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To cite this article: B Astuti *et al* 2020 *J. Phys.: Conf. Ser.* **1567** 042090

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# Development and effectiveness of integrated science learning modules using vogarty integrated method based on Al-qur'an verses complementation

**B Astuti<sup>1\*</sup>, M Ihwanudin<sup>1</sup>, H H Kusuma<sup>2</sup> and A Yulianto<sup>1</sup>**

<sup>1</sup> Physics Department, Faculty of Mathematics and Natural Sciences, Universitas Negeri Semarang, Indonesia

<sup>2</sup> Physics Deapartment, Faculty of Science and Technology, Universitas Islam Negeri Walisongo, Semarang, Indonesia

\*Corresponding author: [b\\_astuti79@mail.unnes.ac.id](mailto:b_astuti79@mail.unnes.ac.id)

**Abstract:** Science is easier for student to learn if it is taught in a manner which integrates scientific disciplines. In addition, when science learning taught in conjunction with religion it will enhance the religious character of students. However, schools have not implemented this integration of science and religion due to a lack of learning resources. The purpose of this research is to determine the level of validity, legibility, effectiveness, and practicality of the teaching material developed. This research uses the research and development method. The validity and practicality of the teaching material was tested using a questionnaire. Furthermore, for readability and effectiveness the test method was employed. The effectiveness test of teaching material is limited to improving students' cognitive domains. The results showed that the teaching material is valid, easy to understand, effective and practical to use in teaching process.

## 1. Introduction

The 2013 curriculum system emphasizes science learning delivered in an integrated method. Students in junior high school usually think cause this as simply. Students will easily attain the science learning goals if science learning is taught in an integrated method [1]. Based on this, a teaching component is needed that is able to support learning, such as integrated teaching materials which incorporate various natural disciplines, such as chemistry, physics, biology, and geology. However, the lack of availability of teaching materials that are designed in an integrated method is an obstacle for teachers seeking to deliver science in an integrated manner. Teaching materials or books in the schools that use integrated science labels are still a formality, while the contents of the book tend to refer to one of the fields of science study [2].

Many researchers has been developed the integrated science teaching materials to improve the cognitive ability of student [3-5]. However, the integration of science with the building of character, especially religious is an interesting thing to develop. Integrating science with religion, especially the verses of the Al Qu'ran will be able to foster a religious character in students and increase faith in Allah SWT. Additionally, Yasyakur [6] states that the teaching model based on the Quran can be applied in a positive and enjoyable way, so that the learning objectives will be achieved. In fact, based on



observations in several schools it was found that teaching science is still not integrated between religious knowledge and learning material. Religious knowledge is given separately through different subjects. Even if there is a process of linking religious knowledge with science lessons is only an insertion made by the teacher and not included in the learning curriculum [7].

Furthermore, good teaching materials are teaching materials that can support learning to achieve the learning objectives themselves. This can be supported by teaching materials that not only cover the concept of science but are also integrated with various disciplines and are also equipped with religious values. In other words, teaching materials are learning resources that can help teachers in the learning process so that learning objectives that have been determined. In addition, these teaching materials can also provide other content such as character building. This is in accordance with what was stated by Widiyatmoko & Wiyanto [8], that learning will be more effective if supported by the availability of integrated teaching materials.

Teaching materials can be developed using integrated methods developed by Fogarty [9], so that they can combine several science disciplines and religious sciences simultaneously. Integrated methods are combining subjects by setting curriculum priorities and determining overlapping skills, concepts, and attitudes in several subjects [10].

The purpose of this study are to determine the validity, readability and the effectiveness of integrated science learning materials using the integrated method based on Al-Quran verses complementation. And the last, to know the student participant' responses of integrated science learning materials using the integrated method based on Al-Quran verses complementation when uses on the learning process.

## 2. Method

This research uses research and development methods. The subjects of the trial were the 7th grade students of SMP Negeri 1 Subah and MTs Nurul Huda Banyuputih. The reason for choosing research subjects is that SMP and MTs are based on religious subjects. Religious learning in SMP is only 2 hours a week, while in MTs there are even more. But for learning science are the same hours. Thus, we want to know the provision of science learning modules that are integrated with the verses of the Qur'an which have a more significant impact to SMP or MTs student. The research procedure was used research design by Sugiyono [11] with few modifications, they are the preliminary stages, planning, development, and implementation. In the preliminary stage, school observations were carried out to look for opportunities and challenges at the research site. At the planning stage, the manuscript was drafted and designed for the learning materials layout. At the development stage, learning materials are compiled using the development of the integrated method based on the 2013 curriculum with an attractive appearance, language that is easily understood, and the complementation of Al-Quran verses. Learning materials that have been compiled are then tested for validity by two lecturers as material experts and two teachers as practitioners. Assessment of the validity tests uses a Likert Scale through the expert judgment technique. Last, the implementation of the material learning was developed, which is two ways on small and large scale. At the small scale implamentation consist of readability tests to determine the level of readability of leaning materials was developed. Readability tests were carried out by ten students at junior high school using the Hitch test. Furthermore, the large-scale implementation consisting of testing the effectiveness of learning materials. The effectiveness test was carried out using experimental design i.e. One-group Pretest-Posttest Design. The effectiveness test was to assess the acquisition of learning outcomes and understanding of science in an integrated manner of SMP and MTs students. Furthermore, students were asked to respond through a student responses questionnaire after using learning materials to determine the practicality of the materials.

