Tekno-Pedagogi : Jurnal Teknologi Pendidikan

Implementation of Science Student Worksheets Based on Multiple Intelligences Material Temperature and Its Changes

Maria Silalahi [1], Afrida[2]
[1]SMP Negeri 21 Kerinci, Jambi, Indonesia
[2]SMP Negeri 1 Kota Jambi, Jambi, Indonesia
Corresponding author email: maria_sillalahii39@gmail.com

Info Article

Abstract

The aim of this research is to produce science worksheets based on multiple intelligences on temperature and its changes, then to find out students' responses to science worksheets based on multiple intelligences. The research method used is the Research and Development (R&D) method and uses the Borg and Gall development model. The test subjects in this research were students at SMPN 1 Jambi City. The instruments used in this research were an expert team validation questionnaire and a student perception questionnaire. The data analysis technique for the expert team's validation questionnaire carried out a structured assessment, while for validator suggestions used qualitative descriptions. The data analysis technique for student questionnaires is carried out using a rating scale which is then interpreted in a qualitative sense. From the research results, the results of the student perception questionnaire regarding the worksheets that had been tested were an average of 82% which could be categorized as "very good". Based on the results obtained, it can be concluded that the Science Worksheet Based on Multiple Intelligences on temperature and its changes in class VII is very good to use as supporting teaching material for teachers and students in the integrated science learning process in the classroom.

Keywords: Worksheets; Multiple Intelligences; Students

INTRODUCTION

In the 2013 Curriculum students are required to be active and optimize their intelligence and talents. Education must be appropriate to individual differences and teachers must pay attention to the individual uniqueness of students (Surna & Pandeirot, 2014). Dewey in Surna & Pandeirot (2014) also said that all children have the right to receive expertise and skills that should be implemented by education providers. Therefore, learning strategies are needed that are able to facilitate all student activities, one of which is Multiple Intelligences. This theory was coined by Howard Gardner, a psychologist from Harvard. Initially Gardner discovered seven types of intelligence but later expanded them to nine. In Baharuddin & Wahyuni (2015) the nine intelligences include: (1) logic/mathematics; (2) musical/rhythmic; (3) verbal/language; (4) physical, body/movement; (5) visual/room; (6) intrapersonal; (7) interpersonal; (8) naturalist; and (9) existential. The Multiple Intelligences theory can be used as an alternative strategy in the teaching and learning process at school which helps teachers

teach and pay attention to the intelligence and needs of their students so as to obtain better learning outcomes (Aryani, Sudjito, & Sudarmi, 2014).

In the process and learning at school, one of the teaching materials often used by teachers is worksheets. 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 carried out by students, which refer to the basic competencies that must be achieved (Prastowo, 2011). According to the General Guidelines for the Development of Teaching Materials (Diknas, 2008), student worksheets are sheets containing assignments that must be carried out by students. Student worksheets usually consist of instructions or steps to complete a task which must clearly state the basic competencies to be achieved.

Seeing the importance of worksheets in the world of education today, many people are conducting research on worksheets, one of which is multiple intelligences-based worksheets. The aim is to make students learn more creatively. Wijayanti (2014) proved that the Multiple Intelligences-based worksheets he created were successful in improving students' creative thinking abilities. Therefore, researchers conducted research into the development of Multiple Intelligences-based science worksheets which can facilitate the various intelligences possessed by each student. Apart from that, this worksheet can also be used as independent teaching material to increase student creativity.

In this Multiple Intelligences-based science worksheet, in each sub-chapter the learning material presents the 9 multiple intelligences mentioned by Gardner.

RESEARCH METHODS

This type of research can be interpreted as a process or steps to develop a new product or improve an existing product. This research is research and development. The steps in this development use the Borg & Gall model in Sugiyono (2015). This research model is a research model used to develop or validate products used in education and learning. Development Procedure

1. Potential and Problems

At this stage the researcher conducted research on the teaching materials used at SMPN 1 Jambi City, general problems or obstacles faced by science teachers in teaching, selection of media or learning resources, and availability of worksheets. This stage was carried out by reviewing the teaching materials used in schools, interviews with science teachers at SMPN 1 Jambi City, and observations.

