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## Needs Analysis for the Development of Student Worksheets on Heat Material in the Context of a Solar Energy Desalinator

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### Abstract

Before using student worksheets, so that they can be used legally, they should be tested first on at least 3 experts and tested on students. The type of research used is descriptive qualitative. This needs analysis aims to determine what teaching materials are needed in the heat material at Junior High School 4 Bengkulu City. The method in this study, researchers used the Research and Development (R&D). ADDIE model development procedure. The research was carried out in September 2022. The research sample consisted of 40 students who were in 8<sup>th</sup> grade. The research instruments were in the form of interviews and student response questionnaires which consisted of 18 question items regarding the needs of integrated worksheets for solar energy-based desalinator designs which contained 4 aspects namely indicator aspects, teaching material needs aspects, learning media aspects, and interest aspects. The results of student response data based on aspects of the average indicator of 80% do not use Student Worksheets on heat material, the aspect of teaching material needs on average is 80% of students find it difficult to learn science on heat material with teaching materials that used by teachers, the learning media aspects of students on average 77% rarely use laboratories to conduct experiments or practicums, so teachers rarely use and provide Student Worksheets to students in science lessons, and the motivational aspects of student interest on average on average 82% are quite interested, quite enthusiastic about learning science so what are they interested in developing Student Worksheets teaching materials. From the data obtained, some students agree that it is necessary to develop Student Worksheets.

**Keywords:** Teaching Materials; Students Worksheet; Need Analysis

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## INTRODUCTION

The independent learning curriculum policy has characteristics that emphasize student creativity, problem solving and learning based on the demands of the world of work (Dermawati et al., 2019). In line with the objectives of the 2013 curriculum, which is to prepare Indonesian people to be productive, creative, innovative and affective and able to contribute to social life (Turmuzi et al., 2022). Therefore, efforts to realize the goals of the curriculum in schools need to be developed, one of which is through teaching materials.

Teaching materials used in the learning process if developed according to the needs of teachers and students and used correctly will be one of the important factors that can improve the quality of learning (Anggraini et al., 2023). With the existence of teaching materials, the roles of teachers and students in the learning process shift. Originally the teacher was perceived as the only source of information in class, while students were positioned as passive recipients of information from their teacher. With the existence of teaching materials, the teacher is no longer the only source of learning in the classroom. In this case, the teacher is more directed to act as a facilitator who helps and directs students in learning (Nurhidayati, 2019). Teaching materials are materials or subject matter that are arranged systematically, which are used by teachers and students in the learning process (Magdalena et al., 2020). Teaching materials are additional materials used in the learning process which are arranged systematically. The forms of teaching materials vary greatly, such as modules, learning packages, learning units, student worksheets and others. One of the teaching materials used in schools in describing the process is the Student Worksheet (Astuti et al., 2021).

Student worksheets are print media resulting from the development of print technology in the form of books. According to (Putri et al., 2022) that Student Worksheets are student guides that are used to carry out investigative or problem-solving activities. The guide in this Student Worksheet is used as an exercise for students to develop aspects that must be possessed in the process of learning activities. In addition to guiding students in solving problems in learning, Student Worksheets also assist educators in conveying concepts that students must understand (Devita,

2018). The definition of Student Worksheets is a learning resource for printed teaching materials in the form of sheets of paper containing material, summaries, and instructions for carrying out learning tasks that must be done by students, which refers to the basic competencies that must be achieved, and their use depends on the material. other teaching materials, such as textbooks, modules, Student Worksheets, and others (Aidin et al., 2019).

Student Worksheets can understand the material presented better, because in Student Worksheets they are also directed with activities that can make it easier for students to understand the concept of learning material (Firdaus & Wilujeng, 2018). Based on the needs analysis research that has been carried out, learning by creating a product that is directly related to the concepts being studied can be applied through teaching materials in the form of Student Worksheets.

