

# Beta Testing Techniques in Non-Functional Testing of Gamified Learning Applications for Lecture Learning Media During the Covid-19 Pandemic

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## Abstract

The Covid-19 pandemic has changed lecture procedures and habits. Lecturers and students must get used to carrying out lectures online. Initial observations made by researchers on the use of e-learning turned out to have several obstacles. The biggest obstacle lies in student learning motivation and lecture activities. The solution to this problem is to build a gamified learning application (e-learning combined with game elements). The use of gamification can have a positive effect and can increase understanding and motivation in learning activities. The focus on this writing is not on the process of designing and building the application but on the process of testing a gamified learning application that has been built. The test model carried out is non-functional testing using beta testing techniques. Beta testing is done by distributing questionnaires to users to provide an assessment of their experience in interacting with the application. The purpose of this study is to determine the level of usefulness of the application whether it has been successfully felt by users during interactions on this application. There are five assessment components using five Linkert scales with thirty-five respondents. From the results of the assessment, a percentage of value of 87% was obtained with good categories in the aspects of usefulness, ease of use, ease of learning and satisfaction.

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## 1 Introduction

The evolution of a sophistication of information and communication technology will continue to develop over time. There are many positive impacts that can be utilized related to the evolution of technology today, especially in the field of education. Strengthened again by the existence of extraordinary events that spread throughout the world, namely Corona Virus Disease 2019 (Covid-19) has had a tremendous impact on various aspects of life, including the field of education (Herliandry et al., 2020).

This event forces to immediately adapt everything related to the learning process, this is because all forms of learning process are carried out online or online (Sagirani et al., 2020). From this event, many innovations in the world of education have emerged, especially matters related to learning media (Khotimah, 2021). The transformation of a learning media is also increasingly innovative not only one way but can be done in two directions or commonly known as interactive learning. Interactive is a process to provide students with an understanding of the material in a learning environment by utilizing a computer (Ramansyah, 2016) (Khasanah et al., 2019).

The Covid-19 pandemic has changed lecture procedures and habits. Lecturers and students must get used to carrying out lectures online. This certainly does not go smoothly; gadget problems and internet quotas are often used as scapegoats for the delay in the lecture process. The efforts made include providing e-learning and teleconference lectures so that lectures are still held.

But these efforts have not been optimal. Initial observations made by researchers on the use of e-learning turned out to have several obstacles. The biggest obstacle lies in student learning motivation and lecture activities (Khasanah et al., 2020). Students replied that they only carry out lecture obligations such as reading the material at a glance or simply uploading it. If there is a question exercise, the majority of students only do one exercise with a limited number of questions. The limitation of this problem is due to the limited time of lecturers in making it.

In teleconference lectures, too. Students admitted that they only joined the teleconference room and then most of them turned off their cameras on the grounds of saving quota, and the lecturer did not know whether the student was listening carefully or doing anything else. This certainly makes it difficult for lecturers to measure how much student activity is in attending lectures.

The solution to this problem is to build a gamified learning application (e-learning combined with game elements). Gamification is a new and good approach to be applied in a learning process. The use of gamification can have a positive effect and can increase understanding and motivation in learning activities (Hamdan, A., Hidayat, W.N., & Suswanto, 2020) (Handayani et al., 2020). Gamification can be interpreted as "the use of game element design to motivate users in a non-gaming context". Gamification integrates game elements into software applications to improve user experience and user engagement rates. Game elements in gamification include points, levels, challenges, badges, leaderboards, progress bars, feedback, and avatars. The most widely used game elements in e-learning are points (75%), badges (68%), leaderboards (63%), and levels (38%) (Alomari et al., 2019). With these technological innovations and new interaction patterns, User Interface (UI) and User Experience (UX) are becoming increasingly important and changing user expectations and demands. In the context of e-learning, poor UI and UX can affect students' attitudes towards e-learning (Handayani et al., 2020).

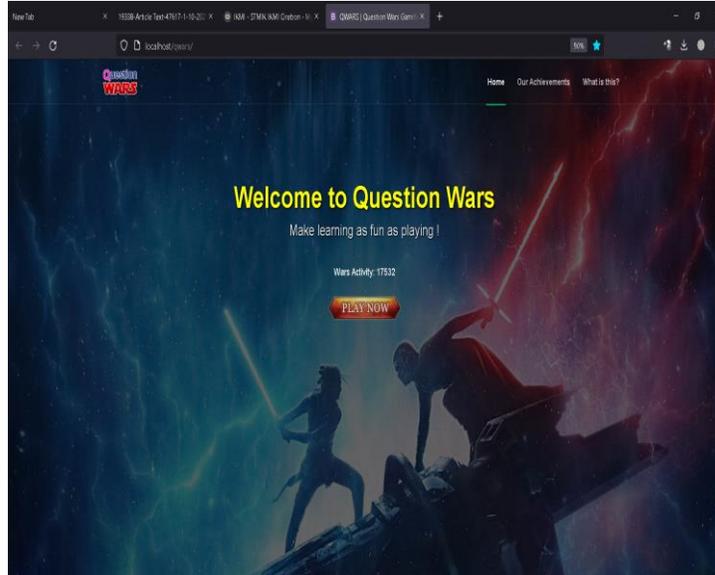


Figure 1: Home View Gamified Learning Design

Source: Research Results (2022)

The focus on this writing is not on the process of designing and building the application but on the process of testing a gamified learning application that has been built. The test model carried out is non-functional testing using beta testing techniques. Beta testing was conducted by distributing a questionnaire to users to provide an assessment of their experience in interacting with the application (Rahadi, 2014) (Khasanah et al., 2018). The purpose of this study is to determine the level of usefulness of the application based on the user experience from the aspects of usefulness, ease of use, ease of learning and satisfaction during interaction.

