Development of Online System-Based Learning Evaluation Instrument Using Kahoot Application in Immune System Topic

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Abstract: This research is classified as developmental research that aims to determine (1) validity, (2) practicality, (3) effectiveness. This research is a 4-D model development research. The subjects of this research are students of class XI of SMA Negeri 2 Gorontalo in the 2021/2022 academic year. The data collection techniques used are instrument, response questionnaire, and test. The findings indicate that the avaluation instrument developed can be used in the learning process, and it is observable from the percentage of validation result, namely, validation from material expert for 95.5%, evaluation tool expert for 86.6%, application expert for 94.0%, and practitioner for 95.0% with a very feasible category. Additionally, the practicality of the evaluation instrument is noticeable from the implementation of teacher activities, student activities, and student responses, which are 100%, 91.5%, and 92.0% respectively, with very good categories. In addition, the effectiveness of evaluation instrument can be identified from the result of analysis of learning outcomes using t-test and N-Gain score. The t-test Sig. (2-failed) of 0.000 indicates the existence of significant difference while the N-Gain score with a value of 0.66 is in the medium category. Thus, the evaluation instrument developed using Kahoot application is feasible and can be used in Biology learning for immune system topic for class XI students of SMA Negeri 2 Gorontalo.

Keywords: Evaluation instrument; Kahoot Application; Immune System

Introduction

Education is one of the most important factors for humans in the growth of science and technology. Education is also important to improve one's qualities and abilities. The role of education is to grow and develop the potential that already exists in humans through teaching and learning activities. According to Fauzan (2019) the position of teachers is very important in education to educate their students.

To realize a good and advanced education, it is necessary to improve the learning process and evaluate quality learning, the success rate is not only in the educational process, but can also be seen from the results of learning evaluation. Learning evaluation is an activity carried out in a series of stages of a good teaching and learning process. According to Huljannah (2021) evaluation is an important thing that must be done

correctly in addition to the learning process, because with evaluation a teacher can obtain valid data about the abilities of his students. Learning evaluation activities must be carried out in a planned and interrelated manner between supporting factors for education, so that it can function as a tool to find out the extent of the effectiveness of the implementation of teaching and learning in order to achieve the goals set by the teacher.

The development of an online-based evaluation instrument system is very necessary in Biology learning because it is considered capable of providing different variations and has the advantages of several features including long processing time and automatic proofreading so that teachers no longer need to correct manually. Currently, games can be used as a tool to evaluate a learning process. One of the games that can be used to evaluate learning to be more interesting and fun for students is the Kahoot application.

The Kahoot application is an online application that contains questions or quizzes that can be developed into a game to evaluate learning outcomes. By using the Kahoot application, students will be on time in doing problems and do not feel bored / saturated. In addition, the Kahoot application can also make it easier for teachers to evaluate the end of learning because there is no need to correct students' answers anymore.

Based on the results of preliminary observations made with one of the teachers of Biology subject class XI SMA Negeri 2 Gorontalo, the immune system material is material that is quite closely related to daily life and is related to the current condition of students. However, many students still do not understand this material because when learning takes place online, many students are less active and do not pay attention to the teacher's explanation. The results of the evaluation of students revealed that they had not met the Maximum Graduation Criteria, of the total number of students as many as 33 people who met the Maximum Graduation Criteria only 65%. The evaluation tools used are still conventional (using paper), but some are sent by teachers via google classroom or whatsApp. Students will work on it in their respective homes and will then be delivered to school. However, the fact that many students are late in collecting the evaluation results and some even do not do it at all. In addition, teachers still need a long time to correct the evaluation results of students. Not only that, many students have the same answer because they cheat or exchange answers so that teachers find it difficult to ascertain whether it is the result of the student's own work or the work of others, in this case including parents.

Based on the study above, it is very interesting for researchers to hold a study with the title "Development of Online System-Based Learning Evaluation Instruments Using the Kahoot Application on Body Defense System Material Class XI SMA Negeri 2 Gorontalo" in the hope of increasing the practicality of the evaluation process in learning.

