

## INTEGRATION-INTERCONNECTION-BASED SCIENCE MODULE DEVELOPMENT IN LIGHT MATERIALS FOR JUNIOR HIGH SCHOOL

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### ABSTRACT

This study aims to 1) produce a science module based on integration-interconnection on light material for grade VIII students of Junior High School [SMP/MTs], 2) find out the quality of a science module based on integration-interconnection on light material for class VIII students of Junior High School, 3) find out students' responses to the science module based on integration-interconnection on light material for grade VIII Junior High School students.

This research is an R&D research with a procedural model that adapts development research procedures according to Borg and Gall, which can be carried out more simply according to the Puslitjaknov Team, which involves five main steps, namely (1) analyzing the product to be developed, (2) developing the initial product, (3) validation and revision, (4) small-scale trials and product revisions, and (5) large-scale trials and final products. We conducted this research at the stage of small-scale trials. The research instruments were validation sheets, quality assessment sheets for science modules based on integration-interconnection for material experts, media experts, integration-interconnection experts, and SMP/MTs science teachers using a Likert scale made in the form of a checklist. The student response sheet instrument for SMP/MTs students uses the Guttman scale, which is made in the form of a checklist.

The result of the research that has been developed is the integration-interconnection-based science module on light for grade VIII students of SMP/MTs. The quality of the integrated-interconnection-based IPA module developed according to the assessment team is of Very Good quality (SB) with the average score of each assessor being: material expert 3.80 (SB), media expert 3.19 (B), expert integration-interconnection 3.67 (SB), and SMP/MTs Science Teachers 3.44 (SB). Student responses to the integration-interconnection-based science module have the Agree (S) category with a score of 0.96 in a small-scale trial. The results of this study indicate that the developed integration-interconnection-based science module can be used as teaching material for Grade VIII students of SMP/MTs.

**Key Words:** Research and Development, IPA Module, Integration-interconnection, Light.

### 1. INTRODUCTION

Education in life is an absolute thing. Education can be carried out by anyone, starting with parents, teachers, and the community. People who are aware of the importance of education for their future generations will try various ways to achieve a good education system and adequate infrastructure. The most important elements in good learning (Paul Suparno, 2007: 2) are students who learn, teachers who teach, learning materials, and the relationship between teachers and students. The four elements are interrelated so that good learning is realized.

These four elements can be found in schools, namely in the learning process at schools, which involves teachers, students, and the teaching materials used. As in SMP IT Permata Hati Banjarnegara, you can find learning that involves teachers, students, and teaching materials in the learning process. Where this is carried out every day by teachers and students, in the learning process, using teaching materials will significantly support teaching and learning activities that take place in schools.

An interview was conducted with one of the science teachers at the school to learn about the science learning process that took place at SMP IT Permata Hati Banjarnegara. Based on the interview process, it is known that teachers sometimes experience difficulties or problems. Some of the problems encountered are learning resources such as teaching materials that are still lacking, there are no practicum tools to support learning, and the time allocation is small.

Teaching materials used in the learning process in class are printed books and worksheets. Meanwhile, for independent study outside the classroom, only use worksheets. The absence of practicum tools for learning science makes students less understanding of the lesson. The time allocation used in science learning is less, namely, 1 x meeting = 2 hours of lessons per week.

Then the next question is asked about science material that is difficult for students to understand. According to the science teacher at SMP IT Permata Hati Banjarnegara, there is still a lot of material that is difficult for students to understand, one of which is the subject of light, especially in the sections on refraction, formation, and the properties of shadows. The light material is considered quite a lot and difficult for students to understand because there are no teaching materials that help students learn independently outside the classroom, the time allocation is limited, and there are no practicum tools. Furthermore, it was also asked about the integration-interconnection (relationships) of teaching materials used with religious knowledge because SMP IT Permata Hati Banjarnegara is an integrated Islamic school. From the statement of the science teacher, there is a guidebook on integration-interconnection (linkage) of teaching materials used with religious knowledge, but teaching materials in the learning process do not yet have integration-interconnection with religious knowledge.

In learning science, in addition to educating and providing broad insight to students, it is necessary to instill religious character and values contained both in science teaching materials and in the learning process. This is in accordance with RI Law number 20 of 2003 concerning the National Education System article 3, which contains (Ministry of National Education, 2003: 6): "National education develops capabilities and forms dignified national character and civilization in the context of educating the nation's life, aims to develop the potential of students to become human beings who believe and fear God Almighty, have a noble character, are healthy, knowledgeable, capable, creative, independent, and become a democratic and responsible citizen." Based on this, it shows that the learning process and teaching materials used by students can be developed by incorporating religious characters and values or by integrating science with religious knowledge.