2. Data Collection

After obtaining potential and problems based on the results of observations, interviews and curriculum analysis, the next thing to do is collect data. According to Sugiyono (2015), the data collected can be used as material for planning certain products which are expected to overcome these problems. This data collection is carried out to find out what students need in learning which will then be used as a basis for making the initial product of the Multiple Intelligences Worksheet. Apart from that, researchers also collect material from various sources which will be presented in the worksheet that will be developed.

3. Product Design
The stages carried out in designing this product are as follows:
a) Material analysis stage
Material analysis aims to identify, detail and systematically organize the main relevant parts that students will learn. The first step taken was to identify core competencies, basic competencies, indicators and learning objectives for temperature and changes based on the syllabus used at the school as details in compiling the worksheets and secondly to create an arrangement or sequence of sub-materials which would later become the content of the material in the worksheets.
b) Format selection

The choice of format in developing worksheets is adjusted to the factors described in the learning objectives. The format chosen is for designing the appearance, content and selection of learning strategies.

c) Multiple Intelligences-based science worksheet design stage

After analyzing the material and selecting the format for preparing the worksheets, the next stage is to create or design a Multiple Intelligences worksheets with material on temperature and its changes. The material in this worksheet is prepared using language that is easy for students to understand and includes images related to the material. Apart from that, this worksheet is equipped with practical sheets and practice questions.

4. Design Validation

According to Sugiyono (2013), design validation is an activity process for assessing product designs which is carried out by providing assessments based on rational thinking, not yet tested in the field. Product validation is carried out by experts or experienced experts to assess new products that have been designed in such a way.
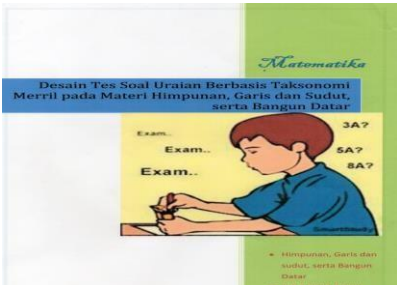
5. Product testing

Science worksheets based on Multiple Intelligences on temperature and its changes have been validated and then tested on 35 students in class VII C and 32 students in class VII B at SMPN 1 Jambi City.

The research instrument used was a questionnaire. According to Sugiyono (2013), a questionnaire is a data collection technique that is carried out by distributing a set of questions or written statements to respondents to answer. In this study, the questionnaire used was divided into two based on the filler/respondent, namely: Validation questionnaire for material and design experts and Perception questionnaire for students

RESULTS AND DISCUSSION

Worksheets Science based Multiple Intelligences Which has developed will done validation. Validation is carried out to obtain approval from the specified validators. To obtain this approval, the electronic module will receive assessments and suggestions repair. After get evaluation and suggestion from the validators, the next step is to revise or improve the electronic module. In this research, material and media were validated by two validators. The following is an example of a science worksheet cover design that the researcher made.

Table 1. Cover design

No	Visual	Information
1	The initial *cover design* was designed in such a way as to attract students' attention to see it	On the cover there are pictures relate with lessons like image of a student studying. There are also material titles, and the description test questions used are taxonomy-based Merrill.

The material validation process is carried out once, while the design validation is carried out three times. From the material and design validation process, the validators have stated that the Multiple Intelligences -based science worksheet developed is suitable for testing.

The worksheet was tested on class VII D students at SMPN 1 Jambi City to test the reliability of the questionnaire. Calculations using the alpha formula obtained a reliability of 0.67 in the high category. So it is concluded that this research questionnaire can be trusted and is used to collect non-test data on the suitability of Multiple Intelligences -based science worksheets. Next, a trial was carried out on 35 students in class VII C and 32 students in class VII B at SMPN 1 Jambi City to see students' perceptions or responses to the worksheets. The following are the results of the perception questionnaire that has been distributed.

