Development student worksheets-based question, read, reflect, recite, review (PQ4R) to improve creatives thinking skills

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Abstract: This research and development aims to develop student worksheet based on proper preview, question, read, reflect, recite, review (PQ4R) (valid, practical and effective). This development research uses the Borg & Gall design which consists of 10 steps. At this research stage, it only uses 5 steps and is divided into three stages. The first stage is preliminary, at this stage it is used to take initial data and review the curriculum, then in the second stage of planning and development, at this stage it is used to design student worksheet, design student worksheet, and make student worksheet. At this stage the student worksheet product is produced. The third stage is the field test stage, at this stage it is used to test practicality and effectiveness. The population in this study were elementary schools in the Rose Cluster, Kotabumi Kota District, North Lampung Regency. The sample of this research was grade IV Students. Data collection techniques are observation, expert validation sheets, documentation, and questionnaires. The results of research and development, namely student worksheet based on PQ4R are very suitable for use as teaching materials in grade IV learning based on the results of the assessment of material experts 85.5 (very good), media experts 92.0 (very good), language experts 93.3 (very good), and the practitioner test got an average value of 83.5 (very good). The results of the n-gain test showed that the student worksheet based PQ4R used was effective with a value of 0.47.

Keywords: Student worksheet, PQ4R, creative thinking skills.

Introduction

Education is about how to improve students' learning outcomes. This case will continue in order to the future generations can grow and have competitiveness. Education is one of the important things and plays a role in human life. Education is a conscious and planned effort to actualize the learning process actively in order that students can develop their potential (Tohir & Mashari, 2020).

In this modern era, the learning process that is applied tends to use the constructivism approach, taken from the word "construction" which means to build. The theory of constructivism realizes that knowledge cannot be transferred just like that, but rather must be interpreted by each individual. Knowledge is also a process that develops continuously. For this reason, a person's activeness is crucial in developing knowledge (Cahyo, 2013; Qomario et al., 2020).

Education is a field that has an important role in creating competent human resources in the 21st century today. Efforts in realizing these skills in the 21st century require humans who are not only intelligent in thinking from memorizing activities, but also thinking intelligence which is formed from the habituation process to solve problems and think creatively. 21st century education requires students to process the information they learn through analyzing, assessing, and creating activities. Education has to accommodate the development of students' higher-order thinking skills (Zubaidah et al., 2017). According to Bialik and Fadel (2015) the abilities that students in the 21st century must have are creativity, critical thinking, communication, and collaboration. Students must be able to use the information obtained to create something new, be able to make sensible opinions, communicate the knowledge gained, and collaborate with other students to build more optimal abilities.

Creative thinking skills is one of the skills that students must have to be able to solve various problems. Martin (2009) argues that being able to generate new ideas and ways to produce a product is

being able to think creatively. According to Sambo and El-Yakub (2012), creative personas individual who provide unique and unusual problem solutions, which is different from other people. Therefore, creative thinking is the way of thinking which is direct to the generation of new ideas or views or new ways of solving the problem.

According to Runisah (2016) creative thinking skills is higher order thinking skills. Meanwhile Birgili (2015) explains that creative thinking can be interpreted as the regulation of all cognitive activities according to specific objects, situations, or problem solving. Thus, a person who has the ability to think creatively always tries to get new ideas/ideas to solve when faced with a problem.

Based on the results of the questionnaire analysis of the creative thinking abilities of students of the Elementary School of the Kotabumi Rose Cluster, the results showed that 71.7% of students did not like doing experimental activities (detailed aspects). This is because the experimental or experimental activities in finding the concept being carried out are not interesting or too complicated. Then 59.2% of students do not like to give examples that are different from existing examples (including aspects of original thinking). This is because students are accustomed to being faced with concrete problems only at the level of knowledge and understanding. As many as 51 or 42.5% of students easily see errors in solving problems (including in the aspect of fluent thinking). Based on the results of the questionnaire, the three indicators above of the 10 questions in the creative thinking skills questionnaire of students had a calculation result below 50%.

Ideally, quality creative learning can take place if the communication process runs smoothly, so that teaching materials are needed as learning aids. In developing creative thinking skills and supporting the success of the learning process of understanding the material, it is necessary to have the role of teachers, students, and media or learning tools. This is needed in the learning process, where the learning process is essentially an interaction between educators and students. One of the learning media is teaching materials. There are many types of teaching materials available, such as books, modules, and student worksheets. Apart from serving as a guide for conducting activities, discussion guides and other scientific activities, student worksheets also have an important role in the elaboration of the concept of knowledge.

