ANALYSIS OF THE QUALITY OF "ONLINE EQUIVALENT" E-LEARNING USING WEBQUAL 4.0 AND IPA METHODS

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Abstract: The use of e-learning in non-formal education is increasingly important to support the improvement of access to learning, one of which is through the online platform. This study aims to analyze the quality of online services using WebQual 4.0 and Im-portance Performance Analysis (IPA) methods to evaluate the suitability between user expectations and perceptions. The research method used a quantitative approach by distributing questionnaires to active users, then analyzed using the WebQual Index to measure the overall quality of the system as well as the IPA to determine improvement priorities. The results showed that the quality of SeTARA Online was relatively good with a WebQual Index value of 0.798. However, there is still a gap between user expectations and satisfaction with a negative gap value of -0.238. The IPA analysis identified indicators in Quadrant I as priority improvements, especially in the aspects of service interaction and information presentation. These findings underscore the need for continuous development of features and technical support to optimize the user experience. The conclusion of this study suggests that there should be improvements in priority indicators to increase user satisfaction, as well as strengthen the effectiveness of online learning. Advanced research can expand variables, compare with other platforms, and combine quantitative and qualitative analysis methods for more comprehensive results.

Keywords: e-learning; importance performance analysis; quality of service; online equivalent; webqual 4.0

Abstrak: Pemanfaatan e-learning pada pendidikan nonformal semakin penting untuk mendukung pemerataan akses pembelajaran, salah satunya melalui platform seTARA Daring. Penelitian ini bertujuan menganalisis kualitas layanan seTARA Daring dengan metode WebQual 4.0 dan Importance Performance Analysis (IPA) guna mengevaluasi kesesuaian antara harapan dan persepsi pengguna. Metode penelitian menggunakan pendekatan kuantitatif dengan penyebaran kuesioner kepada pengguna aktif, kemudian dianalisis menggunakan WebQual Index untuk mengukur kualitas sistem secara keseluruhan serta IPA untuk menentukan prioritas perbaikan. Hasil penelitian menunjukkan bahwa kualitas seTARA Daring tergolong baik dengan nilai WebQual Index sebesar 0,798. Namun demikian, masih terdapat kesenjangan antara harapan dan kepuasan pengguna dengan nilai gap negatif sebesar -0,238. Analisis IPA mengidentifikasi indikator dalam Kuadran I sebagai prioritas peningkatan, khususnya pada aspek interaksi layanan dan penyajian informasi. Temuan ini menegaskan perlunya pengembangan berkelanjutan pada fitur dan dukungan teknis agar pengalaman pengguna semakin optimal. Simpulan penelitian ini menyarankan adanya perbaikan indikator prioritas untuk meningkatkan kepuasan pengguna, sekaligus memperkuat efektivitas pembelajaran daring. Penelitian lanjutan dapat memperluas variabel, membandingkan dengan platform lain, serta mengombinasikan metode analisis kuantitatif dan kualitatif untuk hasil lebih komprehensif.

Kata kunci: e-learning; importance performance analysis; kualitas layanan; setara daring; webqual 4.0.

INTRODUCTION

The development of information technology has had a significant impact on various aspects of life, including education. One of the important innovations is e-learning that allows the teaching and learning process to take place flexibly without being limited by space and time [1]. However, despite providing many conveniences, the implementation of e-learning still faces various challenges, such as limited interactivity, the quality of the information presented, and technical issues that affect user convenience. In Indonesia, education paths are divided into three, namely formal, non-formal, and informal education[2]. Among the three, non-formal education is considered the most suitable to adopt e-learning because of its flexible nature and oriented to the needs of students[3]. Through the use of e-learning, non-formal educational institutions can increase the accessibility and effectiveness of learning for the community. One of the e-learning platforms used in non-formal education is seTARA Online. This platform is implemented in various Community Learning Activity Centers (PKBM), including PKBM Rini Handayani, to support the equality program of Package A, Package B, and Package C. seTARA Online is here as a solution in providing structured learning services, easy to access, and can be used on various devices[4].