Subsequent research by (Mahjatia et al., 2021) entitled Development of STEM-Based Student Worksheets to Train Students' Science Process Skills Through Guided Inquiry. shows the validity of the student worksheets in the valid category, the developed student worksheets are declared practical, because the response questionnaires from students are categorized as practical, the effectiveness of the student worksheets obtained is in the moderate category which means effective, KPS achievement through STEM-based student worksheets obtained as a whole is very well and has increased in every meeting, so this Student Worksheet can be used to train students' science process skills. Based on the research above, it can be concluded that learning by creating a product that is directly related to the concepts being studied can be applied through teaching materials in the form of student worksheets.

## METHODS

The type of research used is descriptive quantitative method. In this study, researchers used the Research and Development (R&D) development research method. Research and development was carried out based on the ADDIE model development procedure (Andi Rustandi & Rismayanti, 2021). The research was conducted in September 2022 at a public junior high school (SMP) in Bengkulu City. The research sample consisted of 40 students who were in class VII. The research instrument was a student response questionnaire consisting of 18

question items regarding the needs of Student Worksheets integrated with solar energy-based desalinator designs which contained 4 aspects, namely aspects of convenience, aspects of the need for teaching materials, aspects of learning media, and aspects of interest (Ermawati & Rufaidah, 2019) . The data collection process was carried out by means of observation, interviews with science teachers and distributing student response questionnaires directly which were then analyzed descriptively.

### RESULTS AND DISCUSSION

Analysis of the needs for the development of Student Worksheets was carried out through interviews and observations at Public Junior High School 4 Bengkulu City. This is intended to know the learning process and see how the characteristics of students during the learning process. The results of needs analysis data in developing Student Worksheets based on four aspects can be seen in table 1 below:

Table 1. The results of the needs analysis data are based on 4 aspects

Aspect	Average
Indicator Needs	80 %
Teaching Material Needs	80 %
Learning Media Needs	77 %
Interest Motivation	82 %

