students stated most ready on confidence with ICT variables, which can be concluded that ITS students have high confidence in applying ICT. And ITS students say they are at least ready for the technology variables, which can be concluded that the availability of internet connection in the implementation of e-learning still requires improvement.

5. Conclusion

Comparison of e-readiness average score based on faculty, it can be concluded faculty sequence ranging from faculty which has the highest average e-readiness score to lowest.

Table 10 Readiness Ranking of the Faculties

No	Faculty	Score
1	FTIK	3,8
2	FTK	3,78
3	FMIPA	3,74
4	FTI	3,58
5	FTSP	3,51

This means that the faculty of FTIK is a faculty at ITS which has the highest level of readiness to apply e-learning, and FTSP is the faculty at ITS which has the lowest level of readiness to apply e-learning. Here is the table of the average score of e-readiness among faculty (see Table 10).

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