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Free Game Education Assessment Development "Button Go Green" on Green Chemical Materials

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Abstract

Green chemistry is material in class X in the driving school curriculum. This material is very closely related to phenomena in everyday life. For that, we need an interesting and meaningful assessment in the form of games that are easy to use. This study aims to determine the feasibility of the "Go Green" education game-based assessment on green chemistry, determine the characteristics of the game education-based assessment and determine the effectiveness of the "Go Green" education game assessment on green chemistry. The research and development method used was adapted from the ADDIE model which consists of five stages, namely Analysis, Design, Develop, Implementation, Evaluation. The research subjects were students of class X SMA Negeri 9 Bengkuku Selatan. The instruments used are questionnaires and quantitative descriptive data analysis. The results showed that material expert validation was 93.42% and media expert validation was 92.86% with a feasible category for implementation. Based on the results of the development carried out, it can be concluded that the assessment developed has met the appropriate criteria. "Go Green" can help educators in conducting assessments effectively and optimally and make students relax in doing questions well.

Keywords
assessment; R&D; educational games; green chemistry

I. Introduction

The Motivating School Program as a model for quality education units is a program of the Ministry of Education and Culture to improve the quality of education. Based on the Ministerial Decree No. 162 of 2021 becomes the legal basis for implementing the driving school program. The driving school program provides an opportunity for schools to develop a student-centered school operational unit curriculum. Renewal of learning in driving schools continues the process of improving the quality of learning that has been initiated by previous curricula. One of the chemicals studied in class X is green chemistry. This material is very closely related to phenomena in everyday life.

According to Astuti et al (2019) Education is an obligation of every human being that must be pursued to hold responsibilities and try to produce progress in knowledge and experience for the lives of every individual. Education is one of the efforts to improve the ability of human intelligence, thus he is able to improve the quality of his life (Saleh and Mujahiddin, 2020). Education is expected to be able to answer all the challenges of the times and be able to foster national generations, so that people become reliable and of high quality, with strong characteristics, clear identities and able to deal with current and future problems (Azhar, 2018).

The education process has a single unit in its learning and assessment (Efendi, et al., 2015). To carry out a good learning process an assessment must be carried out to determine the development of students' abilities (Budiman & Jailani, 2014). The assessment is carried out to find out the student's difficulties in learning. This research is motivated by the opinion (Kusairi, 2012) which states that the quality of learning is determined by the quality of the assessment carried out by the teacher in the learning process. According to (Widiana, 2016) the assessment was carried out to see the effectiveness of the teaching and learning process and to interpret the learning measurement result data. Assessments that are realized in schools have their own goals and characteristics that are tailored to the learning process built by the teacher. Identification of problems in the implementation of the assessment is needed to improve and improve the assessment to produce a quality assessment. Assessment activities are carried out to assist teachers in understanding the weaknesses and strengths experienced by students concerning the material studied in the learning process (Kurniawan, et al., 2020). The implementation of a strong assessment and proper analysis of the student learning process can facilitate teachers in making effective decisions on their learning process. In addition, when students can know the progress of their learning, students will improve their learning behavior.

In today's digital era, assessment has led to the use of information technology (ICT) as a means of communication. Mastery of ICT is part of 21st-century skills (Milligan et al, 2015), so the use of ICT-based assessment is very relevant in efforts to develop these skills. ICT-based assessment or electronic assessment (e-assessment) is an assessment made by involving computer technology and internet networks in its use (Ma'muroh, 2014). According to (Wulan et al, 2018) electronic-based assessment can improve problem-solving skills as an indicator of the importance of 21st-century skills.

Many studies have been carried out by various parties to overcome problems in the implementation of the assessment, one of which is the implementation of computer-based assessments. Assessment using a computer can simplify the correction process so that feedback can be given immediately (Kearney, 2002; Kusairi, 2012; Pakpahan, 2016; Shute & Rahimi, 2017). In addition, assessment results tend to be more accurate and reliable (Kearney, 2002; Scalise, 2006). Computer-based assessments can be carried out outside the classroom, making it easier for educators and not requiring a specific classroom for the assessment, more flexible outside of face-to-face hours, and easy to control and manage by educators (Kearney, 2002; Setyoko, 2018; Zainuddin & Keumala, 2007). 2018). In this study, the development of an assessment based on the "Go Green" education game was carried out in the form of an application. According to Lakoro (2009) states that all the potential of the game as a medium is very likely to be utilized in a motivating learning process for students. In addition, games have a very close relationship and have a positive effect on the learning process (Novaliendry, 2013; Pelletiere, 2009). The development of this educational game-based assessment is expected to make it easier for educators to make assessments related to Green Chemistry and create a fun learning atmosphere.

