Development of The Living Thing Transportation Systems Worksheet on Learning Cycle Model to Increase Student Understanding

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Abstract. This study aims to know: 1) the feasibility LKPD review of aspects of the didactic requirements, construction requirements, technical requirements and compliance with the Learning Cycle. 2) Increase understanding of learners with Learning Model Learning Cycle in SMP N 1 Wates in the form LKPD. 3) The response of learners and educators SMP N 1 Wates to quality LKPD Transportation Systems Beings. This study is an R & D with the 4D model (Define, Design, Develop and Disseminate). Data were analyzed using qualitative analysis and quantitative analysis. Qualitative analysis in the form of advice description and assessment scores from all validates that was converted to a scale of 4. While the analysis of quantitative data by calculating the percentage of materializing learning and achievement using the standard gain an increased understanding and calculation of the KKM completeness evaluation value as an indicator of the achievement of students understanding. the results of this study yield LKPD IPA model learning Cycle theme Transportation Systems Beings obtain 108.5 total scores of a maximum score of 128 including the excellent category (A). LKPD IPA developed able to demonstrate an improved understanding of learners and the response of learners was very good to this quality LKPD IPA.

1. Introduction

In 2013 curriculum, there is a Learning Cycle model where the learning process of learners can master the competencies that must be achieved by participating actively participate. The success of the learning cycle is examined by experts from the beginning of its development. The results show that the learning cycle can improve the learners' learning outcomes, improve the reasoning abilities and skills of the science process and learners have better conceptual retention [1].

Understanding concepts are considered important in the learning process because concepts are the building blocks of thinking and the basis for higher mental processes to formulate principles and generalizations [2]. If in the process of learning to teach learners, we have problems in understanding the concept, this will result in low learning achievement of science. Although, not all students experience it because each learner has different abilities. To overcome these problems required an innovation in learning so that the learning process learners run effectively and learning objectives can be achieved completely. Benny A Pribadi [3] suggests that the learning process can be called successful if learners interact with learning resources seriously and continuously, doing exercises for competency mastering, getting feedback immediately after learning, applying skills in real contex and interacting in acquiring knowledge And skills. To realize a successful learning process and in

accordance with the objectives of learning, appropriate approaches, models and learning methods are needed.

The process of learning in the class, of course, cannot be separated from the role of teachers as educators. To find a concept, educators need to guide learners toward the discovery of concepts. One method that can be used to find a concept that is experimental activities, learners positioned as if a scientist who performs a process to connect with the symptoms he encounters. Trial activities require activity guidance, that is LKPD (Student Activity Sheet) which can be arranged as a guide for learners in doing activities. According to Trianto [4], the worksheet of learners activities is the learners' guides used to carry out investigative or problem-solving activities. LKPD has a big role in the learning process because it can help educators to lead learners to discover concepts through their own activities. This material science is very complex, such as the material in the Transportation System of Living Things. Make teachers overwhelmed to teach it in the classroom. Usually, the teacher will explain the material with the theory without any experiments conducted by learners.

2. Research method

2.1. *Type of research*

This research type is *Research and Development* (R & D).

2.2. *Time and place*

The study was conducted at SMPN 1 Wates, 15-23 February 2016.

2.3. *Subject and objects research*

The subjects of this study were 28 children in class VIII C SMP N 1 Wates as respondents. The object of this research is LKPD IPA theme "Transportation of Life" in Learning Cycle model to improve students' understanding.

2.4. *Procedure*

The method used in this research is development. The model used is the development of the 4-D model. The 4-D development model was developed by S. Thiagarajan, Dorothy S. Semmel and Melvyn I. Semmel [5] includes four stages: *define*, *design*, *develop* and *disseminate*. The defining stage did by problem analysis, student analysis, task analysis, concept analysis, and formulate learning objectives. In the design stage, the preparation of instruments, selection of teaching materials, format selection, and initial product design. The development stage includes the review phase by the supervisor, expert judgment (validation by the expert lecturer and science teacher), and product trial. In the disseminated stage (dissemination) is only done in a limited, considering the realm of R & D research is very broad.

2.5. *Technique of data analyze*

Validation/feasibility analysis, students' response, and observation sheet of learning cycle implementation are done by calculating the average score, the average score is then converted to scale 4 presented in Table 1.

Table 1. Conversion Score to Value on a Four Scale [6]

No.	Score Range	Value	Category
1.	$X > Xi\,Xi + 1 \cdot Sbi$	A	Very Good
2.	$Xi\,Xi + 1 \cdot Sbi > X \geq Xi\,Xi$	B	Good
3.	$Xi\,Xi > X \geq Xi\,Xi - 1 \cdot Sbi$	C	Bad
4.	$X \leq Xi\,Xi - 1 \cdot Sbi$	D	Very Bad

While the increase in understanding of learners is calculated by using gain score

$$\text{Gain score} = \frac{posttest\ score - pretest\ score}{maximum\ score - pretest\ score} \quad (1)$$

Table 2. Completeness Criteria Based on KKM [9]

Range Score	Category
$g > 0.7$	High
$0.3 \leq g \leq 0.7$	Medium
$g < 0.3$	Low

Based on the completeness of the final test result (posttest) of the whole students, the percentage of learners' complete mastery can be calculated as follows.

$$\text{Percentage of Mastery: } \frac{the\ number\ of\ succeeded\ students}{total\ number\ of\ students} \quad (2)$$

3. Results and discussion

3.1. *Feasibility of LKPD IPA development results*

The researcher compiled the operational definition of the theory that has been studied then compiled the LKPD grid. The grid is used as a development guide and measurement instrument on LKPD.