Table 2 Results Analysis Questionnaire Perception Student class VII C and VII B

No.	Statement	Category	Percentage Class VII C	Percentage Class VII B
1	This Multiple Intelligences Worksheet is interesting so it's not boring	Good	79.43%	78.03%
2	The cover of the Multiple Intelligence Worksheet is attractive	Very Good	85.71%	85.00%
3	Multiple Intelligences worksheets make it easier for me to learn the lesson material.	Very Good	81.71%	79.65%
4	The language use in the worksheets Multiple Intelligences are not confusing.	Very Good	84.00%	80.78%
5	The images on the Multiple Intelligences Worksheet look clear and help me understand the material.	Very Good	85.14%	82.24%
6	Multiple Intelligences worksheets help I remember the material	Very Good	84.57%	84.00%
7	There are activities related to Multiple Intelligences in the Multiple Intelligences Worksheet	Good	78.86%	78.77%
8	The size of the letters on the Multiple Intelligences Worksheet is not too small and not too big.	Very Good	84.00%	82.00%
9	The practical activities on the Multiple Intelligences worksheets are easy to do and can help me draw conclusions draft.	Very Good	83.43%	80.45%

The trial was carried out by distributing perception questionnaires to students. From the trials that have been carried out, data on students' perceptions of the Multiple Intelligences-based science worksheet that was developed was obtained. The results of the analysis of student perceptions show a figure of 83% for class VII C and 81% for class VII B which is in the "very good" category. So the average percentage of students at SMPN 1 Jambi City is 82%. This is in accordance with the percentage scale for the very good category, namely in the range 81.00%-100% (Akbar, 2013). Overall, it can be concluded that this Multiple Intelligences-based science worksheet has a very good response from students so that it can be used in the learning process, especially regarding temperature and its changes.

CONCLUSION

Based on this research, science worksheets based on Multiple Intelligences were produced on temperature and its changes in class VII. The resulting worksheets consists of 5 pages consisting of outer and inner covers, foreword, table of contents, general and specific instructions for using worksheets, core competencies and basic competencies, concept map, core contents of the worksheets along with intelligence symbols, bibliography, and back cover of the worksheets. After validating the material once and validating the design three times, the Science worksheets based on Multiple Intelligences was worth trying out and received an average percentage of student perception of 82% which stated that the worksheets was in the "very good" category.

ACKNOWLEDGMENTS

REFERENCES

Akbar, S. (2013). *Instrumen perangkat pembelajaran.* Bandung: PT. Remaja Rosdakarya.

Aryani, A. D., Sudjito, D. N., & Sudarmi, M. 2014. Model pembelajaran berdasarkan teori *multiple intelligences* yang dominan dalam kelas pada materi tekanan. *EDUSAINS, 02* (VI), 130-136.

Baharuddin & Wahyuni, E. N. (2015). *Teori belajar & pembelajaran.* Yogyakarta: Ar-Ruzz Media.

Branch. (2009). *Instructional Design: The ADDIE Approach*. London: Springer.

Prastowo, A. (2011). *Panduan kreatif membuat bahan ajar inovatif: Menciptakan metode pembelajaran yang menarik dan menyenangkan.* Yogyakarta: Diva Press.

Sugiyono. (2013). *Metode Penelitian Pendidikan: Pendekatan Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.

Surna, I. N. & Pandeirot, O. D. (2014). *Psikologi Pendidikan 1*. Jakarta: ERLANGGA.

Wijayanti, F. (2014). *Pengembangan LKS IPA berbasis Multiple Intelligences pada tema energi dan kesehatan untuk meningkatkan kemampuan berpikir kreatif siswa*. Skripsi diterbitkan. Semarang: Universitas Negeri Semarang.