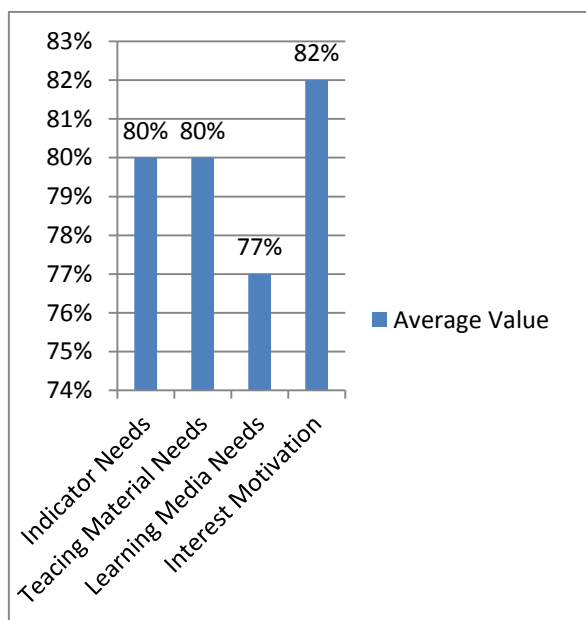


Figure 1. Diagram of the results of the needs analysis data based on 4 aspects

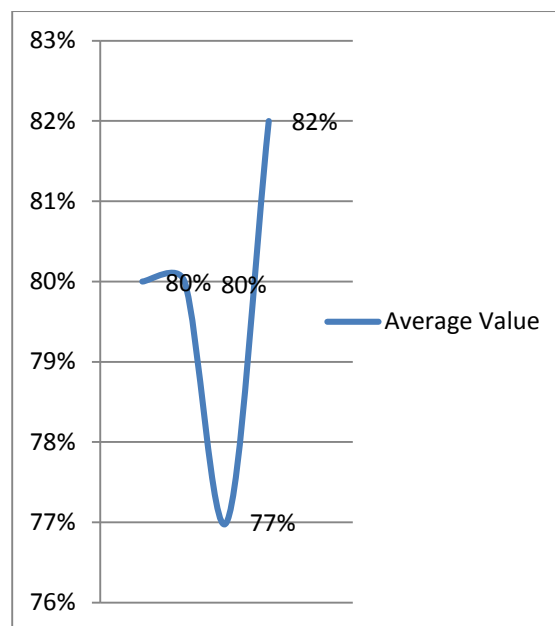


Figure 2. The results curve of the needs analysis data is based on 4 aspects

### Basic Competency Analysis and Learning Material Objectives

The analysis phase in this study includes: Competency Analysis. Competency analysis refers to core competencies and basic heat competencies that must be achieved by students of SMP Negeri 4 Bengkulu City. Each competency is developed into an indicator of achievement and learning objectives. Based on the 2013 curriculum syllabus, the basic competencies (KD) that are considered most relevant are KD 3.4 Analyzing the concepts of temperature, expansion, heat, heat transfer, and their application in everyday life and 4.4 Conducting experiments to investigate the effect of heat on temperature and the shape of objects and displacement heat. The basic competencies, indicators, and learning objectives are presented in the table below:

Table 2. Basic Competence and Indicators of Caloric Matter

Basic Competence	Indicator
3.4 Analyze the concepts of temperature, expansion, heat, heat transfer, and their application in everyday life	3.4.4 Distinguish between conduction, convection and radiation heat transfer

4.4 Conducting experiments to investigate the effect of heat on temperature and shape of objects and heat transfer	4.4.2 Conducting experiments to investigate the effect of heat on the shape of objects
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Based on the Basic Competencies above, the analysis of student characteristics begins with interviews and observations. Interviews were given to science teachers at SMP Negeri 4 Bengkulu City. The material to be developed in the worksheets is material on basic competences 3.4 and 4.4 on analyzing the effects of heat and heat transfer and planning and conducting experiments..

### Teaching Material Needs Analysis

At this stage, observations, interviews and questionnaires were carried out to analyze the needs of students. Observations were made directly related to learning Natural Sciences at SMP Negeri 4 Bengkulu City, researchers conducted interviews with three Natural Sciences teachers who taught at Public Junior High School 4 Bengkulu City using interview guide sheets have been designed by previous researchers. Meanwhile, the researchers used a needs analysis questionnaire in a class with a total of 40 students at Public Junior High School Bengkulu City. It can be seen that the curriculum used in Public Junior High School 4 Bengkulu City still uses the 2013 curriculum and has not used the independent learning curriculum because there are several factors that influence it so that it is not yet biased using the independent learning curriculum. The learning process in the classroom in Natural Sciences) subjects still uses lecture, question and answer, and discussion methods. By using the lecture method, question and answer, and discussion, some students when learning Natural Sciences in the class are not too enthusiastic in following the lesson and listening to some of the teacher's explanations. The results of the needs questionnaire can be seen in the figure 3.

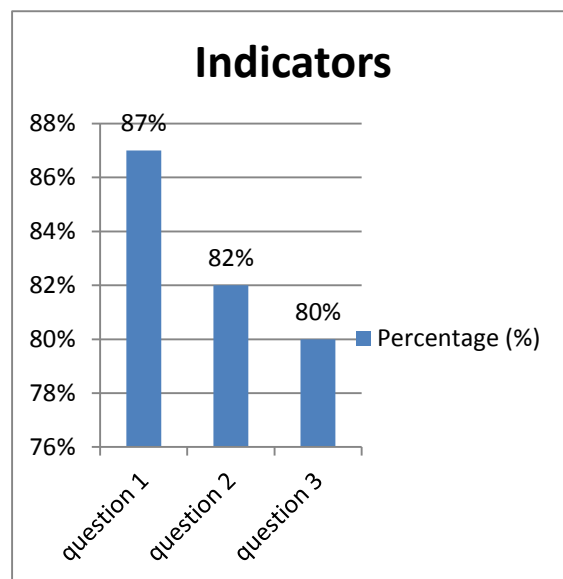


Figure 3. Graph of Indicator Needs Questionnaire Results

Based on the graphic image above, it can be concluded that the results of the needs questionnaire on the aspect of student indicators on average 80% did not use Student Worksheets on heat material, these students used teaching materials originating from schools provided by the Ministry of Education and Culture, using materials teaching from school has not made it easier to follow science lessons.

