



Validity of Real Picture Analysis (RPA) Based Student Worksheet to Improve Junior High School Students' Critical Thinking Skills

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The science learning process in junior high school has now been encouraged to give teachers more freedom in developing learning and is more flexible. Teachers need Student Worksheet which can facilitate the learning process with more flexibility regarding the material, both for material with a lot of theoretical reading and material. assignment of experimental projects and problem solving. Student Worksheet will be more optimal if it is developed with an approach that involves students thinking through Real Picture Analysis (RPA) so that students are able to generate learning motivation and enliven an interactive classroom atmosphere. RPA is an activity for students to

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determine interpretations and provide assessments through image media in the form of photography of science events in their environment. The aim of this research is to examine RPA-based Student Worksheet to improve junior high school students' critical thinking skills with validity. The type of research used is Research and Development research. This research and development methodology is closely related to RPA-based Student Worksheet to improve students' critical thinking skills. Validation activities through Focus Group Discussion (FGD). The development model in this research refers to the 4D (four-D) research and development model. The 4D research and development model consists of 4 main stages, namely define, design, develop and disseminate. The validation results for material substance got a percentage of 90% in the valid category, learning design got a percentage of 87% in the valid category, and the use of Student Worksheet got a percentage of 99% in the valid category. The development of RPA-based Student Worksheet considers the elements of writing, the hierarchy of material in the form of photography and the selection of questions as efficient and effective stimuli that can direct students to improve their critical thinking skills.

Keywords: Validity; student worksheet; real picture analysis; critical thinking.

1. INTRODUCTION

Basically, science is a way of systematically finding out about nature to master a collection of knowledge in the form of facts, concepts, principles, discovery processes and having a scientific attitude. This of course has implications for science learning activities [1]. The science learning process in junior high school has now been encouraged to give teachers more freedom in developing learning and is more flexible. Teachers need Student Worksheet which can facilitate the learning process with more flexibility regarding the material, both for material with a lot of theoretical reading and material. assignment of experimental projects and problem solving [2][3].

Student Worksheet can provide an overview of learning material to students so that it really helps students to achieve learning goals. Student Worksheet will be more optimal if it is developed with an approach that involves students thinking through Real Picture Analysis (RPA) so that students are able to generate learning motivation and enliven an interactive classroom atmosphere. RPA is an activity for students to determine interpretations and provide assessments through image media in the form of photography of science events in their environment. Media which is a reproduction of the original form in two dimensions, in the form of photos, paintings [4]. Seeing the detailed understanding of existing components which are realized visually in two-dimensional form which is used to help achieve science learning objectives [5].

The results of the research group's research provide an overview of follow-up actions that are

relevant to needs including: (1) there are no standardized Student Worksheet so they are not optimal in supporting the achievement of learning objectives; (2) have not adopted RPA in accordance with the development of the learning process in the 21st Century; (3) the need for Student Worksheet which can improve students' critical thinking skills. This is considered important because critical thinking skills will train students to think logically and not accept things easily. Critical thinking allows students to analyze their thoughts in making choices and drawing correct conclusions. Good critical thinking skills will help students understand concepts, be sensitive to problems that occur so they can understand and solve problems and be able to apply concepts in different situations [6].

Images are learning media that have different properties and are visually attractive to students. The development of RPA-based Student Worksheet considers the elements of writing, the hierarchy of material in the form of photography and the selection of questions as efficient and effective stimuli that can direct students to improve their critical thinking skills. Critical thinking skills have several indicators including: (1) interpretation; (2) explanation; (3) inference; (4) analysis; (5) evaluation; (6) self-regulation [7]. Critical thinking skills are a reflective and reasoned way of thinking that is focused on making decisions to solve problems.

2. LITERATUR REVIEW

Student Worksheet encourages stimulus or teacher guidance in learning which will be presented in writing so that when writing it you need to pay attention to the criteria for graphic

media as a visual medium to attract students' attention. The development of Student Worksheet provides alternative learning strategies that are innovative, constructive and student-centered, by focusing on achieving the expected competencies [8]. The components in the Student Worksheet are expected to create an interactive, inspiring, fun, challenging learning atmosphere, motivate students to participate actively, and provide sufficient space for initiative, creativity and independence in accordance with their talents, interests and physical and psychological development. students [9]. Student Worksheet, which is a much-needed teaching material, must be designed in such a way as to adapt to current developments, to prevent learning problems that arise due to students' low knowledge and skills due to the lack of development of the teaching materials used [10]. The existence of Student Worksheet has quite a big influence on the teaching and learning process, so that preparing Student Worksheet must meet various certain requirements in order to be a good quality Student Worksheet so that it can support increased student activity in the learning process and can optimize learning outcomes [11].

