

Students' Responses to Guided Discovery Based-Worksheets in Physics Material on the Respiratory System

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Received: 15 October 2021 Accepted: 4 November 2021 Published: 22 November 2021

DOI: <https://doi.org/10.20527/jmscedu.v1i2.4152>

Abstract

This study aims to determine students' response in junior high school to the development of guided discovery-based worksheets. The type of the research is Research and Development (R&D). The sample used was 28 students of class VIII in Junior High School using purposive sampling. The data was collected by providing a previously validated student response questionnaire. Based on the results of data analysis, the average student response for each aspect in a row is 90.2%; 86.8%; 87.9%, with an average overall response of 88.3% with a very good category. The conclusion from this research, the worksheets can be used in learning, marked by the very good response of students to the developed guided discovery-based worksheets.

Keywords: Guided Discovery; Student's Responses; Worksheets

How to cite: Purwasih D., & Jumadi, J. (2021). Students' Responses to Guided Discovery Based-Worksheets in Physics Material on the Respiratory System. *Journal of Mathematics, Science, and Computer Education (JMSCEdu)*, 1(2), 74-79.

INTRODUCTION

Education is a process of transformation or change in human development to become more qualified to meet personal, community and state needs. According to the 2013 Curriculum, science learning must be integrated and applied at all levels of education, starting from elementary, junior high, high school and vocational school. Integrated science learning is combining objects in the form of Physics, Chemistry and Biology material packaged into an integrated theme (Kemendikbud, 2017). This learning is expected to answer the challenges of the 2013 curriculum to produce students who are skilled at thinking critically, innovating and sensitive to changing times.

The government's effort to answer the existing problems is by developing the curriculum. The 2013 curriculum currently used in Indonesia is expected to provide students with a meaningful learning experience (Anderson et al., 2001). Learning has two objectives, namely retention and transfer. Retention only focuses on the results of remembering, while transfer focuses on the purpose of knowledge transfer. Knowledge transfer produces meaningful learning and can help students have higher-order thinking skills (Hasanah, Sunarno, & Prayitno, 2021). The 2013 curriculum gives teachers the freedom to determine everything needed in the learning process and the selection of teaching materials.

Teaching materials are all tools or materials used by teachers or instructors to assist the process of teaching and learning activities. Some forms of teaching materials include visual

teaching materials. Visual teaching materials can be in the form of handbooks, books, modules, student worksheets, student books, brochures, leaflets and so on (Kemendikbud, 2017). Student worksheets are teaching materials that contain instructions and steps in solving problems through scientific investigations or activities that refer to essential competencies (Hidayat, Festiyed, & Asrizal, 2016).

The functions of the student worksheets themselves, namely: (a) as teaching materials that can minimize the role of educators, but more activate students, (b) as teaching materials that make it easier for students to understand the material provided, (c) as teaching materials which are summarized and rich in tasks to train, and (d) facilitate the implementation of teaching to students (Choirudin, Anwar, Azizah, Wawan, & Wahyudi, 2021; Ibrahim & Ducha, 2012; Nugraheny, 2018). Student worksheets that have many functions will help the learning process. Some research shows that student worksheets make students active and increase learning outcomes (Nurkholis, 2019; Utami et al., 2016). In this research, this worksheet contains the process or stages contained in guided discovery. Discovery is finding a concept through a series of data or information obtained through observation or experimentation (Astra, Nasbey, & Muharramah, 2015). Discovery occurs when individuals are involved, especially in using their mental processes to find some concepts and principles (Misbah, Dewantara, Hasan, & Annur, 2018; Handayani, Arifuddin, & Misbah, 2017; Mastuang, Erliana, Misbah, & Miriam, 2017). According to the teacher, this learning is a cognitive learning method that is more creative in creating situations that can make students learn actively to find their knowledge (Puspitasari & Handziko, 2018). Therefore, the student worksheet that was developed was a guided discovery-based student worksheet. Therefore, this study aims to see the students' responses to the developed guided discovery-based student worksheets.