The analytical method used to calculate the level of validity of learning materials, readability of learning materials was developed, and the response of students to learning materials using equations according to Sudijono [12] are as follows:

$$P = (N/f) \times 100\% \quad (1)$$

In the validity of learning materials, the criteria for validity according to Sa'dun [13] as shown in Table 1.

**Table 1.** Criteria for validity of teaching materials

Interval	Criteria
85.01 – 100.00	Very Valid
70.01 - 85.00	Valid
50.01 - 70.00	Valid Enough
01.00 – 50.00	Invalid

Then the readability of learning materials criteria for legibility according to Rosmaini [14] as shown in Table 2.

**Table 2.** Criteria for Readability of Teaching Materials

Interval (%)	Criteria
score < 37	Elusive
$37 \leq \text{score} \leq 57$	Appropriate for Students
score > 57	Easy to Understand

Furthermore, the practicality of learning materials has a practicality level according to Sa'dun [13] as shown in Table 3.

**Table 3.** Teaching Materials Validity Criteria

Interval	Criteria
85.01 -100.00	Very Good
70.01 – 80.00	Good
50.01 - 70.00	Good Enough
01.00 – 50.00	Not Good

### 3. Result and Discussion

#### 3.1 Validity of Teaching Materials

Validation of learning materials was carried out by expert judgment which is two lecturers as materials experts and two SMP/MTs science teachers as practitioners. The validity of learning materials consists of several indicators, such as content, presentation, language, and graphics. Recapitulation of the percentage results of each aspect of the assessment of teaching materials by the validator is presented in Table 4.

**Table 4.** Learning Materials Validity Test Results

Validity Aspects	Score (%)	Criteria
Contents	90.81	Very Valid
Presentation	95.31	Very Valid
Language	82.81	Valid
Graphics	93.75	Very Valid
<b>Average</b>	<b>90.67</b>	<b>Very Valid</b>

Based on Table 4, it can be seen that the results of the validity of learning materials for each indicator are in the very good category, except in the language aspect which is in the good category. The average validity for all aspects is 90.67% which is included in the very good category. Its because aspects of the content of learning materials have been adjusted to the applicable curriculum, namely the 2013

curriculum. In addition, the contents of the material are prepared by considering students can achieve the basic competencies needed. That is because the delivery of subject matter depends on the basic competencies that must be achieved by students [15]. Then, the presentation of materials in learning materials is also associated with several different branches of sciences to expand students knowledge. The branches of science that are linked to these learning materials are Physics, Chemistry, Biology, and Geology which are linked in one solar system theme concept by using the integrated method developed by Fogarty [9].

Furthermore, the learning materials are also complemented with Al-Quran verses about natural phenomena surrounding students. This is an effort to improve the religious character of students in accordance with the learning objectives of the 2013 curriculum system. Learning materials complemented with Al-Quran, can make learning enjoyable and enhance Islamic character, curiosity, and increase student motivation to study [6, 16]. Then the presentation of materials in learning materials is also focused on students centered so that students can manage learning materials independently. Based on this, learning materials are presented contextually, where the presentation of materials concepts begins with discussing the phenomena that surrounding students, its will attract learning interest of students [2,17]. Last, the preparation of learning materials also pays attention to the active involvement of students in learning which is demonstrated through group discussion activities [18]. Through active involvement of students in learning, students can solve the problems in daily life and has respond actively to natural phenomena around them [19].

Another reason is that the language used in the preparation of terms in the learning material is also consistent and the language is easily understood or communicative according to the age level of students. This is based on the opinion of Prastowo [15], which states that one of the factors that must be considered in the preparation of learning material is the choice of language that is easily understood by students and in accordance with the level of student knowledge. The learning materials developed also pay attention to the appearance and presentation of images so that abstract knowledge can be explained in an interesting and easy to understand manner [20]. In addition, the sentences used in learning materials are not too long and use fonts that are not too small so that students are interested in reading the instructional materials [15, 21-22].

