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DEVELOPMENT OF STUDENT WORKSHEETS IN SCIENCE BASED ON THE DISCOVERY APPROACH FOR STUDENTS OF GRADE IV OF MADRASAH IBTIDA'IYAH

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Abstrak
Hasil analisis kebutuhan menunjukkan sebagian hasil belajar mata pelajaran IPA, siswa belum mampu memenuhi KKM IPA sebesar 65, sekolah membutuhkan LKS yang bervariasi untuk menarik perhatian siswa belajar. Salah satunya Student Work Sheet IPA Berbasis Pendekatan Discovery. Model penelitian dan pengembangan penelitian menggunakan desain menurut Branch 2009 Pendekatan ADDIE. Analysis (analisis), Design (perancangan), Development (pengembangan), Implementation (ujicoba) dan Evaluation (penilaian). Hasil penelitian diperoleh (1) LKS IPA berbasis pendekatan discovery valid dan layak digunakan berdasarkan uji validasi ahli materi dan ahli media memperoleh rata-rata skor 3,30 dan 3,95 dengan kriteria sangat baik, (2) LKS IPA Berbasis pendekatan discovery dapat menigkatkan hasil belajar kognitif siswa pada materi gaya dan gerak, ditunjukkan dari hasil uji t test yaitu rata-rata hasil posttest > rata-rata hasil pretest yaitu79 > 53.

Kata kunci: pengembangan LKS/*Student Work Sheet*, IPA, pendekatan *discovery*, hasil belajar.

Abstract
The results of the needs analysis show that some of the learning outcomes of science subjects, students have not been able to meet the KKM of science of 65, schools need varied LKS to attract students' attention to learning. One of them is the Student Work Sheet Science Based on the Discovery Approach. The research and development model uses a design according to Branch 2009 ADDIE Approach. Analysis (analysis), Design (design), Development (development), Implementation (trial) and Evaluation (assessment). The results of the study obtained (1) Science LKS based on the discovery approach is valid and feasible to use based on the validation test of material experts and media experts obtaining an average score of 3.30 and 3.95 with very good criteria, (2) Science LKS Based on the discovery approach can improve students' cognitive learning outcomes on the material of force and motion, shown by the results of the t-test, namely the average posttest result> the average pretest result, namely 79> 53.
Keywords: development of LKS/Student Work Sheet, science, discovery approach, learning outcomes

Introduction

One of the printed media that is often used by students in the learning process is the Student Activity Sheet (LKS). As stated in the general guidelines for the development of teaching materials (Diknas, 2004), Student Activity Sheets (SWS) are

sheets containing tasks that must be done by students. Student activity sheets are in the form of instructions or steps to complete a task, and the task must be clear about the basic competencies to be achieved. LKS has an important role in achieving learning objectives, because LKS has the following functions: a) Can minimize the role of educators, but activate students more; b) Make it easier for students to understand the material given. LKS in teaching and learning activities can be used at the concept instillation stage (conveying new concepts) or at the concept understanding stage (advanced stage of concept instillation) because LKS is designed to guide students in studying topics. At the concept understanding stage, LKS is used to study knowledge about topics that have been studied.

Approach is one component of learning that also has an important role in achieving learning objectives. According to Piaget, in students' cognitive development, the most important thing is the mastery and category of concepts, through these concepts students get to know the environment and solve various problems faced in their lives. One approach that can make students find concepts is the discovery approach which has the advantage that students will understand basic concepts and ideas better, encourage students to think initiatively and teaching is more student-centered. The material on force and motion is one of the materials related to daily activities such as opening and closing doors, pushing tables, even playing on swings is always related to force and motion. Through the discovery approach, students will be more active in learning when faced directly with problems and how to solve them. So it is hoped that students will be able to think initiatively and reach the final stage of the discovery approach, namely students are able to find concepts about force and motion.

Based on the background above, researchers are interested in developing printed teaching materials in the form of Science Student Work Sheets based on a discovery approach that can help teachers during the learning process and guide students in solving problems related to the material on force and motion.