II. Research Method

This research was conducted at SMA Negeri 9 Bengkulu Selatan. The type of research used is research and development (R&D). According to Sugiyono (2010), R&D is a research method used to produce certain products and test the effectiveness of these products. The research syntax follows the research and development method according to Sugiyno (2010) which is described in the chart as follows:

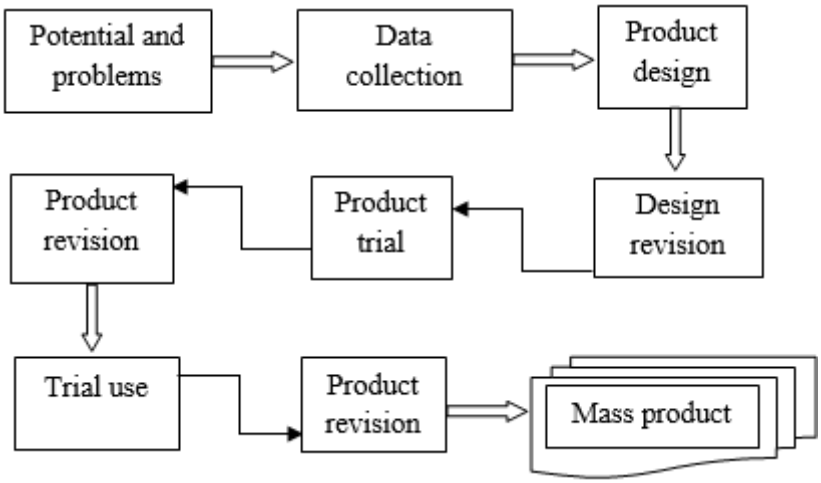

Figure 1. *Research Stages*

The design for the research activity of developing an assessment based on the "Go Green" Educational Game only arrived at a product feasibility test followed by an evaluation of the final model. Thus, this syntax is an adaptation of the Borg and Gall development model, namely three steps of simplifying research methods carried out with 3 development stages, namely preliminary studies, product development, and product evaluation.

The research instrument according to Arywiantari (2015) is a tool used to measure natural phenomena and to measure observed social phenomena. In this study, data collection methods were used to answer problems regarding the development design, quality of results, and the effectiveness of developing an assessment based on the "Go Green" Educational Game which was carried out using the questionnaire method. According to Arywiantari (2015) the questionnaire method is a method used to test product validity in the development of an assessment based on the "Go Green" Educational Game. Sugiyono (2010) states that the questionnaire method is a data collection technique that is carried out by giving a set of questions or written statements to respondents to answer. In this study, questionnaires were distributed to 34 students of class X A of SMA Negeri 9 Bengkulu Selatan regarding the "Go Green" Education Game application.

This development research requires data analysis techniques, namely quantitative descriptive analysis techniques. Quantitative descriptive analysis is a way of data processing which is done by arranging systematically in the form of numbers or percentages, about an object under study, to obtain general conclusions (Agung, 2012). In this study, quantitative descriptive analysis was used to process the data obtained through a questionnaire in the form of scores. The equations used for each subject are as follows:

$$Persentase = \frac{\Sigma(Jawaan \times bobot\ pilihan)}{n \times bobot\ tertinggi} \times 100\%$$

Information:

Σ = amount

n = total number of questionnaire items

Furthermore, to calculate the percentage of the overall subject used the formula: Percentage = (F: N)

Information:

F = Total percentage of subjects

N = Multiple Subjects

To be able to give meaning and make decisions, the accuracy of the results of validation and product testing is used as follows:

Table 1. Conversion of PAP Achievement Level with a 5. Scale

Achievement Rate %	Qualification	Information
90-100	Very good	No Need to Revise
75-89	Good	No Need to Revise
65-74	Enough	Revise
55-64	Not enough	Revise
0-54	Very less	Revise

III. Results and Discussion

The assessment developed is in the form of an educational game application with a green theme (Go Green). The application is created with the help of the Smart Apps Creator application then converted to an android application in the Apk extension. This education game uses the concept of Sustainable Development with the theme of greening because it is following the subject being taken, namely Green Chemistry. This game consists of a menu, green chemistry vocabulary, instructions for each level, questions, and feedback, and videos.