Method

This research was carried out in the even semester of the 2021/2022 school year located at SMA Negeri 2 Gorontalo with product trial subjects in class XI. Researchers will take a type 4-D development model that has been adapted by Bito where it has been limited to only the Development stage to be a reference. Because the results of this study were not disseminated in other schools, but only in the schools where the research was conducted, so the Dissemination stage was not used.

Data collection in the research on the development of this evaluation instrument is carried out in several ways, namely validation, questionnaires of student responses, and tests of student learning outcomes.

Validity

This validity analysis is used to assess aspects related to the quality of the evaluation instruments developed including: the feasibility of content, language and display. Based on the data obtained from the validation sheet by the validator, its validity is calculated using the Likert scale calculation.

Table 1. Likert Scale Criteria

Valuation	Score
Very Valid	5
Valid	4
Valid Enough	3
Less Valid	2
Invalid	1

Calculate the percentage of eligibility by using the Formula 1.

$$\text{Eligibility Percentage} = \frac{total\ validation\ score}{maximum\ score} \times 100\% \quad (1)$$

The results of the validation sheet analysis are used to determine the feasibility of the evaluation instrument based on the validity of the evaluation tool, the interpretation of the score based on the calculation results using the Formula 1.

Table 2. Interpretation of Validation Scores by Validators

Criterion	Percentage (%)
Very Worthy	81-100
Proper	71-80
Decent Enough	56-70
Less Viable	41-55
Not Worth It	<40

The evaluation tool is said to be good if the interpretation of the validation sheet score from the validator reaches a percentage of ≥ 71% in terms of the validity of the evaluation tool.

Practicality
Analysis of the Implementation of Teacher Activities

This analysis is used to assess the implementation of learning in accordance with the criteria made. Observations use the answers "YES" or "NO". The assessment guidelines refer to the Guttman scale.

Table 3. Guttman Scale Criteria

Answer	Score
Yes	1
Not	0

The data obtained are analyzed using the Formula 2.

$$\text{Percentage (P)} = \frac{Number\ of\ Answers\ Score\ "YES"}{The\ Many\ Aspects\ to\ Observe} \times 100\% \quad (2)$$

The results of the calculation of the implementation of teacher activities in the following Table 4.

Table 4. Interpretation of Teacher Activity Implementation Score

Criterion	Percentage (%)
Excellent	P ≥ 90
Good	80 ≤ P < 90
Enough	70 ≤ P < 80
Less	60 ≤ P < 70
Very lacking	P ≤ 60

Analysis of Student Activities

Analysis of student activities can be known from the results of observations of overall learners according to the number of students that have been determined. To calculate learner activity using the Formula 3.

$$\text{Percentage} = \frac{The\ value\ of\ the\ student's\ answer\ score}{maximum\ score} \times 100\% \quad (3)$$

The results of the calculation of student activities in table 5.

Table 5. Interpretation of Learner Activity

Criterion	Percentage (%)
Very Worthy	81-100
Proper	71-80
Decent Enough	56-70
Less Viable	41-55
Not Worth It	<40

Student Response Questionnaire

During the limited trial, students were given a questionnaire to find out the response of the students. The results of the student response questionnaire were analyzed using the following Formula 4:

$$\text{Percentage} = \frac{The\ value\ of\ the\ student's\ answer\ score}{maximum\ score} \times 100\% \quad (4)$$

The calculation results of the student response questionnaire are percentaged as in the following Table 6.