Previous studies have shown that the quality of e-learning significantly affects user satisfaction and learning success. WebQual 4.0 and Importance Performance Analysis (IPA) are commonly used to assess quality and identify improvement priorities; however, specific research on the quality of online services remains limited. [5]. There is a need for more in-depth studies combining WebQual 4.0 and IPA to provide a comprehensive evaluation of e-learning quality. Introduced by Martilla & James (1977), IPA has been widely applied to identify priority improvements by analyzing the gap between user expectations and actual performance in e-learning systems[6].

This study aims to analyze the quality of e-learning services such as online seTARA using WebQual 4.0 and IPA methods, with the expectation of providing practical recommendations to improve service quality in order to meet user expectations and enhance the effectiveness of non-formal learning in Indonesia.

METHOD

Figure 1. Research Flow

Problem Identification

This stage includes assessing the research background and identifying problems found in the field through interviews with e-learning users[7].

Literature Review

In the second stage, a literature study is carried out to obtain references and research bases that include relevant theories, concepts, and methods, so that it can build a logical and structured framework of thinking in the preparation of this research[7]

Research Design

At this stage, research design is carried out which includes determining methods, variables, and sample selection. This study uses a quantitative approach, with measurement and quality analysis.

Data Collection

Data collection was carried out through the distribution of questionnaires compiled using Google Forms. The data obtained came from the results of filling out questionnaires by students and educators at PKBM Rini Handayani. The research sample consisted of 195 respondents from the total population of e-learning users at PKBM Rini Handayani which amounted to 338 people. The sample count is determined by the Slovin formula with margin of error by 5%[7] [8]. The following is a description of the sample calculation with the formula Slovenia:

$$n = \frac{N}{1 + N.e^2} \tag{1}$$

$$n = \frac{380}{1 + 380.\,0{,}05^2}$$
$$n = 194{,}871 = 195$$

Means:

n: Lots of Samples

N: A lot of people

e: Desired error rate ("margin of error")

Analysis and Results

This stage discusses, explains the results of the analysis of research findings obtained from previous data processing. Some of the aspects analyzed in this study include respondent profile, validity test, reliability test, paired sample t-test, WebQual Index analysis, gap analysis and determination of improvement priorities using the IPA method[9]

Questionnaire Creation

At this stage, a questionnaire was prepared based on the WebQual 4.0 method instruments, including the as-pects of "usability, information quality, and ser-vice interaction quality".

From each question indicator, there are 2 sub-questions to be catego-rized as users' interests or expectations for e-learning and user perceptions or performance of e-learning.

Table 1. Table of sub questions

Sub Questions of Each Question Indicator	
Interests/Expectations	Perception/Performance
How important is that statement to you	Does the statement match how you feel

Validity Test

The test is to ensure that the details of the instrument can really measure the aspect to be examined.

In this study, the analysis product moment Performed during the validity test, the value of R is calculated com-pared to the R of the table at the degree of freedom df = n-2 with a significance level of 5%[10]. Each indicator on the instrument has a valid value if the calcu-lated r value is more than the r of the ta-ble.

Reliability Test

The research instrument can be trusted and consistent if a reliability test is carried out. A measuring instrument is considered reliable if it can be reused to measure the condition or characteristics of twins and the results are stable [11].

Empirically, the reliability of an instrument is indicated by the value of the reliability coefficient. The increase in the alpha value or towards the value of 1, the greater the level of reliability. The reliability categories based on alpha val-ues are shown in the following table: [11].

Uji Paired Sample t-Test

The average difference between the two related samples is known by per-forming the test"Paired Sample t-Test" [12]. In this study, two interrelated data

are data from the interests or expectations of the user e-learning Online and data from the perception or performance of services.

Two paired samples were considered to have no significant difference if the probability value or Sig. (2-tailed) was greater than 0.05. On the other hand, if the value of Sig. (2-tailed) is less than 0.05, then the two samples are declared to have a significant difference.

Gap Analysis

Gap analysis (gap analysis) is obtained by calculating the average of each variable instrument based on the level of interest of the user and the user's perception of the performance of the service[13].

The value of the gap between the user's interests and the user's perception of the service performance is calculated using the formula:

Gap = Perception Score (P) – Expectation Score (I).