Based on interviews conducted with one of the science teachers at SMP IT Permata Hati Banjarnegara, it can be concluded that the material that can be used as a theme is light. Then the products developed are teaching materials in the form of modules because they can help students

in the learning process or self-study outside the classroom. If students use the module for learning outside the classroom and can understand it, then the problem of time allocation can be overcome. Furthermore, the integration-interconnection approach of science and religion is carried out, because Permata Hati IT Middle School is based on integrated Islam.

Products developed in the form of modules are expected to support both the learning process and independent learning outside the classroom. Modules that contain light material are presented in more depth and contain religious characters and values, and students can learn independently at home so that students can understand the material in more depth and have morals by instilling religious values. Therefore, the product developed is a teaching material in the form of an integration-interconnection-based science module on light material for class VIII students of SMP/MTs.

This study aims to: 1. Produce an integration-interconnection-based science module on light material for grade VIII students of SMP/MTs. 2. Knowing the quality of science modules based on integration-interconnection on light material for grade VIII students of SMP/MTs. 3. Knowing students' responses to the science module based on integration-interconnection on light material for class VIII students of SMP/MTs.

## **2.METHODS**

### **2.1 Development Model**

The type of research used in this research is research and development or Research and Development (R & D). Research and development or Research and Development (R & D) is a process used to develop and validate educational products (Borg and Gall, 1983:772). This research and development uses a procedural model. The procedural model is a descriptive model, which means it shows the steps that must be followed to produce a product (Puslitjaknov, 2008: 8). The research object to be developed is a science module based on integration-interconnection on light material for Grade VIII students of SMP/MTs.

### **2.2 Development Procedures**

The procedure for developing the IPA module based on integration-interconnection uses the Borg and Gall development model adapted by the Puslitjaknov team. The procedures in the research were taken or carried out in stages to produce a product in the form of a module. The steps carried out in this study are 1. Analysis of the product being developed. 2. Develop the initial product. 3. Validation and revision. 4. Small-scale trials.

### **2.3 Data Analysis Techniques**

Qualitative data in the form of suggestions, criticisms and input on the module. Quantitative data is in the form of an assessment of each aspect of the quality of the module being assessed.

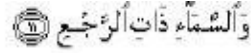
## **3.RESULTS**

### **3.1 Research Results**

#### **3.1.1 Initial product**

In this study the product developed was a science module based on integration-interconnection with light material for class VIII students of SMP/MTs. The light material in the module is integrated with the verses of the Qur'an and commentary. The integrations in the module use a

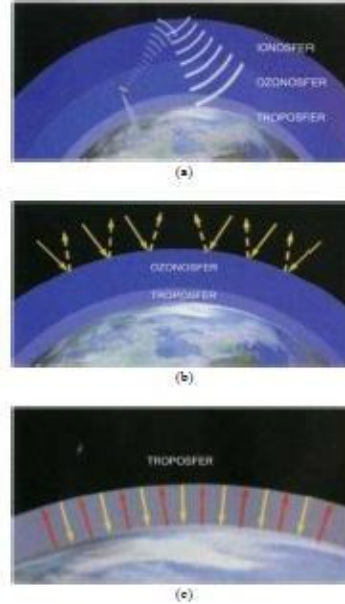
confirmative model. In this module there are interesting pictures and also help understand the material presented, for example as shown in Figure 1.



Artinya: "Demi langit dengan sistem siklusnya" (QS Ath-Thaariq: 11)

"Sistem siklus" dalam terjemahan Al-Qur'an, memiliki arti "mengirimkan kembali" atau "mengembalikan". Sebagaimana diketahui, atmosfer yang melapisi bumi terdiri dari beberapa lapisan. Masing-masing lapisan mempunyai fungsi penting demi kelangsungan hidup, riset telah mengungkapkan bahwa lapisan-lapisan ini mempunyai fungsi mengembalikan material atau sinar yang mengenainya ke ruang angkasa atau kembali ke bumi.

Beberapa contoh fungsi lapisan yang mengembalikan, yaitu: Lapisan troposfer, memungkinkan uap air naik dari permukaan bumi untuk dikondensasikan dan dikembalikan ke bumi sebagai hujan. Lapisan ozon dan lapisan magnetosfer, memantulkan sinar kosmik, sinar



Gambar 2.16 (a,b,c) tentang lapisan atmosfer yang mengembalikan atau memantulkan  
Sumber: Kewajiban Alqur'an

Figure 1: Module Material and Contents

This initial product is an IPA module that has not been validated. After the initial product has been completed, then this initial product will be validated. With the aim that the product being developed is better.

