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Evaluation of User Experience in Integrated Learning Information Systems Using User Experience Questionnaire (UEQ)

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Abstract

Information and Communication Technology (ICT) has a role in assisting in monitoring and evaluating the learning process in schools. Integrated Learning Information System is the application of an integrated information system to improve the quality of academic and learning services accessed by all school members (teachers, homeroom teachers, foundations, and students) and parents/guardians of students. The learning information system focuses on making it easier to monitor and evaluate student academic and learning outcomes. User experience measurement is carried out to determine the extent to which the success of user understanding using the system so that the purpose of using the system can be achieved. This study aims to analyze the user experience of the Integrated Learning Information System using the User Experience Questionnaire (UEQ) method. This study uses quantitative data by distributing online questionnaires to 50 students. The results of the evaluation of user experience on learning information systems using the UEQ method state that attractiveness is 2.121, perspicuity is 2.152, efficiency is 2.319, dependability is 1.505, stimulation is 1.716, and novelty is 1.020. This proves that all aspects have positive values. The benchmark results showed that the attractiveness, perspicuity, efficiency, and stimulation aspects were included in the excellent criteria, while the dependability aspect was included in the good criteria and novelty included in the above average criteria.

Keywords: ICT, Integrated Learning Information System, User Experience, UEQ

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1. INTRODUCTION

Information and Communication Technology (ICT) is any form of technology that can help generate and manipulate, communicate, store, and convey information. ICT is a significant need for school management to improve efficiency and productivity in the learning process. ICT plays a role in monitoring and evaluating the learning process in schools. The school management uses the implementation of monitoring and evaluation of the learning process to support decision-making in improving the quality of learning [1].

Integrated Learning Information System is the application of an integrated information system to improve the quality of academic and learning services accessed by all school members (teachers, homeroom teachers, foundations, and students) and parents/guardians of students. The Integrated Learning Information System focuses on making it easier to monitor and evaluate student academic and learning outcomes. User experience measurement is needed to determine the extent to which the success of user understanding in using information systems so that the purpose of using the system can be achieved. One of the success factors of an information system is that it can provide an experience of convenience and satisfaction for users when using software applications [2][3]. User experience is a statement of feelings or experiences that users get when using software applications [4][5][6]. A user interface that is too complex makes it difficult for users to use it, so it poses a risk of errors in use [7] [8].

This study aims to analyze the user experience of the Integrated Learning Information System using the User Experience Questionnaire (UEQ) method. UEQ is one of the most widely used usability testing measurement methods to evaluate user experience [9]. UEQ aims to obtain a comprehensive and pragmatic impression of usability and experience through a subjective quality assessment survey [7][10]. The measurement of the UEQ method involves attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. UEQ measures technical and non-technical aspects of the user's emotions or perceptions of pleasure. UEQ can be used to perform measurements directly and quickly related to UX [12][13][14].

UEQ can provide comprehensive user experience measurement results related to usability and experience aspects and is equipped with analytical tools in the form of Data Analysis Tools to explain the evaluation results [8] accurately. The results of the UEQ measurement can be used as a reference for improving the quality of the user interface. With the results of the UEQ method, it is possible to make predictions about areas where improvement will have a high impact [15].

2. METHODOLOGY

This research was conducted using the User Experience Questionnaire (UEQ) method through several stages, as shown in Figure 1.

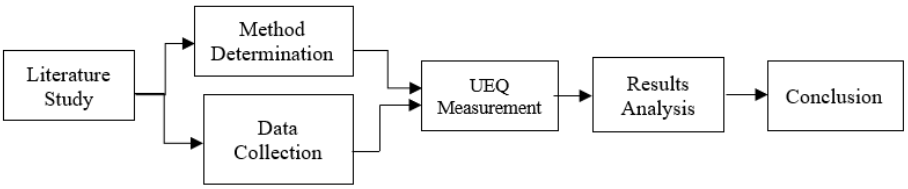

Figure 1. Research Stages

2.1. Literature Study

This research went through the initial stage, namely conducting a literature study on the measurement of usability and experience. Literature study reviews previous research and reference books to obtain theories supporting user experience analysis.

2.2. Method Determination

The next stage in this research is determining the user experience method. Based on the results of the literature study that has been carried out, this study uses the User Experience Questionnaire (UEQ) method to analyze user experience in the Integrated Learning Information System. The study used the UEQ instrument consisting of 26 opposite items measured on a scale of one to seven on each item. The entire UEQ instrument in the study can be seen in Figure 2.

2.3. Data collection

UEQ evaluation is carried out for users of the Integrated Learning Information System. This study uses quantitative data by distributing online questionnaires to 50 students, making the UEQ questionnaire using Google Forms to facilitate the distribution of the questionnaire. The questionnaire contains 26 question points that refer to the UEQ questionnaire instrument.