Prastowo (2015), student worksheets is a printed teaching material in the form of sheets of paper containing material, summaries, and instructions for implementing learning tasks that must be done by students, which refers to the basic competencies that must be achieved. In addition, student worksheets as a support to increase the activities of students in the learning process can optimize learning outcomes. student worksheets can be useful in terms of academic achievement. For example, as a support for textbooks (Lee, 2014).

The results of observations in the field also found that the learning strategies carried out by teachers were less varied and did not motivate students to learn. One of the learning strategies related to the creative thinking process is the PQ4R Strategy (Preview, Question, Read, Reflect, Recite, Review). The PQ4R strategy is part of the elaboration strategy. The elaboration strategy is the process of adding details so that new information will be more colorful. The elaboration strategy helps transfer new information from short-term to long-term memory in the brain by creating relationships and combinations of new and existing information (Iskandarwassid & Sunendar, 2008).

Furthermore Trianto (2011) states that the PQ4R Strategy is a practical strategy that can be applied in various learning approaches. The independence of students in learning will lead to structured learning habits that will develop student learning skills. Furthermore, according to Thomas and Robinson (Novriansyah, 2013) states that the PQ4R strategy is a stimulus that helps students develop their knowledge using six steps, namely: reviewing, questioning, reading, reflecting, retelling and repetition. According to Anwar et al (2012) abilities that include creative thinking are flexibility, originality, fluency, imagery, associative thinking, attribute listing, metaphorical thinking and forced relationship. Guilford (Alghafri et al, 2014) identifies four main aspects of creative thinking skills, namely fluency (thinking fluently), flexibility (flexible thinking), originality (original thinking) and elaboration (ability to detail).

Based on the above background, researchers are interested in improving the learning process through the development of Student worksheets-based on Preview, Question, Read, Reflect, Recite, Review (PQ4R) to improve creative thinking skills.

Methods

This type of research, namely research and development or research development. Research and development (Research and Development/R&D) is intended to produce a product. This is in accordance with Sugiyono (2013) explaining that R&D is a research method used to produce certain products and test the effectiveness of these products. The type of R & D research used in this study is the design model of Borg and Gall (1983). The R&D steps are: (1) initial information collection, (2) planning, (3) product development, (4) initial product testing, (5) product revision, (6) main product trial, (7) main product revision, (8) trial operational products, (9) product revisions, and (10) dissemination.

The R&D research steps used in this study were completed in stage five, namely revising operational products based on the results of the main trials. This is because step eight and thereafter must be carried out on a large scale, product dissemination must be carried out after going through quality control before it can be published.

Population in this research was Elementary School Gugus Mawar Kotabumi, North Lampung Regency. The sample in this study was grade IV SD N 3 Rejosari, amounting to 8 students. The data collection techniques used were observation, questionnaires, tests, and documentation. The data analysis techniques used in the study were the validity, practicality and effectiveness of student worksheets. The validity category of the student worksheet can be seen in the Table 1.

Table 1. The validity category of the student worksheet

Value	Category
86-100	Very Good
71-85	Good
56-70	Enough
0-55	Less

(Aqib, 2009)

Furthermore, for the practicality category of student worksheets can be seen in the Table 2.

Table 2. Categories of student worksheet practicality

Value	Category
86-100	Very Good
71-85	Good
56-70	Enough
0-55	Less

The effectiveness of these student worksheets was obtained from the pretest and posttest results. The data obtained were then analyzed, by calculating n-Gain. The n-Gain formula according to Meltzar (Sudjana, 2012) is as Formula 1.

n-Gain $=\dfrac{\text{Posttest}-\text{Pretest}}{\text{Max Value}-\text{Pretest}}$ …………………………………….. 1)

The n-Gain categories are as follows (Table 3).

Table 3. *n-Gain Categories*

Large Percentage	Interpretation
$-1.00 \le g < 0.00$	Decrease
$g = 0,00$	Fixed
$0.00 < g < 0.30$	Low
$0.30 \le g < 0.70$	Moderate
$0.70 \le g \le 1.00$	High

(Sudjana, 2012)

Result and Disscussion

This research is a research and development (R&D) by following the following steps: initial information gathering, planning, product development, initial product testing, and product revision. At the initial information gathering stage, the researcher made direct observations in grade IV to find an overview of the problems that became obstacles in the learning process. At this stage it is also a process for conducting needs assessment (needs analysis), identifying problems (needs), and conducting task

analysis. In this stage, a needs analysis is carried out to gather information that there is a need for media development in the form of student worksheets-based on the PQ4R strategy with the theme of My Residence.

