VALIDITY OF E-WORKSHEET REACTION RATE TO PRACTICE CRITICAL THINKING ABILITY USING PROBLEM BASED LEARNING MODEL

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Abstract. *This research aims to describe the validity of reaction rate electronic worksheets in training critical thinking skills with the problem based learning model developed. The development model in this research is 4-D (four-D) with the stages Define, Design, Develop and Disseminate. The subjects of this research were students of SMAN 7 Surabaya. The validation results will then be analyzed according to the mode of each aspect. Based on the validation results, it is known that the reaction rate electronic worksheet developed has a very valid category with a score of 4 in the content validity aspect and a valid category with a score of 3 in the construct validity aspect. Then the electronic worksheet can be used in the classroom learning process so that you can find out the practicality and effectiveness of the electronic reaction rate worksheet being developed.*

Keywords: *Electronic Worksheets, Critical Thinking, Validity, Reaction Rate, Problem Based Learning.*

INTRODUCTION

Education within the 21st century requires understudies to think fundamentally, creatively and imaginatively since within the world of work, understudies will be confronted with different issues that must be illuminated. One of the government's endeavors to create the potential of understudies so that learning gets to be more compelling is progressing the level of quality of instruction in Indonesia. In this effort, graduate competency measures are required as clarified within the Serve of Instruction and Culture Control Number 20 of 2016 concerning competency measures for tall school graduates that tall school understudies must have creative, profitable, basic, autonomous, collaborative and communicative considering and acting abilities employing a logical approach. as a improvement of what is learned in instructive units and other sources autonomously. Based on these controls, basic considering is one of the competency measures for tall school graduates. So, this appears that basic considering abilities are exceptionally critical to prepare understudies.

Basic considering is an demeanor where somebody needs to think profoundly and completely about problems or other things that are inside the extend of their involvement [1]. However, facts within the field appear that students' basic considering capacities are still not as anticipated. This may be seen from the comes about of the pre-research that has been carried out, based on the comes about of the critical considering aptitudes test on Tuesday, February 28 2023 at SMAN 7 Surabaya, students' basic considering elucidation aptitudes were 29.4%, students' explanatory basic considering abilities were 18, 3%, students' assessment basic considering abilities were 12.8%, students' basic induction considering abilities were 13.9%, students' basic illustrative considering aptitudes were 11% and students' self-regulation critical thinking abilities were gotten from the comes about of the meet survey instructors are still not ideal in actualizing it for this reason It can be concluded that students' introductory basic considering aptitudes are generally moo so they still have to be be prepared within the learning prepare. Basic considering is an mental considering handle in which the mastermind intentionally surveys the quality of his considering, the scholar employments intelligent, free, clear and judicious considering [2]. Basic considering abilities can be prepared and connected in all subjects at school, one of which is chemistry.

Chemistry could be a subject that can be related to different perspectives of human life and other sciences, as expressed by Mary Felicia Opara in her investigate entitled Application of the Learning Speculations in Educating Chemistry:

Implications for Worldwide Competitiveness that chemistry may be a central science. for different logical disciplines, such as science, material science, wellbeing, plant science, designing, geography, beauty care products, and natural science [3]. From this complexity, of course there's a essential concept of chemistry itself, and each existing concept will be associated to each other, complement each other, and construct on each other to get it this complexity. In this manner, the advancement of understanding of the subject of chemistry, the higher the level of consider, the more complex the fabric, so that there are more concepts that must be examined. Subsequently, chemistry subjects at tall school level are subjects that start to require an theoretical understanding of concepts. In truth, in chemistry subjects, high school level understudies still regularly encounter challenges with chemistry fabric. One chemical fabric that requires a better understanding is the response rate.

The comes about of the Proclaim of the Head of the Instructive Guidelines, Educational programs and Evaluation Organization No.008/H/KR/2022 of 2022 contain the F stage chemistry learning outcomes which contain "understudies are able to get it and clarify response rates" particularly within the sub-material of affecting components response rate. Variables that impact the response rate are concentration, surface zone, temperature, and catalyst. In these learning outcomes, students are too anticipated to be able to clarify the application of chemistry concepts in way of life. Applications to the sub-material of components that impact response rates are regularly found in standard of living. One learning demonstrate that bolsters the application of response rate fabric in standard of living. is issue based learning.