2.4. Measurement of User Experience Questionnaire (UEQ)

The UEQ method is one of the usability testing measurement methods to obtain a comprehensive and pragmatic impression regarding usability and experience aspects through a subjective quality assessment survey. The evaluation results using the UEQ make it possible to predict areas where improvement will have a high impact. There are six scales with a total of 26 elements that are categorized based on the measurement scales contained in the UEQ:

a. Attractiveness: How much the system attracts users. For example, likes or dislikes.
b. Perspicuity: How much the system provides clarity to users. For example, easy-to-understand or difficult to understand
c. Efficiency: How much the system provides efficiency to the user to complete the task. For example: sooner or later, practical or impractical.
d. Dependability: How much the system provides accuracy to the user in controlling interactions with the system. Examples: predictable or unpredictable, favor or hinder.
e. Stimulation: How much the system motivates users to use the product. For example: useful or less useful, interesting or unattractive.
f. Novelty: How much the system provides users with novelty value. For example: creative or not creative, conservative or innovative.

	1	2	3	4	5	6	7		
annoying	○	○	○	○	○	○	○	conservative	1
not understandable	○	○	○	○	○	○	○	understandable	2
creative	○	○	○	○	○	○	○	dull	3
easy to learn	○	○	○	○	○	○	○	difficult to learn	4
valuable	○	○	○	○	○	○	○	inferior	5
boring	○	○	○	○	○	○	○	exciting	6
not interesting	○	○	○	○	○	○	○	interesting	7
unpredictable	○	○	○	○	○	○	○	predictable	8
fast	○	○	○	○	○	○	○	slow	9
inventive	○	○	○	○	○	○	○	conventional	10
obstructive	○	○	○	○	○	○	○	supportive	11
good	○	○	○	○	○	○	○	bad	12
complicated	○	○	○	○	○	○	○	easy	13
unlikable	○	○	○	○	○	○	○	pleasing	14
usual	○	○	○	○	○	○	○	leading edge	15
unpleasant	○	○	○	○	○	○	○	pleasant	16
secure	○	○	○	○	○	○	○	not secure	17
motivating	○	○	○	○	○	○	○	demotivating	18
meets expectations	○	○	○	○	○	○	○	does not meet expectation	19
inefficient	○	○	○	○	○	○	○	efficient	20
clear	○	○	○	○	○	○	○	confusing	21
impractical	○	○	○	○	○	○	○	practical	22
organized	○	○	○	○	○	○	○	cluttered	23
attractive	○	○	○	○	○	○	○	unattractive	24
friendly	○	○	○	○	○	○	○	unfriendly	25
conservative	○	○	○	○	○	○	○	innovative	26

Figure 2. UEQ Instruments

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3. RESULTS AND DISCUSSION

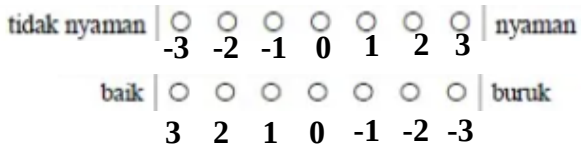
The results and discussion stages explain the data processing from the UEQ questionnaire obtained from all respondents.

3.1. Data Analytics

The UEQ questionnaire data analysis was done using the UEQ Data Analysis Tools. Data analysis produces an average value representing the user's system perception. Respondent data obtained from the questionnaire results were entered in the UEQ Data Analysis Tools. The UEQ Data Analysis Tools has several stages:

1. Data Transformed

Respondent data entered into excel will undergo a data conversion process; namely, the order of values (positive right and negative left) is randomized in the questionnaire to minimize the tendency of answers, as shown in Figure 3.



Gambar 3. Data Convertion

Figure 3 shows the value order process used to minimize the tendency of the answers for each item. The converted data will produce an average value per person with each grouping based on aspects. Here's the formula for the average data conversion:

$$\bar{x} = \frac{\sum \bar{x}\,[person]}{\sum item} \ldots\ldots\ldots\ldots (i)$$

Description:

$\bar{x}$ = individual scale average

$\sum \bar{x}[person]$ = total item scale

$\sum item$ = number of items scale

2. Results UEQ

The result of the average data conversion will be recalculated to get the main result (result). The result is the main result of the UEQ, which is the benchmark for the following calculation, namely the benchmark. The overall scale and assumption

scale are calculated using the average value and variance of the average data conversion results. The determination of the intermediate results of the scale has an expected value of -0.8, and 0.8 is a normal result. The following is the result calculation formula:

$$\bar{x} = \frac{\sum \bar{x}\,[person]}{\sum item} \ldots\ldots\ldots\ldots (i)$$

Description:

$\bar{x}$ = individual scale average

$\sum \bar{x}[person]$ = total item scale

$\sum item$ = number of items scale

3. Set Data Benchmark

UEQ method uses benchmark standards. The benchmark test results are divided into five categories: Bad, Average, Below, Above Average, Good, and Excellent. Values for each category can be seen in Table 1.