At the planning stage, starting with the preparation of student worksheets-based PQ4R framework, then determining the systematic presentation of material in the development of student worksheets-based PQ4R on KI and KD which have been determined to be developed indicators. The presentation of the material was adjusted to the PQ4R steps. and planning evaluation tools used in student worksheets-based on the PQ4R strategy include competency tests. The evaluation in this study was a multiple-choice test.

As a follow-up to the design that was carried out in the planning stage, steps were taken to develop student worksheets-based on the PQ4R strategy. Furthermore, this product will be tested through initial field trials. The initial field test stage is the final test stage in this research and development because it is considering Covid-19. In the initial field trial stage it is used to carry out validity, practicality, and effectiveness. Validity is done through expert validation, which consists of material expert validation, design expert validation, and linguist validation. The results of the material expert validation are as follows (Table 4).

Table 4. Result of the Material Expert Judgement

No.	Aspect	Total Score	Maximum Score
1.	Suitability of picture story books with learning materials	25	32
2.	Quality of story book content	40	44
	Total Score	65	76
	Average	85.5	
	Description	Very Good	

Based on the material validation expert's judgement (Table 4), the score obtained is 65 from a maximum score of 76 and the resulting value is 85.5. In this study, the material validation test was carried out once. Some suggestions given by material experts have been used to revise the product including description material according to indicators and related sub-themes, complete information on the images presented, and grammar to meet the correct and correct spelling and writing of Indonesian. Furthermore, the design validation obtained the Table 5.

Table 5. Results of Design Expert Validation

No.	Aspects	Total Score	Maximum Score
1.	Didactic Terms	36	40
2.	Construction Requirements	25	28
3.	Technical Requirements	31	32
	Total Score	92	100
	Value	92	
	Description	Very Good	

Based on the Table 5 assessment, a score of 92 was obtained from a maximum score of 100, and the final score was obtained, namely 92 in the very good category. In this study, the design expert validation was carried out once. Some of the suggestions given by media expert validation have been used to revise the product, including the size and color of the letters in the rearrangement, the image should be professional better than the photo, and the contents of the PQ4R steps should be related. Expert validation which then is validation of linguists, obtained the Table 6.

Table 6. Results of Linguist's Expert Validation

No.	Aspects	Total Score	Maximum Score
1.	Straightforward	11	12
2.	Communicative	17	20
3.	Posts	8	8
4	Conformity with the level of development of students	10	10
5	Usage terms, symbols, or image	10	10
	Total Score	56	60
	Value	93.3	
	Description	Very Good	

Based on the Table 6, the score obtained is 56 from a maximum score of 60 and the resulting value is 93.3 in the very good category. In this study, the linguist's expert validation was carried out once. Some suggestions given by linguist's have been used to revise products, namely improving the use of punctuation marks and writing words.

A part from the three expert validations, the researcher validated the practitioners, who in this case were elementary school teachers. This test aims to determine the teacher's response to the feasibility / practicality of the product being developed. The practitioner test was carried out on 8 teachers who were initially the targets of a questionnaire for teaching material needs. This is intended to assess the material, media, and language aspects of student worksheets from the point of view of the teacher as a user of student worksheets in learning.

The feasibility analysis of the student worksheets-based on the teacher's assessment is summarized in the Table 7.

Table 7. Results of Teacher Response Data Analysis of Student Worksheets

No.	Subjects	Total Score	Maximum Score	Value
1.	Practicioner 1	189	204	92.6
2.	Practicioner 2	198	204	97
3.	Practicioner 3	189	204	92.6
4.	Practicioner 4	190	204	93.1
5.	Practicioner 5	199	204	97.5
6.	Practicioner 6	186	204	91.1
7.	Practicioner 7	192	204	94.1
8.	Practicioner 8	191	204	93.6
	Total	1534	1632	752
	Average		83.5	
	Description		Very Good	

Based on the validation results obtained an average value of 83.5 (Table 7) and how many are in the very good category. In general, the teacher's response to the design of student worksheets shows that this teaching material can help students in learning. Interaction in learning is carried out based on the stages of thinking that evoke the experience of students through pictures to help the learning process effectively based on the PQ4R stages (preview, question, read, reflect, recite, review). Thus, this student worksheets is feasible/practical to be continued and used because it meets the aspects of making student worksheets.

After conducting the expert and practitioner test, the next step is to test the attractiveness, convenience, and usefulness of the student worksheets through 3 students. The results of this test are as follows (Table 8).

Table 8. Results of the Analysis of Student's Responses to Student Worksheets

No.	Learners	Value	Category
1.	Diray	80	Very Good
2.	Riska	85	Very Good
3.	Amin	85	Very Good
	Average	83.33	Very Good

Based on the Table 8, the value obtained is 83.33 in the very good category. The use of this student worksheets was tested in the field on 8 students to determine the effectiveness to improve creative thingking skills of the product that had been developed. The results of the field test are (Table 9).