Table 6. Interpretation of Learner Questionnaire Scores

Criterion	Percentage (%)
Very Worthy	81-100
Proper	71-80
Decent Enough	56-70
Less Viable	41-55
Not Worth It	<40

Effectiveness Test Analysis

To see the learning outcomes of students, the N-Gain (Normality gain) formula is used as follows:

$$\text{N-Gain} = \frac{posttest\ score - pretest\ score}{max\ score - pretest\ score} \quad (5)$$

Table 7. Interpretation of N-Gain Scores

Value	Criterion
g > 0.7	High
0.3 < g < 0.7	Keep
g < 0.3	Low

Results and Discussion

Based on the results of the research obtained, namely the development of an online-based evaluation instrument system using the Kahoot application on the body defense system material which will be discussed based on the research objectives, namely the validity of the evaluation instrument, the practicality of the evaluation instrument and the effectiveness of the evaluation instrument developed using the Kahoot application.

Validity

Validation of the evaluation instrument is carried out using a checklist (√) in the form of a questionnaire by several validators, namely material expert validators, evaluation tool expert validators, application expert validators, and practitioner validators in this case biology teachers.

Table 8. Validators' Assessment of Evaluation Instruments Using the Kahoot App

| Validators	%	Criterion
Material Expert	95.5	Very Worthy
Expert Evaluation Tools	86.6	Very Worthy
Application Expert	94.0	Very Worthy
Biology Teacher	95.0	Very Worthy
Average	93.0	Very Worthy

The results of the validation of the evaluation instrument carried out by three validators obtained material validation data getting a value of 95.5%, validation of the evaluation tool getting a value of 86.6%, validation of the Kahoot application as an evaluation instrument got a value of 94% and validation practitioners got a value of 95%. Then the percentage of this validation value falls into the range of values of 81-100%, if interpreted to be in the very feasible category. A valid product is a product that can help the learning process and is suitable for use by students and teachers. The validation results are in line with the results of research that has been carried out by Damayanti and Dewi (2021) with the title "development of the Kahoot application as a medium for evaluating student learning outcomes" with an average score of 81.3% with valid information and suitable for use in learning. Based on the validation results, the evaluation instrument developed using the Kahoot application has met the criteria and can be applied in the learning process.

Practicality

The practicality of the evaluation instrument using the Kahoot application is obtained through the analysis of learning implementation, student activities and student responses which can be described as follows.

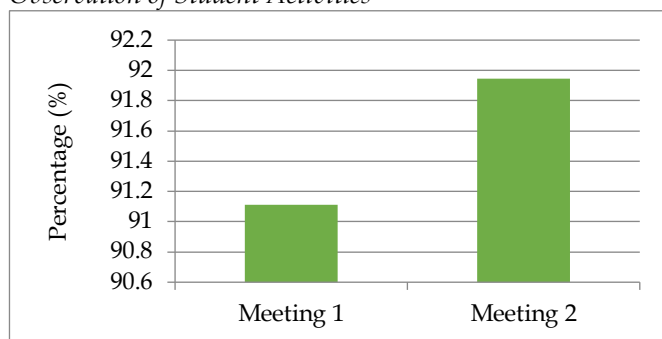*Implementation of Teacher Activities*

The management of the implementation of teacher activities is carried out while the learning process is in progress by providing a checklist mark (√) on the teacher activity implementation sheet. Data on the observation of the implementation of teacher activities in 2 meetings can be seen in the Figure 1.
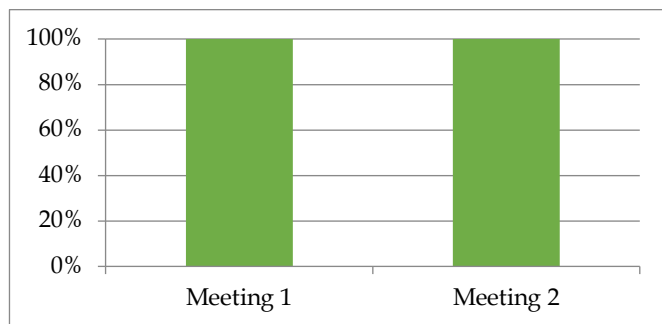
Figure 1. Percentage of Teacher Activity Implementation

The practicality test based on the results of the assessment of the implementation of teacher activities obtained an average score of 100% at each meeting with a percentage of P≥90% implementation with excellent criteria. According to Rohmatullah, et al (2013) a learning tool can be said to be practical if the teacher's activity in classroom management reaches ≥80%.