Table 1. Category UEQ Data Analysis Tool

No	Aspect	Category				
		Excellent	*Good*	*Above Average*	*Below Average*	*Bad*
1	Attractiveness	>1.75	>1.52	>1.17	>0.7	<=0.7
2	Perspicuity	>1.9	>1.56	>1.08	>0.64	<=0.64
3	Efficiency	>1.78	>1.47	>0.98	>0.54	<=0.54
4	Dependability	>1.65	>1.48	>1.14	>0.78	<=0.78
5	Stimulation	>1.55	>1.31	>0.99	>0.5	<=0.3
6	Novelty	>1.4	>1.05	>0.71	>0.3	<=0.5

The interpretation of each category is:

1) Excellent: the highest score of the product range is 10%,
2) Good: 10% higher score products, while 50% lower,
3) Above Average: 25% higher product dataset, 50% lower,
4) Below Average: 50% higher product dataset, 25% lower,
5) Bad: 25% have a low score

3.2. Results Analysis

The analysis of the results discusses the overall UEQ calculation, which results in the mean, variance, and standard deviation for 26 items. The value of each item

has a range above 1, while the novelty item has a value below 1, which is 0.9. The assessment shows that each question item has a good score.

Based on Figure 3 above, it can be seen that the attractiveness scale produces a positive value with an average of 2.121. These results state that respondents like the Integrated Learning Information System. The perspicuity scale produces a positive value with an average of 2.152. These results indicate that the respondents easily understand the Integrated Learning Information System application. The efficiency scale produces a positive value with an average of 2.319. These results indicate that the Integrated Learning Information System can assist respondents in completing their tasks easily and without unnecessary effort. The dependability scale produces a positive value with an average of 1.505. These results indicate that the Integrated Learning Information System application makes respondents feel they can control the system. The stimulation scale produces a positive value with an average of 1.7.16. These results indicate that applying the Integrated Learning Information System can motivate respondents when using the system. At the same time, the novelty scale produces positive values with an average of 1.020. These results indicate that the Integrated Learning Information System is functioning properly. The full scale will be reprocessed to determine the pragmatic and hedonic qualities. Pragmatic quality consists of perspicuity, efficiency, and dependability. Hedonic consists of stimulation and novelty. Assessment for pragmatic and hedonic can be seen in Table 2.

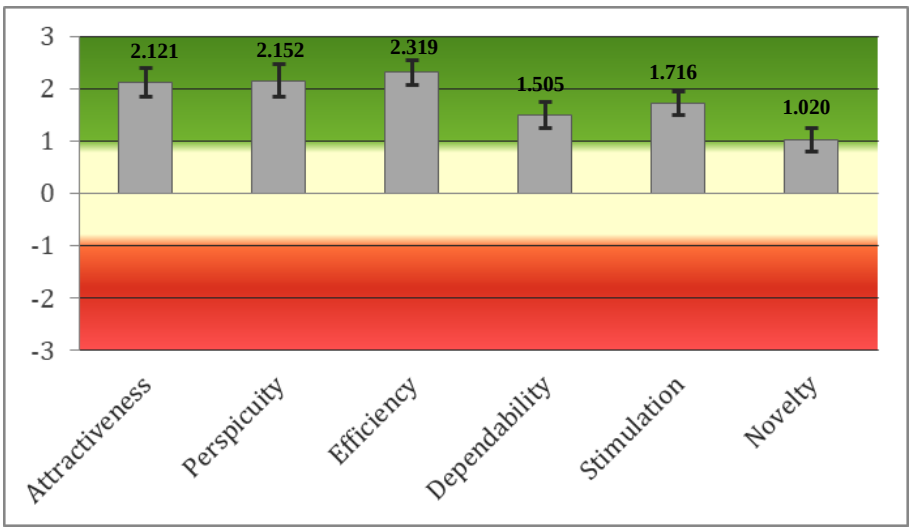


Figure 3. Average graph of impressions of 6 Scales

Table 2. Pragmatic and Hedonic Quality

	UEQ Scale	UX Aspect	UEQ Scale Score
Attractiveness	2.121	Attractiveness	2.121
Pragmatic Quality	1.99	Perspicuity	2.152
		Efficiency	2.319
		Dependability	1.505
Hedonic Quality	1.37	Stimulation	1.716
		Novelty	1.020

Based on the processing results from Table 2, the highest value is Attractiveness, which is 2.121. In the pragmatic quality aspect, the highest value is efficiency, which is 2.319. This shows that the Integrated Learning Information System is an attractive and convenient system for users, and users can complete tasks quickly due to attractiveness and efficiency factors, getting positive scores. The user can control the interaction with the system, which is shown in the aspect of dependability which has a value of 1.505. The perspicuity aspect gets a positive score of 2.152. This shows that the system is easy for users to understand. The test results on the hedonic quality aspect have a value of 1.37. Stimulation and novelty are aspects that enter into hedonic quality. The result of calculating the UEQ value for the stimulation aspect is 1.716. This shows that the Integrated Learning Information System application is useful for users and motivates users to use the system. The UEQ value for the novelty aspect is 1.020, indicating the system design has novelty.