### 3.2 Learning Materials Readability

**Table 5.** Recapitulation of Respondents Test Results of Learning Materials Readability

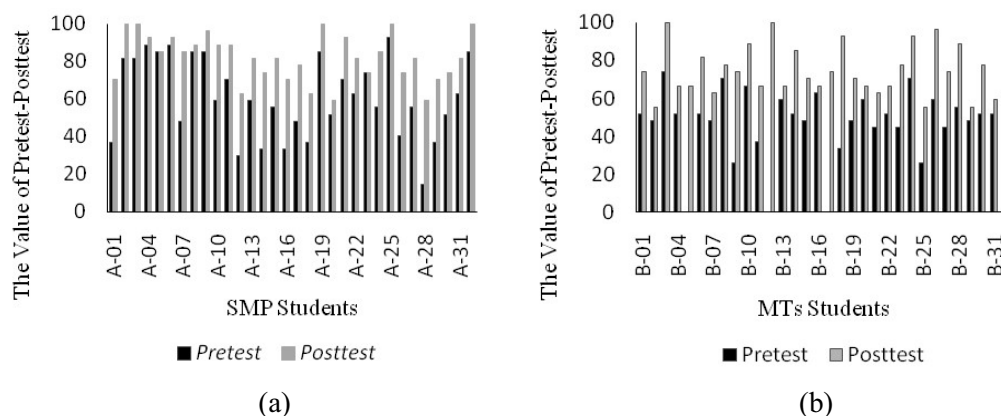
Respondents	Result	Maximum	Percentage (%)	Criteria
UK-01	33	40	82.5	Easy to Understand
UK-02	31	40	77.5	Easy to Understand
UK-03	34	40	85.0	Easy to Understand
UK-04	40	40	100	Easy to Understand
UK-05	35	40	87.5	Easy to Understand
UK-06	40	40	100	Easy to Understand
UK-07	35	40	87.5	Easy to Understand
UK-08	38	40	95.0	Easy to Understand
UK-09	38	40	95.0	Easy to Understand
UK-10	40	40	100	Easy to Understand
<b>Average</b>			<b>91%</b>	<b>Easy to Understand</b>

The results of the readability of learning materials are presented in Table 5. Results of the analysis of the close test shows that the text of learning materials is easily understood [14]. This is shown in Table 5 where the average percentage results obtained in the readability test were 91.0%. On the readability test results there is diversity between the lowest score of 77.5% and the highest score of 100%. The difference in results obtained from the level of readability is influenced by several factors such as from external factors of learning materials, which are related to vocabulary and reading experience of students [23].

### 3.3 Learning Materials Effectiveness

#### a) Improving Learning Outcomes

The effectiveness of teaching materials can be assessed through the results of pretest-posttest scores of students before and after using teaching materials. The effectiveness of teaching materials is limited only to the cognitive domain of students, which is an increase in learning outcomes and understanding of science in an integrated method. Improvement of learning outcomes in the cognitive domain of students can be assessed by using 27 multiple choice questions. Questions are compiled based on the competencies that must be achieved by students in the matter of the Solar System. Learning outcomes of SMP and MTs students are presented in Figure 1.



**Figure 1.** Pretest and Posttest Score of (a) SMP students and (b) MTs Students

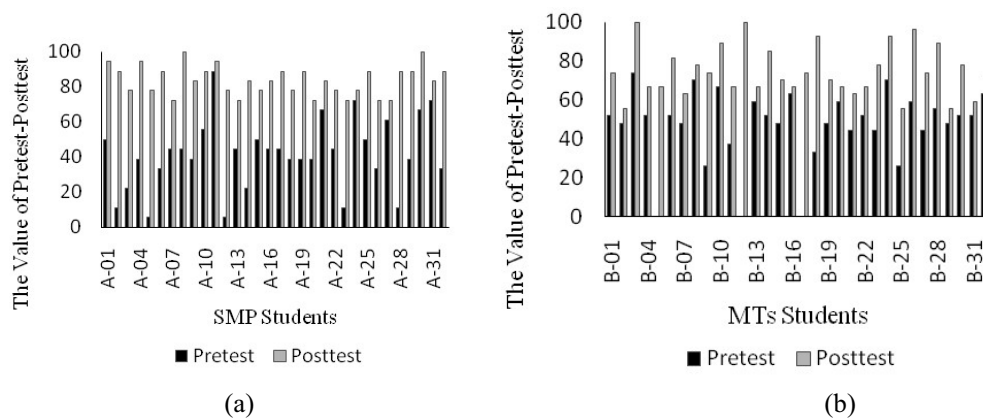
Based on Figure 1, it can be seen that there is an increasing in learning outcomes of SMP and MTs students. The magnitude of the increase in pretest and posttest results of students calculated using the n-gain calculation is 0.55 for SMP students and 0.52 for MTs students. Based on the n-gain criteria according to Hake [24], the increase in student learning outcomes is of medium criteria for both result. The results of n-gain are not included in the high criteria due to several factors. One of the influencing factors is the form of questions used. Questions in the form of multiple choices consist of one answer and several deceptors that are similar to the answers, so that students tend to be fooled in choosing answers.