*Observation of Student Activities*

Figure 2. Percentage of Student Activity Implementation

Student activities are one of the important factors in the implementation of learning. The first meeting obtained an average score of 91.1% and the second meeting obtained an average score of 92%. The average score of the student's activity is included in the very good category and it can be said that the student's activity has been achieved. In accordance with the opinion of Ramadhana & Hadi (2022) that the results of observations of student activities during the learning process with an average percentage of 82.41% show that the student's activity during the learning process is in the very good category.

Student Response
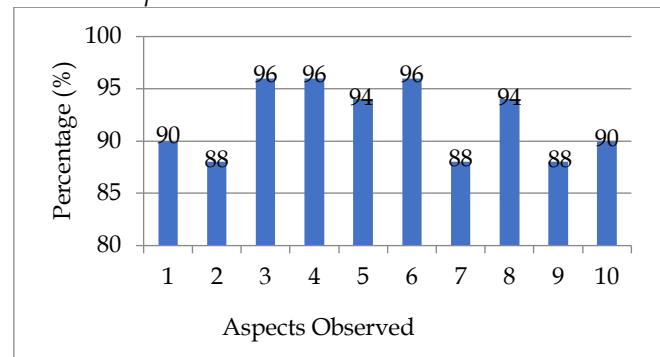
Figure 3. Percentage of Learner Responses

The student response questionnaire is given when the learner has finished using the Kahoot application. Students' responses to evaluation instruments developed using the Kahoot app received an average score of 92% and were included in the excellent category. Based on the results of the criteria obtained from the responses of students, it shows that the evaluation instrument using the Kahoot application is at a very good level of practicality. This is in line with Sujarwinanti, et al (2020) who stated that from the results of tabulation of students with a percentage of 63% with good criteria, it can show that the responses obtained from students are at a good level of practicality. So it can be concluded that the use of evaluation instruments through the Kahoot application received a positive response from students. Students like to play Kahoot and find it easy to use (Pede, 2017). Kahoot application is easy to use, safe, competitive, interesting, and fun (Bicen & Kocakoyun, 2018).

Effectiveness
Pre-test and Post-test Results
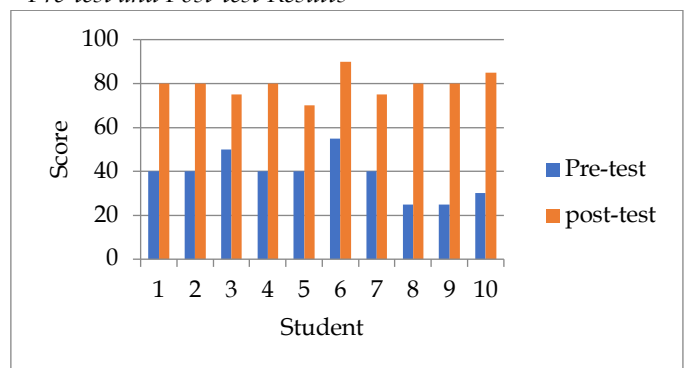
Figure 4. Pre-test and Post-test Results

The effectiveness of the Kahoot application as an evaluation instrument in learning can be seen through

changes in pre-test and post-test learning outcomes. The results of the pre-test scores show that all students are incomplete or have not met the Maximum Graduation Criteria. The highest value obtained is 55 and the lowest value obtained is 25. This is because students have not mastered the material and lack focus when doing the questions. In addition, according to Nurhasanah & Sobandi (2016) that interest in learning has a positive and significant effect on learning outcomes. The results of the post-test scores show that there is 1 student who has not been completed and 9 students who have completed or have met the Maximum Graduation Criteria. The highest score of the post-test obtained is 90 and the lowest value is 70. It can be seen that there is an increase in student learning outcomes through the post-test conducted using the Kahoot application. Kahoot application has the potential to increase and develop high value (Cetin, 2018). The use of the Kahoot application in evaluating learning provides its own interest and motivates students so that it will have an impact on improving learning outcomes. According to Masyrufin (2022) with an increase in the pre-test and post-test scores for students, the Kahoot application can improve learning outcomes. This is in line with Putra, et al (2017) who said that using android applications can increase students' learning motivation and make learning more active and interesting so that it can grow students' willingness to learn. According to Tsymbal (2018), students' motivation and self-confidence increase, and they feel more secure and comfortable in class after using Kahoot. The content and structure help students become confident while learning through the Kahoot application (Zain at al., 2021).