Issue based learning (PBL) or problem-based learning could be a learning demonstrate that prioritizes solving general issues that commonly happen in existence [4]. Language structure of the Issue Based Learning (PBL) learning show, there are 5 learning phases, namely, Stage 1:

Arranging understudies to the issue, Stage 2:

Organizing understudies to memorize, Stage 3:

Directing the examination, Stage 4:

Creating and showing the comes about of the work, Stage 5 :

Analyzing and assessing the issue understanding process.[5]. In this PBL learning show, understudies are required to think basically and discover arrangements. Separated from that, it gives understudies with an understanding of resistance and tuning in to distinctive suppositions from other individuals. Get it to understudies that all problems or issues must have a arrangement. Another advantage is that by utilizing the PBL learning show, understudies don't get bored effortlessly since they are inquired to fathom issues related to daily life. To encourage the application of issue based learning in chemistry learning, instructing materials or learning media are required that are in agreement with the language structure of the issue based learning demonstrate.

Learning media or educating materials utilized in schools can be understudy worksheets (LKPD). One shape of intelligently LKPD is electronic LKPD [6]. Electronic LKPD or commonly truncated as e-Worksheet are understudy practice sheets that are done carefully and carried out efficiently and persistently over a certain period of time [7]. e-Worksheet is an imperative component in chemistry learning, the utilize of e-Worksheet can encourage understudies to be effectively included within the learning handle. The advantage of e-Worksheet is that it can streamline and contract down space and time so that learning gets to be more compelling [8]. Electronic Understudy Worksheets (e-Worksheet) can make it less demanding for understudies to get it lesson fabric in electronic shape which can be connected employing a desktop computer, scratch pad, smartphone or cellphone [9].

As of now, there are numerous applications or websites that can be utilized to form intelligently e-Worksheet, one of which is live worksheets. Liveworksheets may be a stage helped by electronic media which contains text, images, livelinesss and recordings which are more successful so that

understudies don't get bored quickly [10]. With the e-Worksheet helped by the liveworksheets stage, it is trusted that it'll make it less demanding for teachers to instruct response rate fabric by delineating numerous chemical representations (plainly visible, submicroscopic and typical) through pictures and recordings. Based on the depiction of the issue, the analyst serious to conduct inquire about with the title "Improvement of Response Rate Electronic Worksheets to Hone Basic Considering Capacities with the Issue Based Learning Show" which is anticipated to move forward students' basic considering capacities, particularly in response rate fabric with numerous chemical representations utilizing models. issue based learning.

METHOD

This sort of inquire about is advancement inquire about (R&D). The inquire about approach utilized is non-empirical. Improvement of chemical representation-oriented response rate electronic worksheets utilizing the 4-D (four-D) advancement show. The target of this investigate is lesson XI tall school understudies who are considering the most fabric of response rates and the sub-material of variables that impact response rates. This inquire about was conducted on course XI IPA understudies.

The 4-D development show could be a learning apparatus advancement show created by S. Thiagarajan (1974). The 4-D advancement show comprises of 4 fundamental stages, to be specific characterize, plan, create and spread. Be that as it may, this investigate was carried out until the third arrange, to be specific improvement with a constrained trial prepare.

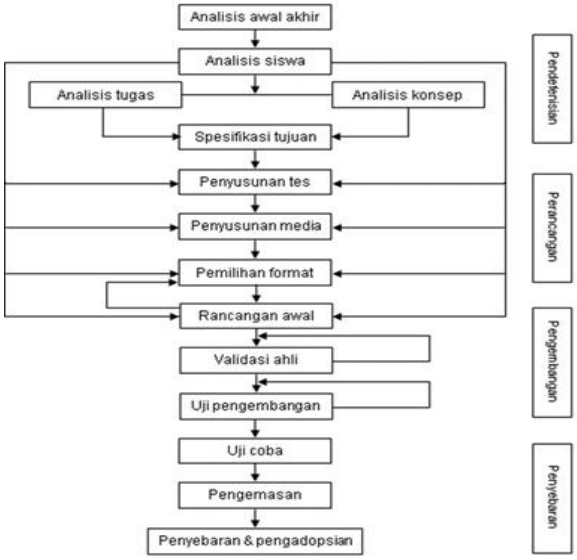

Figure 1. Schematic of the 4-D development model, but the dissemination stage was not implemented (adapted by Trianto, 2010)

The stages in this research are described as follows:

A. Define

The reason of this definition organize is to decide and characterize learning conditions. There are 5 primary steps in this arrange, to be specific:

1) Educational programs examination, 2) Understudy examination, 3) Assignment examination, 4) Concept investigation, 5) Examination of learning pointers. The trial was carried out as takes after; (1) Doing pretest questions; (2) Learning utilizing e-Worksheets; (3) Doing posttest questions. Understudies will be given a interface to the response rate electronic worksheet on Google Classroom.

B. Design

At the learning media plan arrange. This arrange points to plan the arrange of the media being created and the portrayal of the fabric contained within the media. This organize comprises of 2 stages, to be specific the gadget arrangement arrange and the introductory gadget plan arrange.

C. **Develop**

At this organize the point is to create reexamined media based on master exhortation. In this inquire about, there were 2 stages carried out, specifically Audit and Approval.