Furthermore, the selection in the learning model also affects the learning outcomes of students. Students have become accustomed to conventional learning so it needs adaptation to use the constructivism approach learning model [25]. However, there is no significant difference between the acquisition of n-gain test for learning outcomes of SMP and MTs students. So, it can be said that learning materials are quite effective in improving the learning outcomes of students in SMP and MTs.

### b) *Integrated Understanding of Natural Sciences*

In addition to improving student learning outcomes, SMP and MTs students integrated understanding of natural science also increased. The magnitude of the increase in understanding of integrated science of SMP and MTs students according to n-gain calculations respectively are 0.72 and 0.71 with high criteria [24].

Students' integrated understanding of science is measured using a description test, where students answer questions that are viewed from various disciplines in an integrated manner. The data obtained from the results of the pretest-posttest understanding of science in an integrated manner between SMP and MTs students are shown in Figure 2.

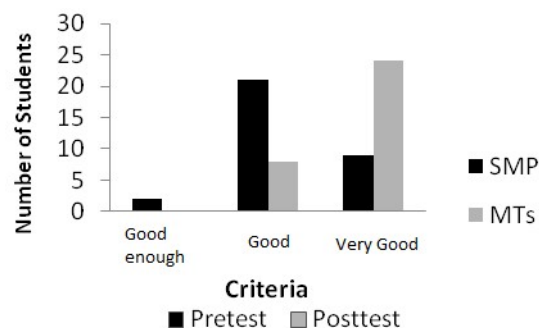


**Figure 2.** Score of Understanding of Integrated Science in (a) SMP and (b) MTs Students

Based on Figure 2, there is an increase in the results of integrated science understanding, in both students of SMP and MTs after using the teaching materials. An increase in understanding of integrated science, will also cause students' thinking ability to develop. This is consistent with Yuliaty [2] which states that students' thinking ability when using integrated science learning materials is better than when using partial teaching materials. This proves that integrated learning materials are effective when used as learning resources for students in the learning process.

### c) *Practical Learning Materials*

The practicality of learning materials is assessed through the data obtained based on the questionnaire responses of students to learning materials. A comparison of the number of students who responded to each criterion of teaching materials is shown in Figure 3.



**Figure 3.** Student Responses to Each Practical Criteria

Figure 3 shows that there were 64 students from SMP and MTs, where 33 students responded very good, 29 students responded good, and 2 students responded good enough. This indicates that learning materials are good and easy to use for students. Based on Figure 3, it is also evident that students of MTs are more interested in learning materials than students in SMP. This is due to the integration of learning materials combining several disciplines within the scope of the natural sciences, and also complementing the verses of the Al-Quran. MTs students have a strong religious ability than SMP students, because they have become accustomed to and more interested in subjects that contain religious values [26, 27].

Based on the results of the analysis of each statement it was found that the statement that reads "Presentation of IPA with verses from the Al-Qur'an made me amazed and grateful to Allah SWT" received the highest score by students in SMP and MTs. This appreciation in students is a result of the incorporation of Al-Quran verses about natural phenomenon. The emergence of admiration from the students towards the greatness of Allah SWT can foster the development of religious character of students. This was similar to the previous researcher, which is stated that learning materials based on Islamic values can improve student character of religious [28].

In addition, the emergence of gratitude and admiration of students made students more motivated to learn science. This is in accordance with the statement of Pujiastuti [16] which report that as a result of the emergence of beliefs and thoughts that there is no dichotomy between science and religion, students will be motivated towards better achievements. However, even though the response of students differed, the majority student responses were positive toward the developed learning materials. This can be seen from the level of enthusiasm of students during the learning process in the classroom. Thus, based on the results of the practicality analysis of integrated science learning materials using integrated method based on Al-Quran verses complementation can be said to be easy to use and fun for students.

#### 4. Conclusion

Integrated science learning materials using the integrated method based on Al-Quran verses complementation is valid and easily understood in terms of readability so it is very feasible to use in the learning process. Learning materials also prove effective for use as a source of learning science in SMP and MTs. This is evidenced by an increase in learning outcomes and understanding of science in an integrated manner from students after using the learning materials. Learning materials are also easy to use for students. This is marked by the response of students who identified good criteria, showing that learning materials are practical to be used by students independently or in the classroom context.

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