The process of seeing the differences between the two visually can result in the possibility of higher learning outcomes being obtained from learning image media because students are more interested in this learning media because it is easy to obtain and easily accessed [12] [13]. RPA is an activity for students to determine interpretations and provide assessments through

image media in the form of photography of science events in their environment. Photographic images are learning media that contain real photos of an object or situation or event, so in the learning process image media is a very realistic (concrete) image media [14]. Attracting the attention of students who tend to focus on things they are interested in, namely using objects that are familiar to their lives [15]. The real pictures have a good center of interest as shown in Fig. 1.

Critical thinking skills are very important for students to face various problems, solve the problems they face, and make the right decisions. A process that aims to make rational decisions directed at deciding whether to believe or do something through critical thinking [7]. Critical thinking provides students with an environment and activities to improve their cognitive abilities [16][17]. The components contained in critical thinking enable students to practice thinking skills, gain an understanding of a fact or concept which can improve their cognitive learning outcomes. The relationship between critical thinking and cognitive learning outcomes is that critical thinking is related to higher level cognitive abilities such as analysis, evaluation and synthesis abilities [18]. Critical thinking indicators consist of six important indicators which include: (1) interpretation; (2) explanation; (3) inference; (4) analysis; (5) evaluation; (6) self-regulation. Critical thinking skills can be measured using tests developed from critical thinking indicators and the answers.



Fig. 1. RPA-based student worksheet component

3. METHODOLOGY

3.1 Types and Research Design

The type of research used is Research and Development research. This type of research is used to develop or validate products used in education and learning. This research and development methodology is closely related to RPA-based Student Worksheet to improve students' critical thinking skills. The developed Student Worksheet also becomes a quality curriculum document, because it has passed the validation stage. Activities are carried out through Focus Group Discussions (FGD) so that they are suitable for students to use. Therefore, implementation in the learning process must be carried out continuously, objectively, and systematically.

3.2 Sample, Place and Time of Research

The sample determination in this research used purposive sampling, this sample determination technique was based on certain considerations with criteria so that the data obtained would be more representative. Three validators involved include: material substance validators, learning design, and use of Student Worksheet which will be implemented in the Odd Semester 2023/2024.

3.3 Research Stages

The development model in this research refers to the 4D (four-D) research and development model. The 4D research and development model consists of 4 main stages, namely define, design, develop and disseminate. The implementation of the main steps in the research is not only according to the original version but is adapted to the characteristics of the subject and the place of origin of the field test. Sample data was taken from Besuki Ex-Residency Middle School students, namely Jember, Situbondo, Banyuwangi, and Bondowoso Regencies. The number of samples taken by researchers depends on the school's willingness to contribute to the development of RPA-based Student Worksheet to improve students' critical thinking skills. Research procedures and research development are carried out through several stages.

These stages are as follows: (1) definition, the define stage is the stage for establishing and defining the conditions needed for learning development. Determining the required requirements is carried out by paying attention to and adapting to the needs of critical thinking

skills for junior high school students; (2) design, the material collected is then designed in an RPA-based Student Worksheet; (3) Development, Thiagarajan divides the development stage into two activities, namely: *expert appraisal* and *developmental testing*.

Expert appraisal is a technique for validating or assessing the feasibility of a product design. In this activity, an evaluation is carried out by experts in the field. The suggestions given are used to improve the learning materials and designs that have been prepared. *Developmental testing* is the activity of testing product designs on real target subjects. During this trial, response data, reactions or comments were sought from the target users of RPA-based Student Worksheet; and (4) distribution, products that have been implemented in junior high schools are then assessed on students' critical thinking skills with the aim of finding out the extent of the product's suitability.

3.4 Method of Collecting Data

Several supporting instruments used in this research include: (1) a questionnaire in the form of a validation sheet which is used to obtain assessment data on the quality of RPA-based Student Worksheet to improve students' critical thinking skills. (2) documentation is used to take photos of activities during the validation process as well as other documents that support the implementation of this research.