METHOD

The type of this research is a Research and Development (R&D). The development model is used to produce the product is the 4D model. The 4D model contains define, design, develop and disseminate. The first stage, define, starts from making observations related to needs analysis for both students and teachers. During the pandemic, learning is carried out online, so in this study, the needs of teachers and students obtained are a medium that can facilitate experiments in science learning after obtaining the needs of students and teachers. The researcher continued in the second stage, namely design, which made the Draft I product, namely student worksheet, which contained material and Experimental Physics material in the respiratory system. The third stage, develop, is to carry out expert product feasibility tests and readability tests by conducting limited trials. In the third stage, a revision of Draft II was obtained from expert input and a limited test. The fourth stage of dissemination is the dissemination of the product. Dissemination is done by conducting field tests.

This research aims to analyze students' responses to student worksheets on physics in the respiratory system. The data collection technique was carried out by using a student response questionnaire. The questionnaire contains ten statements, each containing five negative statements and five positive statements. The Likert scale was used in the preparation of the questionnaire with the answer choices TS (Disagree), KS (Disagree), S (Agree) and SS (Strongly Agree). Data collection was carried out in April 2021 at junior high school. The sample used was class VIII students whom 28 people opened. Students are asked to use student worksheets during teaching and learning activities. Then after completion, students are asked to fill out a response questionnaire honestly, and according to the situation they are experiencing.

Data from the results of filling out questionnaires by students will then be analyzed quantitatively using the following equation:

$$\frac{Score}{Score\ Max} \times 100\%$$

Then the results are categorized by Table 1 as follows (Laelasari & Adisendjaja, 2018):

Table 1 Criteria for response

Interval	Criteria
84%-100%	Very good
68%-83%	Good
52%-67%	Enough
36%-51%	Less
≤35%	Not Good

RESULT AND DISCUSSION

Student worksheets are one of the teaching materials that can use by the teacher to teach students and help students to experiment (Ibrahim & Ducha, 2012). Student worksheets contain experimental objectives, materials, practical steps, discussion sheets and practice questions. In this study, the product developed was not only student worksheets but also equipped with videos. This is so that students can understand the experiment to be carried out. This convenience must be provided because, at this time, learning is carried out boldly or remotely.

The material contained in the student worksheets is physics in the respiratory system. In this case, there is a relationship between physics and biology. The respiratory system is a material that examines the mechanism of respiration. The vital organs in the respiratory system are the lungs. The lungs work by relying on air pressure to be able to inhale and exhale. The working air pressure is found in the laws of physics. The relationship between air pressure and the lungs is very important to study science learning at school. This is intended so that there is a continuity of understanding the concept of the material by students, following the mandate of the 2013 curriculum, which states that science is integrated learning from physics, chemistry and biology. The application of integrated science must be applied carefully in schools so that students can have broad insights.

Learning that takes place based on the 2013 curriculum must be student centre. The product facilitates students to learn independently by not reducing the essence of learning. In the student activity section, they have to experiment. Experiments show the application of the scientific method in learning from observing, asking, trying, presenting, concluding and creating. This section is important to be used as an alternative to studying independently or in groups (Utami et al., 2016). The developed product will go through various stages until a draft II product design for field testing. Products that are suitable for use can be measured through the student's readability test or seen from the student's response to the use of the product. The results of student responses can be seen in Figure 1.

Based on Figure 1, various responses were received out of ten statements containing five positive and five negative statements. Statements numbers 1-7 and 9-10 show a very good response from students. While statement number 8 shows a response with a good category from students. Students stated that using student worksheets during learning was very fun, making them more enthusiastic about learning material about physics in the respiratory system. One of the factors that generate interest is the content in the worksheet. The worksheet contains clear, practical instructions and practical video instructions that make it easier for students to learn. Student worksheets can be made interactive by using clear learning models and steps for easy understanding. Students can see directly from the video

without having difficulty in understanding the writing (Laelasari & Adisendjaja, 2018; Yulkifli, Ningrum, & Indrasari, 2019)

