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Development of Simple Science Learning Media in the Form of Reaction Rate Tools for Effective Understanding of Teaching Materials

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Abstract: Chemistry is one of the study materials in Natural Sciences (IPA) subjects which aims to provide knowledge to students in understanding chemistry learning concepts. One of them is the material on reaction rates, which is one of the studies in chemistry that really demands macroscopic, microscopic and symbolic aspects. This research is a type of analysis and development research which was carried out from April 24 to April 27 2019. The population involved in this research were all Tadris Science class B students with a total of 31 respondents. Reaction rate material in junior high school is still taught through the lecture method and by memorizing concepts without involving the microscopic aspects which will cause difficulties in understanding the concept of reaction rate meaningfully. Therefore, this research aims to utilize learning media which is closely related to improving the quality of learning which is expected to create a more meaningful learning experience, facilitate the process of interaction between students and teachers and students who are relevant anywhere, and enrich the students' learning experience. The results of this research are all questions for each validity have valid status, because the value of Rcount > Rtable is 0.355 and the result of the reliability coefficient of the content instrument is Ralpha = 0.621, the construct instrument is Ralpha = 0.675, the prediction instrument is Ralpha = 0.676, the concurrent instrument is Ralpha = 0.707, and the efficiency instrument is Ralpha = 0.610, apparently it has a "Cronbach's Alpha" value greater than 0.600, which means that the five instruments are declared reliable or meet the requirements. From the results of this research, it can be concluded that simple science learning media in the form of "Reaction Rate Tools" is effectively used for students' understanding of reaction rate material in junior high school.

Keywords: Learning media; Reaction rate; Utilization

Introduction

Chemistry is one of the study materials in Natural Sciences (known with IPA) subjects which aims to provide knowledge information to students to understand chemical concepts. One of them is the reaction rate subject which really demands the study of macroscopic, microscopic and symbolic aspects. Reaction rates in junior high school are still taught using the lecture method and by memorizing most of the reaction rate concepts. The material concept of reaction rates studied without involving the microscopic aspects will cause difficulties in constructing the material concept of reaction rates meaningfully. (Khaeruman et al., 2018)

Good science learning should link science material to students' daily lives. For example, students are given the opportunity to ask questions, generate ideas, build curiosity about everything in the surrounding environment, build self-skill attitudes, and raise students' awareness that learning science is very necessary for learning (Budiman et al.,2016)

Basic chemical reactions can be classified as rate limited or chemical energy transfer rate limited reactions

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(Gargurevich, 2016). The unity of chemistry and physics must be paradigmatic for the unity of science. With the advent of atomic theory, quantum theory, and statistical mechanics, the fields of chemistry and physics have become increasingly intertwined, perhaps even to the point where it would be difficult to imagine chemistry with physics removed (Hettema, 2012) is one of the problems in learning.

Talking about issues related to the learning process cannot be separated from the factors that influence learning itself. According to Suryabrata (1995: 249), these factors include: (1) factors originating from outside the student, which are divided into two factors; namely social and non-social factors; and (2) factors originating from within the student; which is divided into physiological factors and psychological factors.

The low learning motivation and student learning outcomes for science subjects are caused by many factors, one of which is the lack of variety in the teaching and learning process. In terms of improving the quality of science learning which concerns processes and products, it is necessary to develop adequate learning facilities, namely science media. (Hartatiek et al., 2018)

Teachers need tools or media that can later be used to assist and convey lesson material. Tools or media that can be used to assist teachers in conveying abstract material are learning media (Fitriani et al., 2013)

According to Widiada, et al (2018) that demands continue to increase as time goes by, requiring existing learning components to continue to be maximized. One important component in implementing learning is learning media.