### Teaching Material Needs

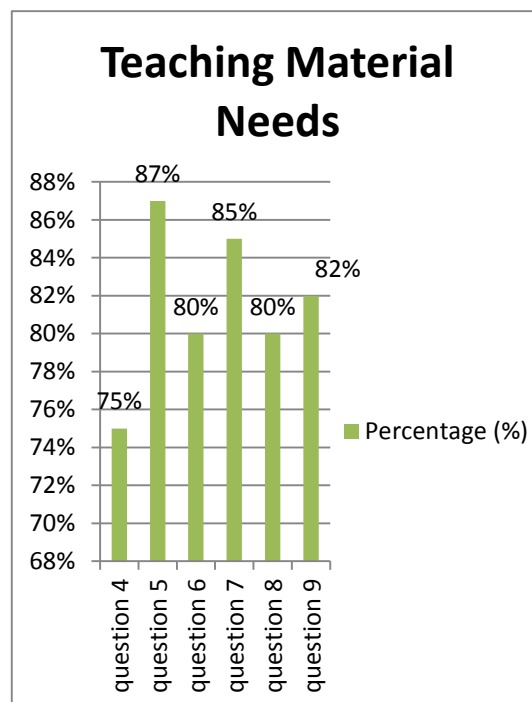


Figure 4. Graph of Material Needs Analysis A

Based on the graph above, it can be concluded that the results of the needs on the needs aspect of students' teaching materials on average 80% of students find it difficult to learn science on heat material with teaching materials used by teachers, students will more easily understand science subject matter by means of do an experiment or experiment. So that it requires teaching materials that can be used to study the subject matter of heat that is easier and more interesting.

**Learning Media**

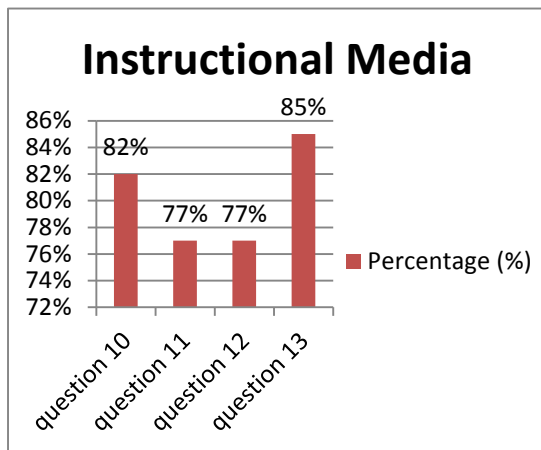


Figure 5. Graph of Learning Media Needs Analysis

Based on figure 5 above, it can be concluded that the results of the needs questionnaire on the learning media aspect of students on average 77% rarely use the laboratory to conduct experiments or practicums, so teachers rarely use and provide student worksheets to students in science courses.

**Interest Motivation**

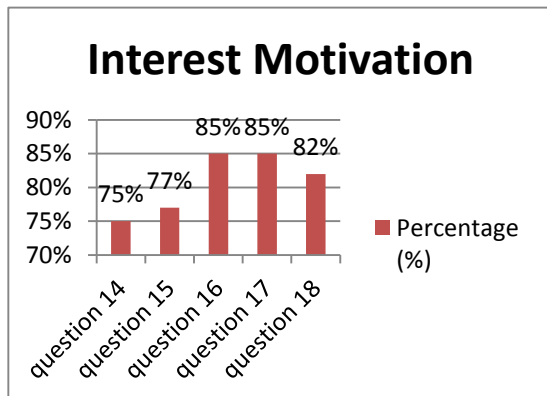


Figure 6. Graph of Interest Analysis Needs Motivation

Based on figure 6 above, it can be concluded that the results of the needs questionnaire on the motivational aspect of student interest on average 82% are quite interested, quite enthusiastic about learning science sehingga tertarik apa bila dikembangkan bahan ajar Lembar Kerja Peserta Didik desalinator energy surya sebagai alternative penyediaan air bersih untuk pembelajaran IPA pada pokok bahasan materi kalor sehingga konsep tersebut muda untuk di pahami.