If the result is positive (+), then the performance and quality of service are categorized as good. On the other hand, if it has a negative value (–), then the performance and quality of the service are considered poor.[13].

Webqual Index (WQI)

WebQual Index is used to set standards (benchmark) e-learning as a whole by comparing users' perceptions of e-learning performance with their expectations.

According to Barnes and Vigen, to determine the Webqual Index, there are several stages that need to be done, including calculating mean of importance (MOI), then calculate maximum score-count weight score, and counting webqual index (WQI)[13].

Account Mean of Importance (MoI)

MoI is obtained from the average score of user interest or expectations on each indicator measured. The Mean of Importance formula is as follows:

$$MoI = \frac{\sum X}{N} \qquad (2)$$

Information:

X = The importance score assigned by each respondent to an attribute.

N = Total number of respondents

Calculation of Maximum Score

This stage is carried out by calculating the highest score from the results of the importance level assessment based on the scale used. The maximum score formula is:

$$Maximum\ Score = MoI \times n \qquad (3)$$

Information:

n = maximum value used[9]

Account Weight Score (Wgt. Score)

The next stage is to find the average of the results of comparing the real value and the value of the user's desire for service quality. The formula is as follows[9]:

$$Weihted\ Score = Mean\ \sum(I \times P)\ (4)$$

Information[9]:

I = The scale value that the respondent gave to the statement

P = Rating given by respondents for website quality

Calculation (WQI)[9]

This method is to find the value of the web page's service quality analysis. The formula is:

$$WQI = \sum \frac{Weighted\ Score}{Maximum\ Score} \qquad (5)$$

Then the results of the WQI calculation can be determined the quality of the web page service with the interval scale in table 4[9]:

Importace-Performance Analysis (IPA)

Importance Performance Analysis (IPA) is a technique used to identify ser-

vice attributes that need to be improved based on importance and performance. In the context of website evaluation, IPAs help determine areas that need improvement to improve user satisfaction[9].

There are stages in the use of the Impotance-Performance Analysis (IPA) is weighting, looking for the average of each attribute, then measuring the results of conformity[14].

Weighting

This weight is placed on the choice of answers on the questionnaire. The weight value was obtained from the results of the questionnaire, where the value with weight was given a value on a scale of 1: 1, 2 : 2, 3 : 3, 4 : 4, 5 : 5[14].

Find the average of each attribute

In mapping the cartesian diagram, the average of the special attributes x and y is searched by subtracting the value of the initial calculation. The formula is:

$$\overline{X} = \frac{\sum Xi}{n} \quad (6)$$

$$\overline{Y} = \frac{\sum Yi}{n} \quad (7)$$

Information:
$\overline{X}$ = average performance
$\overline{Y}$ = average Importance
n = Number of respondents
Measuring Conformity Results

The level of conformity is measured looking at the value of importance and performance value with the aim of correcting the extent to which the quality of service provided has met the expectations of users. The formula is as follows:
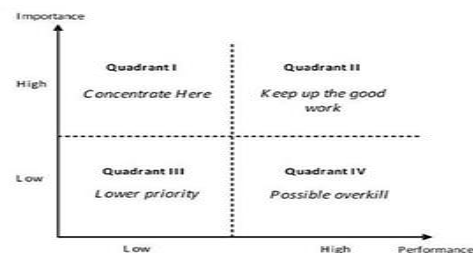
$$Tki = \frac{Xi}{Yi} \times 100\% \quad (8)$$

Information:
Tki = Respondent's level of suitability
Xi = Performance appraisal score
Yi = Expectation assessment score

Source: (Roeke & Nurlela, 2023)
Figure2. Diagram Kartesius

RESULTS AND DISCUSSION
Demographic Analysis

At this stage, an analysis of the number of users was carried out based on the profile of e-learning users like TARA Online. The following is the percentage (%) of respondents with various categories.