Media Learning occupies a very important position as a part of the learning system. Thus, a process that can lead students to have new knowledge and skills in accordance with the curriculum requires a medium. Appropriate and relevant media will make the learning process take place effectively and efficiently, so that learning media is developed. Development is a process used to validate products used in education and learning systems (Sugiyono, 2008)

The use of learning media is closely related to improving the expected quality of learning. It is hoped that this use by teachers can foster and create more meaningful experiences in the learning process, facilitate the interaction process between students and teachers and students who are relevant anywhere, and enrich students' learning experiences. Students actively discuss and search through the various learning resources available, while the teacher plays the role of facilitator who is equally involved in the learning process. The availability of a variety of learning media and technology will later be able to help students flexibly achieve their learning goals. (Asyar, 2011)

The development of interactive media is very important in overcoming the limitations and shortages in the supply of existing media facilities. This problem should become a means of introspection for teachers. Introspection to find the right models, methods and media used in learning so that the teacher's learning does not become boring and boring. (Basuki et al., 2015)

Learning media developed by teachers themselves can optimize students' mastery of the material. More than that, it can also increase the creativity and innovation abilities of teachers so that teacher professionalism can be achieved. Interactive learning methods are the main choice in improving teaching and learning process activities towards achieving optimal learning outcomes. Therefore, researchers created a tool that can later be used to understand student learning, especially in reaction rate material.

Method

This research is a type of analysis and development research which was carried out from April 24 to April 27 2019. The population involved in this research process were all Tadris Science class B students with a total of 31 respondents. The techniques used in this research are as follows:

Data collection technique

To obtain accurate data, the appropriate instruments that will be used in collecting data in this research are questionnaires and tests.

Data analysis technique

After the data is obtained, the next step is to analyze the data. This research focuses more on the effectiveness of products designed as learning media on reaction rate material. To analyze data from the questionnaire, the following steps are carried out: (1) The questionnaire that has been filled out by the respondent is checked for completeness of the answers; (2) Quantitative questions by giving scores according to previously determined value weights; and (3) Create validity tests using SPSS for Windows Version 25.0.

Retrieval of data results is based on the calculated r value > r table of 0.355 for df = 31–2 = 29;α= 0.05 then the item/question can be said to be valid or vice versa.

Result and Discussion

The learning media that researchers created is "Reaction Rate Tool".

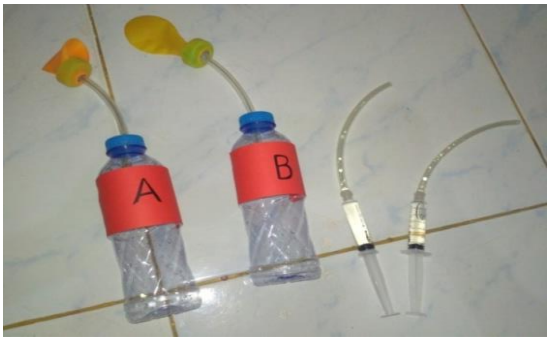

Figure 1. Reaction Rate Tool

The advantages of using this reaction rate tool are as: (1) The teaching and learning process becomes more effective and efficient; (2) Students' understanding of reaction rate material increases; (3) Students can think creatively both in the manufacturing process and when using this tool.

Media Validation Analysis

1. Validity test

The validity test aims to show the extent to which the measuring tool used measures what is being measured. The method is to correlate the scores obtained from each question item with the individual's total score. Validity testing was carried out with the help of a computer using the SPSS for Windows Version 25.0 program. In this research, validity testing was carried out on 31 respondents. Decision making is based on the calculated r value (Corrected Item-Total Correlation) > r table of 0.355 for df = 31–2 = 29;α= 0.05 then the item/question is valid and vice versa.