3.5 Data Analysis Technique

Validation is carried out using assessment guidelines and the complete scoring technique is on the validation sheet. Data is contained in the form of a feasibility score table and description of suggestions. Quantitative data is obtained from the *check-list* results (\checkmark) from each validation sheet. Calculation of the validity of RPA-based Student Worksheet can be obtained from expert validity and user validity. The formula used is as follows [19]:

$$P = \frac{\sum X}{\sum Xi} \times 100\%$$

Information:

P = Percentage
 $\sum X$ = Respondent's score in one item
 $\sum Xi$ = The number of ideal scores in one item
100% = Constant

Assessment includes appropriateness of content, presentation components, language.

Determination of the level of validity and product revision as in Table 1.

Table 1. Product validity and revision level

Percentage	Information	Score
81% - 100%	Valid	4
61% - 80%	Fairly Valid	3
41% -60%	Less Valid	2
<40%	Invalid	1

4. RESULTS AND DISCUSSION

Validity testing is a technique used to measure the extent to which the measuring instrument used can actually measure what it wants to measure. In research, validity tests are important to ensure that the instruments used can measure what they want to measure correctly [20]. The use of Student Worksheet in the learning process can also activate communication between teachers and students in teaching and learning activities. Using Student Worksheet can also make learning more meaningful for students, and what is more important is that using Student Worksheet can provide real experiences that can foster student independence in learning.

The product produced in this development research is an interactive Student Worksheet based on real picture analysis. Interactive Student Worksheet based on real picture analysis before being distributed for learning in elementary schools. Products have been assessed for validity, practicality and effectiveness. Product validity is assessed by material substance validators, learning design, and use of Student Worksheet. The product validity results are explained in detail as follows.

Based on Table 2, it can be seen that the validation results for material substance got a percentage of 90% in the valid category, learning design got a percentage of 87% in the valid category, and the use of Student Worksheet got a percentage of 99% in the valid category. Thus, interactive Student Worksheet products based on

real picture analysis are suitable for use as product trials in junior high schools. One of the causes of problems or problems that make students learn less is a lack of motivation to learn. This lack of motivation to learn is caused by various factors, including monotonous learning. This monotonous learning occurs due to the teacher's lack of creativity in utilizing or using learning media. So that in learning students feel bored and very boring [12].

RPA has the expected functions in the teaching and learning process including: (1) attention function, visual media or images are the core, namely attracting and directing students' attention to concentrate on lesson content related to the visual meaning displayed or accompanying the text of the lesson material; (2) the affective function of visual media or images can be seen from students' level of enjoyment when learning or reading text with images; (3) cognitive function, visual media or images can be seen from research findings which reveal that visual symbols or images facilitate the achievement of the goal of understanding and remembering the information or message contained in the image; (4) compensatory function, visual media or images that provide context for understanding the text help students who are weak in reading to organize information in the text and remember it again. In other words, learning media functions to accommodate students who are weak and slow to accept and understand the content of the lesson. presented with text or presented verbally [4].

RPA can be taught effectively and according to expectations, a teacher must be able to involve students who are achieving and active so that those students who are achieving and active do not become passive listeners, and a teacher must also be able to create a learning atmosphere. which is fun and very enjoyable, which of course must be done in a pleasant situation, so that the objectives of the learning carried out can be carried out well and effectively [13].

Table 2. RPA based student worksheet validation results

No	Assessment Aspects	Interval Score			Percentage (%)	Criteria
		Validator 1	Validator 2	Validator 3		
1	Material Substance	0,94	0,98	0,78	90%	Valid
2	Learning Design	0,95	0,90	0,80	87%	Valid
3	Utilization of student worksheet	1,00	1,00	0,97	99%	Valid
Average Score		0,96	0,96	0,85	92%	Valid

5. CONCLUSION

RPA is an activity for students to determine interpretations and provide assessments through image media in the form of photography of science events in their environment. Based on the results of the material substance validator, learning design, and use of student worksheet, it is stated that interactive Student Worksheet products based on real picture analysis are suitable for use as product trials in junior high schools. Based on consideration of several elements, it is hoped that the development of interactive Student Worksheet based on real picture analysis can direct students to improve critical thinking skills. Interactive Student Worksheet development plan by applying concepts to different situations.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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