LKPD was developed as an initial product which then carried out a series of tests to get constructive criticism, suggestions, and inputs, so as to produce products that meet the criteria that can be used in the learning process. Revisions are made after the validation stages to make the product ready for use for development testing.

After providing inputs and responses to the developed products, expert lecturers and teachers as validators also provide an assessment of LKPD products in order to determine the feasibility of product development. The assessment contains two aspects: material aspect and media aspect. The results of the scores by the validator are shown in Figure 1.

The assessment which is done by the teacher is a validation of LKPD product by referring to LKPD validation questionnaire. The teacher's assessment of LKPD products includes the components of didactic conditions, terms of construction, technical requirements and conformance with Learning Cycle.

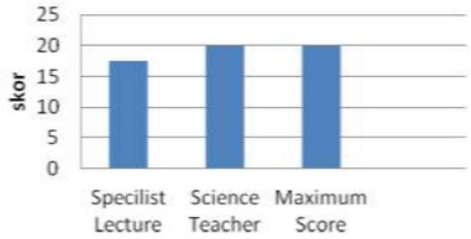

Figure 1. Lecturer and Teacher Rating Score Diagrams

3.2. *Student's Response to LKPD*

Response data of students to LKPD IPA Learning Cycle model using questionnaire given at the end of learning activities. Questionnaire response of learners consists of four aspects namely didactic aspects, construction, and technical and conformity aspects of the Learning Cycle model. Right statements are tailored to the level of understanding of students. Questionnaire response of learners distributed to 28 students class VIII C SMP N 1 Wates. The calculation of student's questionnaire responses uses the same way as media validation score calculation. The result of the average score of didactic condition requirement equals to 15,9, the aspect of construction condition equal to 35,4, the aspect of technical requirement equals to 9,07 and the aspect of conformity with LC equals to 3,2. Based on the scores, the response of student to LKPD included in the category of "Very Good". It shows that LKPD is feasible to be used and can attract students' interest in their learning activities. The diagram of students response of LKPD presented in Figure 2. It shows that LKPD is feasible to be used and can attract learners' interest in their learning activities.

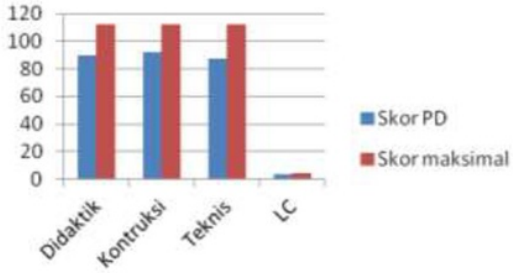

Figure 2. The Diagrams of Students' Response

3.3. *Enhancement of understanding learners*

Enhancement of students' understanding is measured using an evaluation test (pretest-posttest). The test instrument has been previously validated, which is a multiple choice of 30 items that match the predetermined indicator of achievement. Use the C2 understanding aspect of Bloom Taxonomy.

Based on these results, the percentage of students' learning mastery can be calculated as follows.

$$\text{the Percentage of Mastery} = \frac{the\ number\ of\ succeeded\ students}{total\ number\ of\ students} \times 100\%$$

$$= \frac{24}{28} \times 100\% = 85.7\%$$

Table 3. Data of Student Mastery Lesson

No	Score	Frequency	Description	
			Complete	Incomplete
1	73,3	-	-	-
2	76,6	4	-	√
3	80	7	√	-
4	83,3	11	√	-
5	86,6	3	√	-
6	90	-	-	-
7	93,3	1	√	-
8	96,6	1	√	-
9	100	1	√	-
Total		28	24	4

Based on the calculation of the evaluation test has increased from the previous material which achieved the mastery below 75% to 85.7%. Based on the calculation of gain score obtained a value of 0.6 that belongs to the category "medium".

3.4. *Observation of learning cycle in learning activities*

The implementation of learning with Learning Cycle model is done by observation technique. Observations were made by two observers during three meetings. This observation sheet fills the lattice of the Learning cycle learning model. The data of learning outcomes using Learning Cycle can be seen in Table 4.

Table 4. Percentage of Learning Implementation

Activity	Percentage of Implementation (%)			Average (%)
	P 1	P 2	P 3	
Teacher	100	100	100	100
Student	72,2	100	100	90,7

4. Conclusion and suggestion

4.1. *Conclusion*

The feasibility of LKPD IPA with the theme "Living Transportation System" in the Learning Cycle learning model that has been produced according to the assessment of expert lecturers and IPA Teachers is included in the excellent category (A). Enhancement of learners' understanding with Learning Cycle Learning Model at SMP N 1 Wates in 3 meetings gets percentage of complete evaluation value based on KKM that is equal to 85,71% and gain score category including medium. The response of learners and educators SMP N 1 Wates to the quality of LKPD Living Transportation System included in the category very well.

LKPD with Learning Cycle model is said to be feasible and included in the category very well because in accordance with the purpose of learning cycle model that can help teachers in developing a conceptual understanding that can accommodate learning opportunities of teachers and learners. The learning cycle can be implemented flexibly and meet the real needs of teachers and learners. Judging from the dimensions of the teacher application of this model broaden the horizons and improve the creativity of teachers in designing learning activities. In terms of students 'dimensions, the application of this model provides benefits as (1) improves learning motivation because learners are actively involved in the learning process, (2) helps develop the students' scientific attitudes, (3) more meaningful learning. (Fajaroh dan Dasna dalam Buku Guru IPA 2013: 15).

4.2. *Suggestion*

With the arrangement of LKPD IPA "Living Transportation System" in Learning Cycle learning model is expected teachers can use it as a medium of learning while doing learning on the material. And it is expected that the use of this LKPD in addition to the learning process, it is expected that learners can use it outside of class hours as supporting independent activities.

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