Based on the results of this study, it was found that the evaluation results for all aspects had a positive value, where all UX aspects scored above 0.8. This follows that the impression value between -0.8 and 0.8 is a normal evaluation value, a value > 0.8 is a positive value, and a value < -0.8 is a negative value [6]. Another analysis that will be carried out is a benchmark analysis. The analysis compares this study with similar studies [7].

Table 3. Pragmatic and Hedonic Quality

Scale	Mean	Comparison to benchmark	Interpretation
Attractiveness	2.12	**Excellent**	In the range of the 10% best results
Perspicuity	2.15	**Excellent**	In the range of the 10% best results
Efficiency	2.32	**Excellent**	In the range of the 10% best results
Dependability	1.50	**Good**	10% of results better, 75% of results worse

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Scale	Mean	Comparison to benchmark	Interpretation
Stimulation	1.72	**Excellent**	In the range of the 10% best results
Novelty	1.02	**Above Average**	25% of results better, 50% of results worse

Based on Table 3, it can be seen that the highest rating is on the efficiency scale, and the lowest value is on the novelty scale. Therefore the novelty scale needs to be improved in terms of user experience. The form of the benchmark data set results is then processed into a graphic diagram to make it easier to observe the assessment of each scale. The chart of the results of the benchmark data set can be seen in Figure 4.

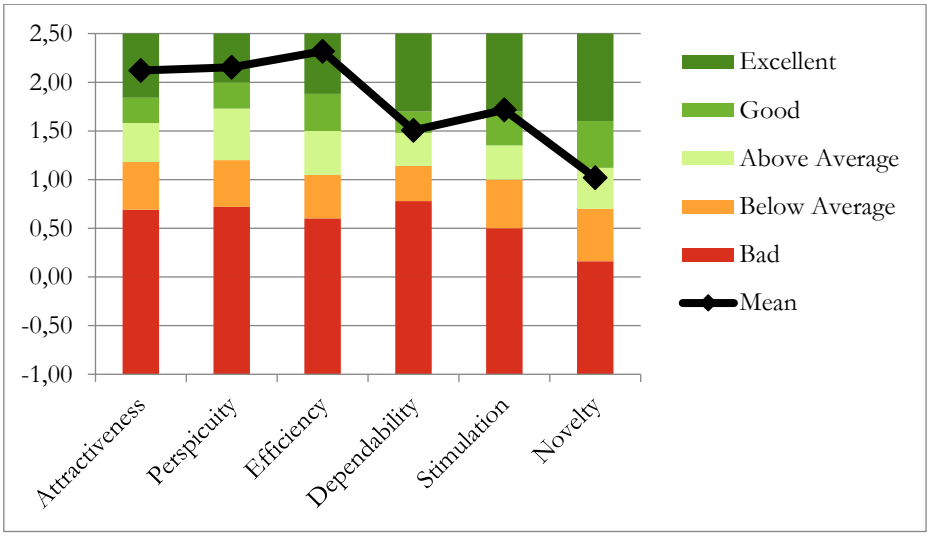

Figure 4. Standard Set Benchmark

Figure 4 shows the standard set of benchmarks where the attractiveness scale gets an average value of 2.12, and then the perspicuity scale gets an average value of 2.15. The efficiency scale gets an average value of 2.32. The dependability scale gets an average value of 1.50. The stimulation scale gets an average value of 1.72, while the novelty scale gets an average value of 1.02. From the benchmark results, it can be seen that all scales have values above the average.

4. CONCLUSION

This study shows the results of the Integrated Learning Information System evaluation, which was carried out using the User Experience Questionnaire (UEQ)

method. The conclusion can be drawn is that the evaluation using UEQ has an attractiveness scale that produces an average value of 2.121. The perspicuity scale produces an average score of 2.152. The efficiency scale produces an average value of 2.319. The dependability scale produces an average value of 1.505. The stimulation scale produces an average value of 1.716, and the novelty scale produces an average value of 1.020. This proves that all aspects have positive values. This proves that all aspects have positive values. The benchmark results showed that the attractiveness, perspicuity, efficiency, and stimulation aspects were included in the excellent criteria, while the dependability aspect was included in the good criteria and novelty included in the above average criteria. In the novelty aspect with a normal impression, attention must be paid to improve it so that the Integrated Learning Information System application in the future becomes better.

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