Table 1. Validity Test Results

Statement	Rcount	Sig.	Table	Criteria
Content/Content				
The use of reaction rate tools can help students' understanding in learning.	0.596	0.000	0.355	Valid
The development of this reaction rate tool can increase students' knowledge and insight.	0.698	0.000	0.355	Valid
The media created can increase students' interest in learning.	0.851	0.000	0.355	Valid
The media used is interesting and effective in learning.	0.576	0.001	0.355	Valid
Construct				
Tools and materials for making media are easy to find.	0.873	0.000	0.355	Valid
The steps for making the tool are easy and clear when done.	0.701	0.000	0.355	Valid
The use of reaction rate tools makes learning fun.	0.552	0.001	0.355	Valid
The application of learning media in the form of a reaction rate tool makes students enthusiastic about learning.	0.690	0.000	0.355	Valid
Prediction				
Mastery of teaching materials without appropriate media will affect students' learning process, especially in terms of understanding the material.	0.765	0.000	0.355	Valid
The success of the learning process is caused by the effectiveness of the media used.	0.636	0.000	0.355	Valid
If students don't use the reaction rate tool, they don't understand the reaction rate material.	0.829	0.000	0.355	Valid
By providing learning media in the form of reaction rate tools, students will become creative and innovative.	0.607	0.000	0.355	Valid
Concurrent				
Students' understanding of reaction rates is very good after using media in the form of reaction rate tools.	0.749	0.000	0.355	Valid
The reaction rate tool helps the learning process become more effective than learning before using media.	0.682	0.000	0.355	Valid
Students can determine the factors that influence the reaction rate by using the reaction rate tool.	0.720	0.000	0.355	Valid
Students can easily determine what the reaction rate process looks like by using the reaction rate tool.	0.789	0.000	0.355	Valid
Efficiency				
The development of this reaction rate tool really helps students' understanding when learning.	0.691	0.000	0.355	Valid
This media is very efficient and effective to use as a learning medium in junior high schools.	0.774	0.000	0.355	Valid
Students can understand the concept of reaction rate material through learning media in the form of reaction rate tools.	0.706	0.000	0.355	Valid
This media is easy to make and easy to use.	0.575	0.001	0.355	Valid

From the table data above, it can be concluded that all questions for each validity have valid status, because the Rcount > Rtable value is 0.355.

2. Reliability Test

Reliability testing was carried out on question items that were declared valid. A variable is said to be reliable if the answers to questions are always consistent.

The instrument reliability coefficient is intended to see the consistency of the answers to each statement given by the respondent. The analysis tool uses the split half method by correlating the total odd versus even scores, then the reliability is calculated using the "Cronbach's Alpha" formula. The reliability results for each variable are presented in the following table.

Table 2. Reliability Test Results

Variable	Ralpha	Critical	Criteria
Content/Content	0.621	0.600	Reliable
Construct	0.675	0.600	Reliable
Prediction	0.676	0.600	Reliable
Concurrent	0.707	0.600	Reliable
Efficiency	0.610	0.600	Reliable

Based on Table 2, reliability tests were carried out on question items that were declared valid. So the results of the reliability coefficient of the content instrument are Ralpha = 0.621, the construct instrument is Ralpha = 0.675, the prediction instrument is Ralpha = 0.676, the concurrent instrument is Ralpha = 0.707, and the efficiency instrument is Ralpha = 0.610, it turns out that it has the value " Cronbach's Alpha" is greater than 0.600, which means that the five instruments are declared reliable or meet the requirements.

Conclusion

One of the successes of the teaching and learning process lies in the learning media used by the teacher. Therefore, teachers must have the skills within themselves to process various aspects of the learning process effectively and efficiently later, especially the learning media used. Interactive learning media is one of the main choices for improving teaching and learning process activities towards achieving optimal learning outcomes. The results of this research are all questions for each validity have valid status, because the value of Rcount > Rtable is 0.355 and the result of the reliability coefficient of the content instrument is Ralpha = 0.621, the construct instrument is Ralpha = 0.675, the prediction instrument is Ralpha = 0.676, the concurrent instrument is Ralpha = 0.707, and the efficiency instrument is Ralpha = 0.610, apparently it has a "Cronbach's Alpha" value greater than 0.600, which means that the five instruments are declared reliable or meet the requirements. From the results of this research, it can be stated that simple science learning media in the form of "Reaction Rate Tools" are effectively used for students' understanding of reaction rate material in junior high school.

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