According to Sumantri (2016: 333). Student Work Sheets are sheets containing assignments that must be completed by students. Meanwhile, according to Trianto (2011: 243). Student work sheets are student learning tools that contain various activities that will be carried out by students actively. These activities can be in the form of observations, experiments, and asking questions. Majid (2016: 374) also stated that LKS is one of the teaching aids in the form of sheets containing assignments that must be completed by students. LKS contains instructions and steps to complete a task, both theoretical and practical tasks. LKS not only contains practice questions, but also contains basic materials that must be studied, understood, and mastered by students. The objectives of compiling LKS include: Training student learning independence and making it easier for educators to give assignments to students.

According to Sagala (2010: 196) the discovery approach is a teaching approach that seeks to lay the foundation and develop scientific thinking, this approach places students more in self-study, developing creativity in solving problems. Students are truly placed as learning subjects. The role of educators in the discovery approach is to guide learning and facilitator learning. According to Sagala there are five stages in implementing the discovery approach, namely:

1) Formulating problems for students to solve;
2) Determining temporary answers (hypotheses);

3) Students seek information, data, facts to answer problems;
4) Drawing conclusions or generalizations;
5) Applying conclusions/generalizations in new situations.

Methods

Research and development model in this R&D research, the researcher used the research and development model design according to Branch, 2009 (Sugiyono, 2016: 38). Analysis, Design, Development, Implementation, and Evaluation. Analysis is related to the gaps in various components of learning and teaching, including those related to educators, students, materials, assignments, assessment instruments, and evaluation. The second step is Design, designing printed teaching materials in the form of Science LKS based on the discovery approach, then the third step is Development, a validation test is carried out, the aim is to find out the shortcomings of the products made as a basis for improvement, the fourth step is Implementation, a trial of using printed teaching materials in the form of Science LKS based on the discovery approach. And the last step is Evaluation, conducting an assessment of the LKS product.

Student Work Sheet Science Based on Discovery Approach is said to be valid if the results obtained by experts, both media experts and material experts, get an average value of 2.51 to 4.00. The following is a categorization table according to Widoyoko (2014: 144).

Number	Interval Score	Category
1	3,26 – 4,00	Very good
2	2,51 – 3,25	Good
3	1,76 – 2,50	Enough
4	1,00-1,75	Low

Result and Discussion

The following will describe the results of the research in this study based on data acquisition and statistical calculation results using SPSS 16.0 for windows. In data analysis to determine the comparison of pretest and posttest results in the study, a prerequisite test was carried out to determine whether both pretest and posttest data were normally distributed and came from the same variance (homogeneous), namely with a normality test and a homogeneity test, then a comparative test stage.

Students' Cognitive Learning Outcomes in Learning Using LKS Based on Discovery Approach

a. *deskriptive statistic test*

Table
pretest dan *posttest result*

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pretest	19	28	89	58.84	16.443
Postest	19	33	100	79.00	17.101
Valid N (listwise)	19				

Based on the data above, it can be seen that the comparison shows that the post-test value is > the pre-test value..

1)Normalitas Test

The hypothesis of the normality test of pretest and posttest data in this study is as follows.

Ho = if sig > 0.05 then the data is normally distributed

Ha = if sig < 0.05 then the data is not normally distributed

The One-Sample Kolmogorov-Smirnov Test method, the decision guideline is if the significance value (sig)> 0.05, then Ho is accepted. But if the significance value (sig) < 0.05, then Ho is rejected.

Table 4 Normalitas test result

One-Sample Kolmogorov-Smirnov Test

		pretest	postest
N		19	19
Normal Parameters[a]	Mean	58.84	79.00
	Std. Deviation	16.443	17.101
Most Extreme Differences	Absolute	.132	.183
	Positive	.132	.138
	Negative	-.104	-.183
Kolmogorov-Smirnov Z		.575	.799
Asymp. Sig. (2-tailed)		.895	.546

a. Test distribution is Normal.

Based on the table above, the pretest significance value is 0.895 > 0.05 and the posttest significance value is 0.546 > 0.05, so it can be concluded that both pretest and posttest data are normally distributed.