On the menu, there are general instructions and a "play" button to start the game. The questions in this education game consist of "True or False" and Multiple Choice statements. Students who complete the game will get feedback in the form of congratulation "you are right" for those who successfully do all the questions correctly or "try again" if there is an incorrect answer.

Based on the results of expert validation on the quality of the material, questions, language, and contextual, the percentage is 93.42%. While the results of the validation of the application display obtained a percentage of 92.86%. This shows that the "Go Green" application is very feasible to be implemented. The following graph shows the percentage validity of the "Go Green" education game-based assessment as shown in Figure 2.

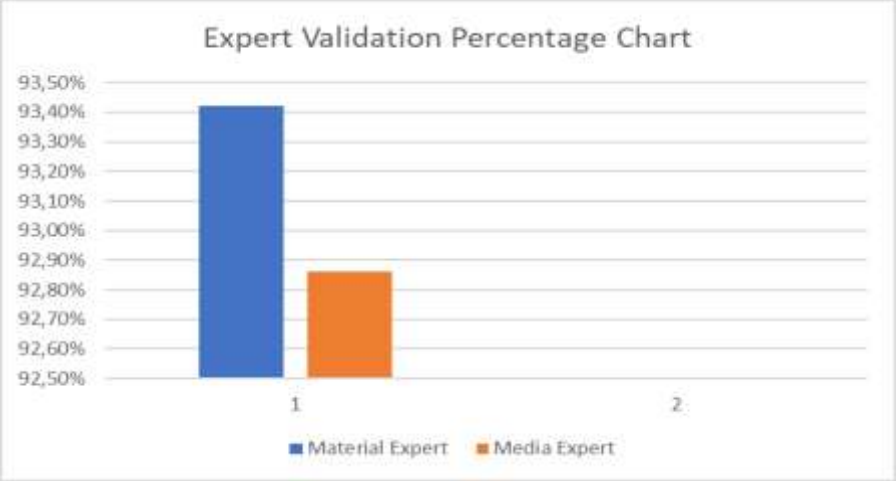

Figure 2. *Validity Percentage Graph*

Based on the results of the questionnaire distribution, it can be seen that the game education application increases students' understanding of Green Chemistry material. In addition, students do not feel afraid when assessing with the "Go Green". Thus, it can be

concluded that the use of the "Go Green" application is very helpful for educators in conducting assessments. The following is a student response questionnaire to the "Go Green" application as shown in table 2.

Table 2. Student Response Questionnaire to the "Go Green" Application

No.	Statement	SS (%)	S (%)	TS (%)	STS (%)
1.	After working on the game "Go Green", I understand more about Green Chemistry	100			
2.	The questions that are packaged in the game make me relax while working on it.	100			
3.	The look of “Go Green” is very good.	64,7	32,4	2,9	
4.	The choice of the “Go Green” background is very appropriate.	47,1	52,9		
5.	The combination of image and color selection “Go Green” is very good.	38,2	68,8	2,9	
6.	The type, size, and color of the letters chosen are very precise.	32,4	67,6		
7.	The language used in “Go Green” is very easy to understand.	29,4	64,7	5,9	
8.	The use of buttons is very suitable for the needs.	26,5	67,6	5,9	
9.	The “Go Green” application is very easy to access/use.	50	41,2	5,9	2,9

At the validation stage and distributing questionnaires carried out by expert validation and students, the aim is to test the application made in the Apk extension. Which can be accessed via Android can be seen in Figure 3 below.

Figure 3. *“Go Green” Application Display*

IV. Conclusion

Based on the results of the analysis carried out, it can be concluded that the assessment developed with the "Go Green" education game application can assist educators in conducting assessments effectively and optimally. This application makes students relax in working on questions so that the assessment process goes well and is fun. Thus, the "Go Green" application can be used as an alternative to assessing Green Chemistry material.

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