Table 9. Recapitulation of Student Learning Outcomes

No	Learning Outcomes	Pretest	Posttest
1.	Total Value	386.31	579.98
2.	Average	48.28	72.49
	Overall n-Gain		0.47
	Category		Moderate

Based on the field test, it was obtained n-Gain 0.47 in the medium category. This shows that the developed student worksheets is effective in improving creative thinking skills.

The last R&D stage is product revision. At this stage all input from expert tests, practitioner tests, and field tests is used to produce products in the form of student worksheets-based PQ4R. The difference before and after revision can be seen in the Figure 1.

Figure 1. Before Revision

In the Figure 1 that was done before revision. The results of input and suggestions from expert validation include many pictures, the name of the developer and the writing of the students' worksheet is not clear. From the suggestions, it is used to improve and the results obtained in Figure 2.

Figure 2. After Revision

Figure 3. Before Revision

In the Figure 3, input from expert validation includes, among others, on one page there is not only a picture but there is other writing, on every page try to have a students worksheet based PQ4R, information and at the bottom of the page there is a description of the sub-theme and also the page number. Input from expert validation is then used to improve LKPD and results are obtained as shown in Figure 4.

Figure 4. After Revision

The use of student worksheets-based PQ4R is effective as indicated by a learning outcome test that is designed and assessed based on five indicators of creative thinking abilities including the ability of students to observe, ask questions, analyze, collect information or try, reason or associate, and communicate. The effectiveness test was analyzed using n-Gain. The result of the n-Gain calculation is 0.47 (moderate category), this indicates an increase between the previous and after learning outcomes after using student worksheets-based PQ4R (preview, question, read, reflect, recite, review).

This result is reinforced by research conducted by Yasa et al. (2013), which states that developing student worksheets uses the Preview, Question, Read, Reflect, Recite, Review (PQ4R) Learning Strategy. In his research, the results show that the application of the PQ4R learning method affects students' academic achievement. The stages of this development research start from analyzing potential and problems, collecting data, product design, design validation, design revision, product testing, product revision, and usage testing. This is in accordance with what is produced in this study, especially on the dependent variable.

Furthermore, according to Fitriyanti et al. (2015), the use of the PQ4R learning model has an effect on increasing student activity and mastery of material. Then the results of research conducted by Toman et al. (2013), it is known that worksheets activate more students and usually increase success. A study was carried out in this study with the aim of evaluating worksheets while teaching ethanol fermentation prepared according to a constructivist model. It is also a known fact that the behaviors that individuals learn by trying them are more effective than those they get by simply hearing or seeing.

The results of this study are also supported by research conducted by Mubin (2013) the results of this study aim to develop and test the feasibility, practicality, and effectiveness of student worksheets-based on Preview, Question, Read, Reflect, Recite, Review (PQ4R) to increase learning motivation. In the subject of Natural Science grade V Elementary school Karang Dawa, Warungpring District, Pemalang Regency, based on the results of his research there was a fairly high increase in student learning outcomes compared to using conventional learning methods.

Student worksheets are sheets that can be used by teachers or educators to convey information better, attract and enable students to be more active. According to Toman et al. (2013) Worksheets are one of the teaching methods which can bedone individually or in group work and enable conceptual development. One of the functions of student worksheets is as an evaluation tool, this is according to Lee (2014) as an assessment tool, worksheets can be used by teachers to understand students' previous knowledge, outcome of learning, and the process of learning; at the same time, they can be used to enable students to monitor the progress of their own learning.

Well-structured student worksheets must refer to various conditions that are met. (Prastowo, 2015) explains that the student worksheets design is not fixed on one form. Educators can develop student worksheets designs by paying attention to the level of ability and knowledge of students. Rohaeti and Padmaningrum (2012) explains the requirements of student worksheets, namely (1) didactic requirements regulate the use of student worksheets which are universal, emphasizing the process of finding concepts, there are variations of stimulus through various media. (2) the construction requirements relate to the use of language, level of difficulty, and clarity in the student worksheets. (3) Technical requirements emphasize writing, pictures, appearance in student worksheets.