Test Results

Table 9. Table t Test Results

	Mean	Std. Dev	Std. Error Mean	95% Confidence Interval of the Difference		t	Sig-(2-tailed)
				Lower	Uppear		
Preters-Postent	-41.000	10.749	3.399	-48.689	-33.310	-12.061	0.000

The learning outcomes of students in the pre-test and post-test were then tested using a t table. The t-test was conducted to determine whether there was a significant difference or not. According to Halimah & Maulidya (2021) stated that if the significance level of Sig. (2-tailed) obtained is 0.000, meaning that it is lower than 0.05, it can be concluded that there is a significant difference. The results of the t-table test show that there is a significant difference between before and after using the Kahoot application. This can be seen in (Table 9). According to Wang & Tahir (2020) the use of the Kahoot application has a significant increase from the pre-test and post-test.

Interpretation of N-Gain Value

Figure 5. N-Gain Value on Product Trial

The learning outcomes of pre-test and post-test students were then analyzed using N-Gain. The interpretation of the N-Gain value obtained has an average score of 0.66 which is in the range of values of $0.30 < g < 0.70$ and belongs to the medium category. In line with Dewi & Masniladevi (2021) which states that N-Gain is the difference between the pre-test and post-test scores, the N-Gain average value of 70% is in the moderate category or quite effective. So, it can be concluded that the evaluation instrument developed using the Kahoot application is effectively used in learning. As concluded by Wigati (2019) that the Kahoot application is feasible and effective to use for students in learning. Kahoot is an online quiz application that can be an option to make learning interesting and fun (Suharsono, 2020). Kahoot is also an effective medium to use as a place where all score results can be downloaded instantly (Sukri at al., 2020).
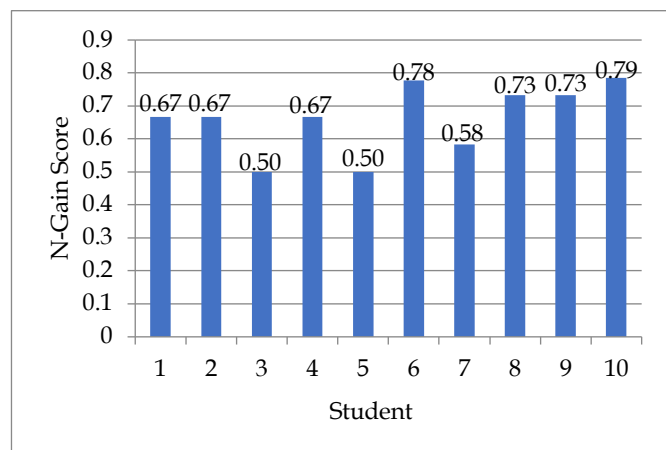
Conclusion

Based on the results of the research and discussion, it can be concluded that the evaluation instrument developed using the Kahoot application can be said to be valid, practical, and effective with an average validity value of 93.0%. The average value of practicality from the implementation of teacher activities is 100% in each meeting, the average value of student activity is 91.1% and 92.0% at each meeting, and the results of student responses get an average value of 92.0%. the

effectiveness value of the t-table test is 0.000 and the average value of n-gain is 0.66. Thus, the instrument can be feasible and can be used in learning biology material for the body's defense system class XI SMA Negeri 2 Gorontalo.

Acknowledgements

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