(1) ***Review***

A audit was carried out by a chemistry teacher to change the item. The media will be looked into by the chemistry teacher, counting appropriateness of the fabric to the educational modules, reasonableness of the substance of the substance and build.

(2) ***Validation***

Legitimacy may be a degree to appear how great the quality of a media is (Arikunto, 2014). The legitimacy of this e-Worksheet is seen from substance legitimacy and develop legitimacy. Substance legitimacy incorporates the appropriateness of response rate fabric with learning results and learning goals; appropriateness of the fabric for practicing basic considering aptitudes, and appropriateness of the fabric with the issue based learning show. In the interim, build legitimacy incorporates Introduction Criteria; Design and Dialect. Approval score information is gotten from the scores on the media approval sheet instrument filled in by the validator.

This research was conducted at SMAN 7 Surabaya. The information sources in this inquire about were 1 chemistry teacher and 2 chemistry instructors as media validators. The data collection strategy in this research could be a approval strategy employing a legitimacy sheet instrument. The data used to decide item legitimacy was analyzed expressively quantitatively with criteria adjusted from the Likert scale as within the taking after table.

Table 1. Learning Tool Validation assessment scores

Score	Category
0	Invalid
1	Not valid
2	Fairly valid
3	Valid
4	Very Valid

(Riduwan, 2012)

Based on the table above, the chemical representation oriented reaction rate e-Worksheet can be said to be valid if the mode (number that appears frequently) is ≥ 3.

RESULT AND DISCUSSION

In this research, the product developed is an electronic reaction rate worksheet to train students' critical thinking skills using a problem based learning model. Validation of the reaction rate electronic worksheet to train students' critical thinking skills using a problem based learning model was obtained from a validation sheet that had been filled in by 3 expert validators consisting of 1 chemistry lecturer and 2 chemistry teachers. The validation sheet in this research includes aspects of content validity and construct validity. The validation results of the reaction rate electronic worksheet to train students' critical thinking skills using the problem based learning model were declared valid based on assessments from experts where the results of expert validation on the content aspect obtained mode 3 with a valid category and the construct aspect received mode 4 with a very valid category. The following is a data table of validator test results on content and construct aspects that have been assessed by 3 validators.

Table 2. Aspect Validator Test Results Data Contents

Aspect	Indicator	Modus	Category
Content	Suitability of material in products developed with Learning Outcomes and Learning Objectives	4	Very Valid
	Suitability of the product to train critical thinking skills in aspects of interpretation	3	Valid
	Suitability of the product to train critical thinking skills in evaluation aspects	4	Very Valid
	Product suitability for training critical thinking skills in inference aspects	3	Valid
	Product suitability with the PBL learning model at the problem	3	Valid

Aspect	Indicator	Modus	Category
	orientation stage		
	Product suitability with the PBL learning model at the stage of student organization for learning	4	Very Valid
	Suitability of the product with the group investigation stage PBL learning model	4	Very Valid
	Product suitability with the PBL learning model stage of developing and presenting discussion results	3	Valid
	Product suitability with the PBL learning model, analysis and evaluation stage of the problem solving process	3	Valid
	Compatibility of the product with the material factors that influence the reaction rate	3	Valid
	Modus	3	Valid

Based on the validation results of the content aspects in Table 2, it was found that the mode (data that appears most frequently) is 3 with the value criteria being valid.

Table 3. Aspect Validity Test Results Data Construct

Aspect	Indicator	Modus	Category
Construct	Clarity of images and writing on the product	3	Valid
	Ease of video playback within the product	4	Very Valid
	Suitability of the color composition used in the product	3	Valid
	Appropriate selection of type and size of letters in the product	4	Very Valid
	Conformity of the language used in the product with good and correct language rules	4	Very Valid
	Modus	4	Very Valid

Based on the validation results of the construct aspects in Table 3, it was found that the mode (data that appears most frequently) is 4 with the value criteria being very valid.

CONCLUSION

This research aims to train critical thinking skills on reaction rate material by using learning media in the form of electronic worksheets. Based on the description of the results and discussion, it was found that the validity of the reaction rate electronic worksheet for practicing critical thinking skills with the problem based learning model developed was valid. This can be seen from the validation results of the content validation aspect which received a mode of 3 in the valid

category and construct validation which received a mode of 4 in the very valid category.

From this data it can also be concluded that the reaction rate electronic worksheet for training students' critical thinking skills using the problem based learning model is ready to be tested on students.

SUGGESTIONS AND ACKNOWLEDGMENTS

The author hopes that research into the development of reaction rate electronic worksheets to train students' critical thinking skills using the problem based learning model can be carried out again with a broader discussion by testing its effectiveness and practicality. The author is also willing to accept criticism and suggestions from any party that could make the product being developed even more perfect.

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