Student worksheets developed based on PQ4R to improve creative thinking skills. Creative thinking is an attempt to connect objects or ideas that were previously unrelated. This is one of the abilities of the cognitive aspects of students. The cognitive aspect is an aspect that emphasizes the intellectual ability of students in thinking, in the realm of Bloom's taxonomic thinking development (Krathwohl & Anderson, 2001). Creative thinking is richer than critical thinking. According to Runisah (2016) creative thinking skills is higher order thinking skills. The above goals necessitate a distinction between an innovative teaching approach and an approach that provides opportunities for creative thinking. Helping students to think creatively in the context of school science is certainly very different form both teaching them creatively (i.e., by implementing an innovative approach) and teaching them about the nature of science, in order to help them become aware of and appreciate science as a creative endeavour (Hadzigeorgiou et al., 2012).

According to Susanto (2014) creative thinking can be interpreted as thinking that can connect or see something from a new perspective. While the characteristics of creative people according to Carin (Susanto, 2014) are curiosity, resourceful, have a desire to find, choose difficult jobs, enjoy solving problems, have dedication to work, think flexible, ask lots of questions, give answers who are better, capable of synthesizing, able to see new implications, and have broad knowledge. Martin (2009) argues that being able to generate new ideas and ways to produce a product is being able to think creatively. The same opinion is expressed by McGregor (2007), namely that creative thinking is thinking whose direction is to gain new insights, approaches, perspectives, and ways when facing something. Creative thinking is a skill of performing thinking pattern that has been based on the indepth understanding toward the concepts that an individual has mastered previously and the thinking pattern then will influence the individual‟s mind to make a change. A usual matter for a teacher might not be usual for a student. Therefore, teachers should be able to develop a learning method or a learning strategy that will develop their students‟ creative thinking (Noviani & Wangid, 2018).

According to Holland (Mann, 2005) aspects of the ability to think creatively are fluency, flexibility, authenticity, elaboration, and sensitivity. Meanwhile, according to Torrance and Guiford (Munandar, 2009), the ability to think creatively includes abilities such as fluency, flexibility, originality, and elaboration. Limitations in the development student worksheet based PQ4R research (preview, question, read, reflect, recite, review) are: (1) Competency tests presented in the student worksheet based PQ4R (preview, question, read, reflect, recite, review) with the theme "uniqueness the area where I live", refers to indicators of the achievement of learning objectives. (2) This research was conducted to focus on studying the use of student worksheet based PQ4R (preview, question, read, reflect, recite, review) in learning. (3) The R&D research steps are completed only in the fifth step due to the existence of policies regarding social distancing. (4) This research was conducted at the level of feasibility of student worksheets only in terms of theoretical feasibility. And (5) the development of student worksheets is only limited to one sub-theme, so that it is considered not comprehensive enough to meet the needs of students.

PQ4R offers learning concepts that optimize students' ability through meaningful organizing of information and involves the student's active role in learning (Fitriani & Suhardi, 2019). Other research, Wahyuningsih & Kiswaga (2019) Preview Question Read Reflect Recite Review (PQ4R) Learning Model is also effective for improving the students' reading comprehension skills. The effectiveness has been confirmed by the significant gain score in the second experimental group from 72.435 into 87.652. Setiawati and Corebima (2018), PQ4R Learning centers on the students, so that students can build their own knowledge. Attributes of creativity include that: (1) it is determined by individual products, results of valuing creation, (2) it is a mental process with focus on occurrence and experiences of creation to understand through observational and instropective methods, (3) it is determined by measurement result of test (Lin, 2012).

Conclussion

Based on the results of research and development under the title "Development of student worksheets-based preview, question, read, reflect, recite, review (PQ4R) to improve creative thinking skills" it can be concluded that the product produced in this research and development is student worksheets-based on preview, question, read, reflect, recite, review (PQ4R) grade IV elementary school with material on the uniqueness of my living area. Based on the results of the validation, the student worksheets-based preview, question, read, reflect, recite, review (PQ4R) was declared valid both in terms of content and construction. language 93.3 and practitioner test of 83.5. In addition, the effectiveness of student worksheets-based on the n-Gain test was obtained by 0.47 in the medium category.

The implication of research and development of student worksheets-based preview, question, read, reflect, recite, review (PQ4R) is learning that can make students learn creatively, in solving various problems. This is because student worksheets-based PQ4R is presented with an attractive and contextual appearance, and presents learning with various activities. student worksheets-based PQ4R is presented by combining fluency, flexibility, authenticity, and detail so that it can facilitate the diverse abilities of students. The results of research and development of student worksheets-based PQ4R can be used as an alternative to support textbooks and make it easier for teachers to deliver practical material. The development of student worksheets-based PQ4R can optimize the creativity of students.

Based on the results of the research that has been done, it is suggested that the following things: the process of searching for information to solve problems is more creative in conveying the information obtained, so that it is easier for students to find answers to problem solving at high-level thinking skills. In addition, it can be used as teaching material that supports facilities in the learning process.

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