2) Homogenitas Test

The homogeneity test of pretest and posttest data values was conducted using SPSS 16.0 for windows with the Levene Statistic test on the One Way ANOVA test. The hypothesis in this study is as follows:

H_o : $\sigma_1^2 = \sigma_2^2$ *pretest score* dan *postest* homogen.

H_a : $\sigma_1^2 \neq \sigma_2^2$ *pretest score* dan *postest* not homogen.

The decision-making criteria are if the significance value (sig) > 0.05 then Ho is accepted. But if the significance value (sig) < 0.05 then Ho is rejected.

Table 5 Homogenitas test result

Test of Homogeneity of Variances

data_postest

Levene Statistic	df1	df2	Sig.
3.622	4	8	.057

ANOVA

Postest					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	3824.083	10	382.408	2.125	.149
Within Groups	1439.917	8	179.990		
Total	5264.000	18			

Based on the table above, it can be seen that the significance value is 0.057 > 0.05. Thus, it can be concluded that Ho is accepted and both data variants are homogeneous.

3) Comparasion Test

According to Priyatno (2012: 42-44) This test is used to determine the difference in the average value of the pretest and posttest results. This comparative test was carried out with the help of SPSS 16.0 with a paired sample t-test. The hypothesis in this study is as follows

Ho = there is no difference between pretest and posttest values

Ha = there is a difference between pretest and posttest values

Paired sample t-test method. The decision guideline is if the significance value (sig 2 tailed) > 0.05, then Ho is accepted. But if the significance value (sig 2 tailed) < 0.05, then Ho is rejected.

Table 6 *Paired Sample T test Result*

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	58.84	19	16.443	3.772
	Postest	79.00	19	17.101	3.923

Paired samples sattistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pretest	58.84	19	16.443	3.772
	postest	79.00	19	17.101	3.923

Paired Samples Test

		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	data_pretest - data_postest	-20.158	11.577	2.656	-25.738	-14.578	-7.590	18	.000

Based on the table above, it can be seen that the significance value is 0.00 < 0.05, so Ho is rejected. Thus, it can be concluded that there is a significant difference between the pretest and posttest results of 0.00.

Summary and Recomendation

Based on the results of the research conducted on the development of Science Student Work Sheets based on the discovery approach, it can be concluded that from the results of the analysis of the needs of the existing LKS media in schools, not all of them fulfill the elements in the LKS, such as the time to complete the task and the color and image design tends to be blurry, so that a more varied LKS is needed, one of which is the Development of Science Student Work Sheets based on the Discovery Approach.

One of the advantages of the discovery approach is that students will understand the basic concepts and ideas better and the Science LKS/Students Work Sheet based on the discovery approach contains the ADDIE stages according to Branch, 2009 (Sugiyono, 2016: 38) and is said to be valid based on the results of the validation test by material and media experts with an average score of 3.30 and 3.95 with very good criteria and suitable for use in the field.

LKS/Students Work Sheet Science based on the discovery approach can improve students' cognitive learning outcomes on the material of force and motion as seen based on the results of the t-test with the help of SPSS 16.0 for Windows with the paired sample t-test showing that the average post-test result is > the average pre-test result, namely 79 > 53.

Suggestions contained in the development of LKS/Student Work Sheet Science Based on Discovery Approach. Based on the findings in this study, there are several suggestions, including:

1. School

It is expected that schools use the Discovery Approach-Based Science LKS/Student Work Sheet as a companion book in the learning process, especially in the science subject of force and motion. Because the discovery approach has the advantage that students will understand basic concepts and ideas better.

2. Teacher

This development product can be used as a reference for teachers in making printed teaching materials, one of which is the Student Activity Sheet. However, this LKS development product still has several shortcomings. In the early stages of the discovery approach, namely when giving problems, illustrations should be given that are relevant to students' lives so that students can provide temporary answers/hypotheses easily.

3. Researcher

This LKS development product can be further developed by using other materials that are appropriate to student characteristics and modified with a different approach..

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