Table 3. Demographic Analysis by Gender

Gender		
	Percentage	Number of Respondents
Man	65%	107
Woman	45%	88

Table 4. Demographic Analysis Based on Education Level

Education Level		
	Percentage	Number of Respondents
Package A (SD)	41%	81
Package B (SMP)	25%	48
Package C (SMA)	34%	66

Table 5. Demographic Analysis Based on Respondent Status

Status Responden		
	Percentage	Number of Respondents
Peseta Didik	41%	81
Educators/teachers	25%	48

Table 6. Demographic Analysis Based on Classes Taken by Pesrta Didik/Taught by Teachers

Education Classes		
	Percentage	Number of Respondents
Grade 4	17%	32
Grade 5	22%	43

Grade 6	3%	6
Grade 7	6%	12
Grade 8	10%	20
Grade 9	8%	16
Grade 10	8%	16
Grade 11	10%	19
Grade 12	16%	31

Reliability Test

It was found that the Cronbach's Alpha value reflects the reliability of the indicators used in the research question-naire.

Table 7. Reliability Test Table

Reliability Statistics		
	Cronbach's Alpha	N of Items
Performance	.941	17
Importance	.945	17

According to Ghozali, in his study, a research instrument is said to be reliable if the Cronbach Alpha value > 0.06. The results of both samples showed a value of Cronbach's Alpha > 0.06, this can be concluded that the instrument used is reliable[15].

Validity Test

The results of the calculation of r calculated from perception (P) and Expectations (H) and the results of the table r from the data produced are as follows:

Table 8. Validity Test Table

No	Variabel	r Calculate (P)	r Count (H)	r Table	Ket. (P)	Ket. (H)
1	USQ1	0.577	0.747	0.140562	Valid	Valid
2	USQ2	0.718	0.765	0.140562	Valid	Valid
3	USQ3	0.655	0.534	0.140562	Valid	Valid
4	USQ4	0.668	0.767	0.140562	Valid	Valid
5	USQ5	0.687	0.760	0.140562	Valid	Valid
6	USQ6	0.777	0.770	0.140562	Valid	Valid
7	IFQ1	0.754	0.806	0.140562	Valid	Valid
8	IFQ2	0.755	0.753	0.140562	Valid	Valid
9	IFQ3	0.715	0.821	0.140562	Valid	Valid
10	IFQ4	0.793	0.812	0.140562	Valid	Valid
11	IFQ5	0.670	0.772	0.140562	Valid	Valid
12	SIQ1	0.713	0.678	0.140562	Valid	Valid
13	SIQ2	0.738	0.830	0.140562	Valid	Valid
14	SIQ3	0.757	0.762	0.140562	Valid	Valid
15	SIQ4	0.676	0.762	0.140562	Valid	Valid
16	SIQ5	0.801	0.804	0.140562	Valid	Valid
17	SIQ6	0.743	0.811	0.140562	Valid	Valid

Based on Table 8, it is known that the value of r is calculated > r table, this shows that the instrument used for the assessment of perception and expectation is valid.

Webqual Index (WQI) Analysis

Table 9. Webqual Index (WQI) Analysis Table

Indicator Code	Average (Performance)	ME	Max.Score	Wgt.Score	WQI	Total WQI
USQ1	4.026	4.323	21.615	17.403	0.805	
USQ2	3.928	4.215	21.077	16.559	0.786	
USQ3	3.913	4.000	20.000	15.651	0.783	
USQ4	4.138	4.236	21.179	17.530	0.828	
USQ5	3.897	4.133	20.667	16.109	0.779	
USQ6	4.051	4.303	21.513	17.431	0.810	
IFQ1	3.887	4.200	21.000	16.326	0.777	
IFQ2	4.010	4.226	21.128	16.946	0.802	
IFQ3	3.949	4.251	21.256	16.787	0.790	0.798
IFQ4	4.133	4.333	21.667	17.911	0.827	
IFQ5	3.923	4.128	20.641	16.195	0.785	
SIQ1	3.969	4.149	20.744	16.467	0.794	
SIQ2	4.082	4.297	21.487	17.542	0.816	
SIQ3	3.990	4.231	21.154	16.880	0.798	
SIQ4	3.862	4.287	21.436	16.555	0.772	
SIQ5	3.979	4.236	21.179	16.857	0.796	
SIQ6	4.062	4.297	21.487	17.454	0.812	
Total			359.231	286.605		

The results of the Webqual index (WQI) calculation were obtained with a total value of 0.798 where according to Barnes and Vudgen in their study it was stated that the value was included in the good category[15].