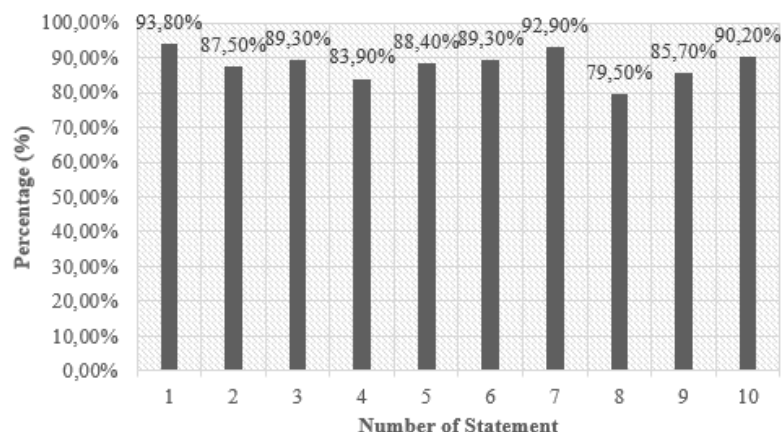


Figure 1 Graph of result student's response

The results of a good response include showing difficulties from students. Some students stated that it was difficult to understand the material because the air pressure could not be seen so that concrete type students found something abstract or out of shape difficult to understand. The cognitive development of students is different, this is cause even though at the age of 13 years they have entered the abstract phase, but some are still in the concrete operational phase in cognitive abilities (Ekantini & Wilujeng, 2018). Based on the results of student responses, the average of the overall responses is obtained in Table 2 below:

Table 2 Result of Student's respond

Aspect	Percentage	Categorize
Perception	90,2%	Very Good
Trust	86,8%	Very Good
participation	87,9%	Very Good
Average	88,3%	Very Good

Overall, from the three aspects, namely perception, trust and participation, the average result is 88.3%, with a very good category. The very good category shows that the overall response of students to the developed Student worksheets is very good or positive. The positive response obtained shows that student worksheets can be properly used as learning materials in schools.

Physics material in the respiratory system is one of the materials that require visualization to see how the respiratory system works and how air pressure affects breathing. The developed student worksheets contain material and experiments that require students to make a simple lung model and then practice how the lungs work. The teacher must prepare interesting learning by choosing the right methods, strategies, media and teaching materials.

The worksheets made material content components and experimental steps that students must do. Worksheets become alternative learning resources that can be used independently; their use is important in learning. The advantage of using student worksheets is that they can be used outside of school, especially when learning is carried out remotely. Student worksheets can be designed for independent study.

The aspect of trust in the response questionnaire can be interpreted that students believe that learning to use the developed worksheets facilitates students to understand the material being taught through experiments carried out. The active role of students must appear to be able to explore the concept of material while learning. The use of student worksheets must

still get supervision from the teacher. The teacher becomes a facilitator who can guide students, control and provide feedback during learning. Without supervision, the use of student worksheets also cannot produce maximum results. The facilitator must have competence in teaching. The competencies in question are the ability to ask students problems, provide motivation, promote learning variations, explain, open & close lessons, manage discussions and manage classes (Corcoran & O'Flaherty, 2017).

Based on all the response results, there are student worksheets that are getting a positive response. Independent learning can be oriented to maximum student involvement in learning activities at school. Student centres are important for teachers to support good learning design. Student worksheets are used as teaching materials to make it easier for students to be actively involved in the class. It can embed scientific concepts such as learning, observing, analyzing and drawing conclusions (Wiguna, Batulicin, Bumbu, & Selatan, 2016). In addition, it can also increase students' curiosity during learning so that they can easily find the basic concepts of the material being taught (Sener, Türk, & Tas, 2015). Such a science education goal requires students to participate in discussions about science, be sceptical, and question claims made by others about scientific issues, and make informed decisions about the environment, their own health, and well-being. In addition, students are also expected to master the competence of demonstrating cognitive abilities and values. When they meet each other, they can show the spirit for discussion and respond to socio-scientific issues (Olasehinde & Olatoye, 2014).

CONCLUSION

The results of the research on student responses to guided discovery-based worksheets received a positive response. The average score for the perception aspect is 90.2%, with a very good category in the perception aspect. In the second aspect, the trust obtained an average of 86.8%, with a very good category. The participation aspect obtained an average score of 87.9%, with a good category. The overall average result shows a score of 88.3% with a very good category, and this shows that the overall response of students to the developed student worksheets is very good or positive. This good response must then be used as a basis so that teachers must continue to innovate to improve the quality of learning in the future.

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