## 2 Method

The flow of research carried out in conducting non-functional testing with beta techniques on gamified learning applications in online lectures during the COVID-19 pandemic is shown in the following figure.

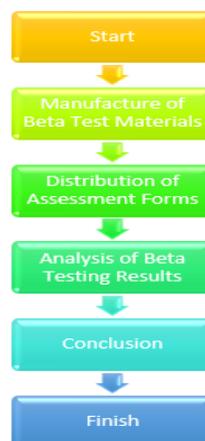


Figure 2: Research Flow

Source: Research Results (2022)

The stage of making beta tests the activities carried out make an assessment component to test the gamified learning application. Beta testing is part of non-functional testing (Waqar, 2020). Beta testing was conducted by disseminating surveys to respondents. The likert scale is designed to give respondents a different response rate for each question included in the survey (Rahadi, 2014).

Table 1: Linkert Scale

Variable	Scale
Strongly Agree (SA)	5
Agree (A)	4
Neutral (N)	3
Disagree (D)	2
Strongly Disagree (SD)	1

Source: Research Results (2022)

After the test, the next step is to analyze the test results. To test the beta analysis method, the survey results are calculated from the questions filled out by the respondents. The survey is calculated using the following formula:

$$Y = \frac{X}{Ideal\ Score} \times 100\% \tag{i}$$

$$X = \Sigma(N \times R) \tag{ii}$$

$$Ideal\ Score = highest\ linkert\ value \times number\ of\ respondents \tag{iii}$$

Information:

Y = percentage value searched

X = sum of the results of the multiplication of the value of each answer with the respondent

N = the value of each answer

R = number of respondents

Then after the analysis of the beta test results is carried out, conclusions can be drawn on the gamified learning application made.

### 3 Result and Discussion

This section will discuss the results of research from the results of non-functional testing on gamified learning applications as one of the learning media that began to be widely used during the Covid-19 Pandemic. Beta techniques are the approach used in testing this application.

In the initial stage of beta testing carried out, it is to collect assessment component materials that will be assessed by respondents. There are five components of assessment made, from components covering aspects of usefulness, ease of use, ease of learning and satisfaction. These aspects need to be studied to find out the respondent's experience while interacting with the application. Table 2 presents the beta test components used in the study.

Table 2: Beta Testing Components

No	Question	1	2	3	4	5
1	This app helps to be more productive					
2	The app is very easy to use					
3	The app is user friendly					
4	The app can be learned quickly					
5	The app is a lot of fun to use					

Source: Data Processing Results (2022)

The assessment component created is then distributed to each respondent of the gamified learning application user. Respondents of this application are students from one of the courses whose implementation of learning is carried out online, therefore it is necessary to use this application to support learning activities. And from the user's experience of the application that has been designed, it is necessary to review this application. Of the five components, respondents are required to give an assessment in each question item using the likert scale.

After the beta test assessment component is completed, the respondents will then analyze the results. Analysis of the results used to determine the percentage value in the five components of the assessment using equations (1) and equations (2). The calculation process is exemplified in Table 3 for the first assessment component on testing with beta techniques.

Table 3. First Component Percentage Value

Question	Scale (N)	Variable	Respondent	X=NxR
This app helps to be more productive	1	SD	0	X=1x0=0
	2	D	0	X=2x0=0
	3	N	11	X=3x11=33
	4	A	11	X=4x11=44
	5	SA	13	X=5x13=65
Total			35	142

Source: Data Processing Results (2022)

The ideal score is obtained from the result of the multiplication of the highest value of the linkert scale multiplied by the number of respondents according to the equation (iii). From the calculation results of the ideal score value obtained  $5 \times 35 = 175$ . The percentage value for the first assessment component can be calculated using equation (i) as follows:

$$Y = \frac{142}{175} \times 100\% \qquad Y = 81\%$$

The same calculation is used also in calculating each of the components of the assessment. The following table presents the results of the percentage of values in each component of the assessment.

Table 4. Beta Technique Testing Results

Question	Percentage
1	81%
2	92%
3	91%
4	89%
5	84%
Average	87%

Source: Data Processing Results (2022)

As for the standard category of assessment of a software based on average values, namely good classification with a value range of 76% - 100%, a fairly good classification with a value range of 56% - 75%, a poor classification with a value range of 40% - 55% and an unfavorable classification with a value range of less than 40% (Khasanah & Herlawati, 2021). Based on the test results of the gamified learning application which was built as one of the innovations in learning media at the lecture level during the Covid-19 pandemic, an average percentage of 87% was obtained. The results of the study can be concluded that the application is included in the category both in the aspects of usefulness, ease of use, ease of learning and satisfaction.

## 4 Conclusion

Non-functional testing was performed using beta test techniques. Testing was carried out on the gamified learning application which is a learning suggestion during the Covid-19 pandemic. The beta testing technique begins with the creation of an assessment component to assess the user's experience in interacting with the application from the aspects of usefulness, ease of use, ease of learning and satisfaction. There are five assessment components using five linkert scales with thirty-five respondents. From the results of the assessment, a percentage of value of 87% was obtained with a good category.

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