Uji Paired Simple t-Test

It was found that the results of the comparison of respondents' assessments in each indicator were based on user expectations for the performance of the online seTARA service. The results can be seen in the significance two-side p (Sig.(2-tailed) which is shown in the following table 10. Based on Table 10, it can be seen that the value of Sig. 2-tailed is < 0.05, so it can be said that there is a significant difference between the two values.

Table 10. Tabel Uji Paired Sample t-Test

Paired Samples Test		
Pair		Sig.(2-tailed)
K_USQ1	H_USQ1	<,001
K_USQ2	H_USQ2	<,001

|		
K_USQ3	H_USQ3	.116
K_USQ4	H_USQ4	.056
K_USQ5	H_USQ5	<,001
K_USQ6	H_USQ6	<,001
K_IFQ1	H_IFQ1	<,001
K_IFQ2	H_IFQ2	<,001
K_IFQ3	H_IFQ3	<,001
K_IFQ4	H_IFQ4	<,001
K_IFQ5	H_IFQ5	<,001
K_SIQ1	H_SIQ1	<,001
K_SIQ2	H_SIQ2	<,001
K_SIQ3	H_SIQ3	<,001
K_SIQ4	H_SIQ4	<,001
K_SIQ5	H_SIQ5	<,001
K_SIQ6	H_SIQ6	<,001

Gap Analysis

The results of the gap calculation on each indicator show a negative value. The average gap in the usability dimension is -0.209, in the information dimension is -0.247, while in the service interaction dimension is -0.259. Overall, the average gap value is -0.238. These findings indicate a significant difference between the level of expectations and user perceptions of platforms like TARA Online.

Table 10. Gap Analysis Table

Question Code	Average Performance	Average Expectations	Gap Average
USQ1	4.026	4.323	-0.297
USQ2	3.928	4.215	-0.287
USQ3	3.913	4.000	-0.087
USQ4	4.138	4.236	-0.097
USQ average	3.992	4.202	-0.236
IFQ1	3.887	4.200	-0.313
IFQ2	4.010	4.226	-0.215
IFQ3	3.949	4.251	-0.303
IFQ4	4.133	4.333	-0.200
IFQ5	3.923	4.128	-0.205
IFQ Average	3.969	4.228	-0.247
SIQ1	3.969	4.149	-0.179
SIQ2	4.082	4.297	-0.215
SIQ3	3.990	4.231	-0.241
SIQ4	3.862	4.287	-0.426
Average SIQ	3.969	4.228	-0.247
Average of all indicators			-0.238

Importance-Performance Analysis (IPA)
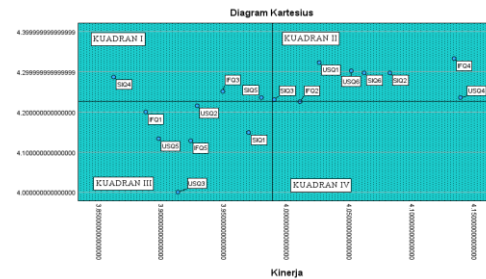
Picture 2. Diagram Kartesius

Based on the results of the analysis of the IPA quadrant, the indicators that need to be prioritized to be improved are in Quadrant I, which is a condition where user expectations are high but the level of satisfaction felt is still low.

CONCLUSION

The results of the study indicate that the quality of seTARA's online e-learning is generally considered good, with a WebQual Index value of 0.798, although there is a negative gap of -0.238 between user expectations and satisfaction. Indicators in Quadrant I are prioritized for improvement, particularly those related to service interaction and information presentation. Continuous feature development and improved technical support are considered important to increase satisfaction and learning effectiveness. Further research is recommended by expanding variables such as learning satisfaction, motivation, or effectiveness, using other analytical methods (e.g., TAM, UTAUT, SERVQUAL), conducting comparisons with other e-learning platforms, and adding a qualitative approach and a wider scope of respondents.

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