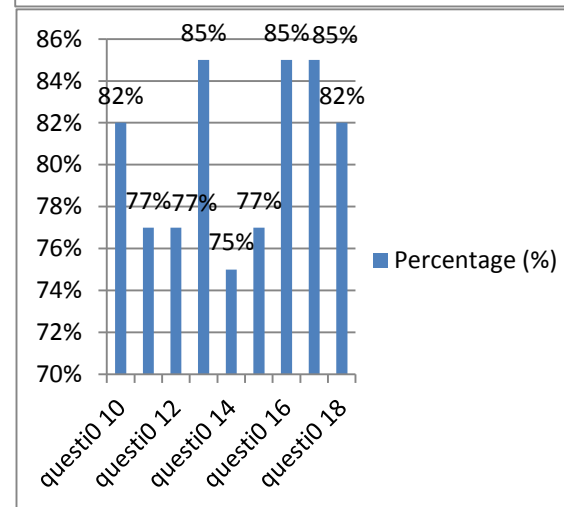
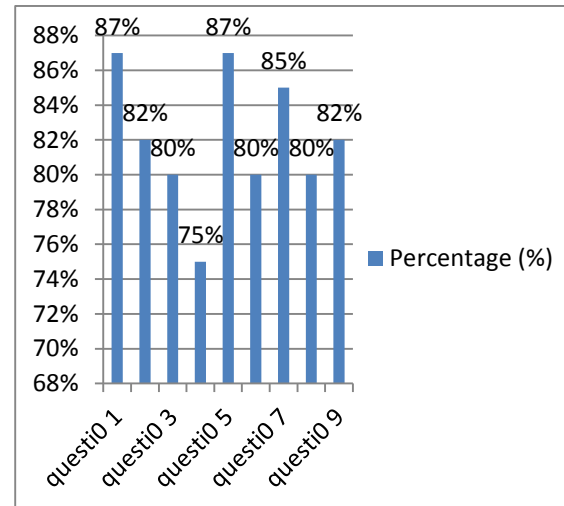


Figure 7. Graph of Needs Analysis Questionnaire Results

Based on the needs analysis in the graphic image above, it aims to collect information about the problems contained in the learning process. The results of the analysis are used as a basis for determining alternative solutions that will be carried out in this case is the development of Student Worksheets. From the results of the needs analysis that has been



carried out, it is necessary to develop Student Worksheets. This is supported by interviews with three teachers at SMP Negeri 4 Bengkulu City, it is known that the curriculum used at SMP N 24 Bengkulu City is the 2013 curriculum.

Students stated that lecture and presentation methods were the learning methods most often used by teachers. This is in line with the opinion of Fatimah, (2018) which states that teachers use the lecture method so that learning becomes less effective, and decreases the level of student participation in participating in learning. And can result in less enthusiasm in participating in class learning because the teacher is more active than the students. The learning resources used by teachers and students are in the form of printed books from the Ministry of Education and Culture. The learning process is more often carried out in the classroom and rarely does learning such as practicum.

## CONCLUSION

Based on the results of the research above, it shows that the lack of enthusiasm of students in participating in the science learning process being taught, the teaching materials used have not maximized students in obtaining material and developing students' skills processes. Therefore, the latest Student Worksheets are needed which are integrated with solar energy-based desalinator designs and it is hoped that the Student Worksheets developed can improve students' science process skills.

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