### 3.1.2 Validation

Each product and instrument validation is carried out by 1 (one) validator. The purpose of this product validation is to obtain input and suggestions for the initial product so that it can be used to revise the product content (revision I). The purpose of instrument validation is to obtain valid instruments and be used in this development.

### 3.1.3 Expert Judgment

Expert judgment is carried out by the assessment team. The assessment team consisted of 3 material experts, 3 media experts, 3 integration-interconnection experts, and 3 science teachers at SMP IT Permata Hati Banjarnegara. The data obtained from the results of the assessment are quantitative and qualitative data. Quantitative data is in the form of assessment questionnaires,

while qualitative data is in the form of suggestions and input from experts as material for conducting revision II.

### 3.1.4 Product Trials

Product trials should have been carried out in two stages, namely small-scale trials and large-scale trials, but due to time constraints, the trials were carried out only up to the small-scale trials stage. A small-scale trial was conducted with 1 class of subjects with 20 class IX students at SMP IT Permata Hati Banjarnegara.

## 4. RESULTS OF DATA ANALYSIS

### 4.1 Validation Analysis Results

After the product has been validated and given input and suggestions by the validator, these inputs and suggestions become material for revising the product being developed (revision I). Likewise with instrument validation that has been validated and given input and suggestions by the validator, the instrument is improved according to the validator's input and suggestions. Input and suggestions from the validator are presented in Table 1.

Validator	Validasi	Masukan dan Saran
Validator 1	Produk	1. Konsep dualisme cahaya, apakah tidak membingungkan bagi murid SMP/MTs?
		2. Konsep sinar (dhiya) dan cahya (nuur) dalam KBBI keduanya adalah sama. Dapatkah modul ini menjelaskan secara gamblang perbedaan keduanya?
		3. Banyak gambar yang seharusnya bisa dibuat sendiri tetapi modul ini lebih suka mengambil dari buku.
		4. Satuan masih banyak yang salah.
		5. Tata tulis tolong diperhatikan lagi.
Validator 2	Instrumen	1. Salah ketik atau ejaan diperbaiki.
		2. Respon siswa indikatornya diperbanyak.
		3. Perbaiki tata tulisnya.

Table 1: Input and Suggestions from the Validator

### 4.2 Results of Assessment Analysis

#### (a) Material Expert Assessment

Product evaluation was carried out by three material experts. The results of this product assessment can be seen in Table 2. In addition to providing assessments, material experts also provide suggestions and input on the products being developed.

Aspek	Butir (N)	Penilai (n)			Jumlah Tiap Pernyataan	Tiap Aspek ( $\sum x$ )	Skor Rata-rata ( $\bar{x}$ )	Kategori
		1	2	3				
Isi Materi	1	4	4	4	12	84	4,00	Sangat Baik
	2	4	4	4	12			
	3	4	4	4	12			
	4	4	4	4	12			
	5	4	4	4	12			
	6	4	4	4	12			
	7	4	4	4	12			
	8	3	4	4	11			
Pendukung Materi	9	4	4	4	12	65	3,61	Sangat Baik
	10	3	4	4	11			
	11	3	4	4	11			
	12	3	4	4	11			
	13	3	2	4	9			
<b>Jumlah Skor</b>		47	50	52	149	149	3,80	Sangat Baik

Table 2: Material Expert Assessment

**(b) Media Expert Assessment**

Product evaluation is carried out by 3 media experts. The results of this product assessment can be seen in Table 3. In addition to providing assessments, media experts also provide suggestions and input on the products being developed.

Aspek	Butir (N)	Penilai (n)			Jumlah Tiap Pernyataan	Tiap Aspek ( $\sum x$ )	Skor Rata-rata ( $\bar{x}$ )	Kategori
		1	2	3				
Penyajian	1	3	4	3	10	66	3,14	Baik
	2	4	3	2	9			
	3	4	3	3	10			
	4	4	3	3	10			
	5	4	3	3	10			
	6	4	2	2	8			
	7	3	3	3	9			
	8	4	3	3	10			
Pendukung Penyajian	9	4	2	3	9	39	3,25	Baik
	10	4	4	3	11			
	11	3	3	3	9			
<b>Jumlah Skor</b>		41	33	31	105	105	3,19	Baik

Table 3: Media Expert Assessment

**(c) Integration-interconnection Expert Assessment**

Product evaluation was carried out by three integration-interconnection experts. The results of this product assessment can be seen in Table 4. In addition to providing assessments, integration-interconnection experts also provide suggestions and input on the products being developed.

Aspek	Butir (N)	Penilai (n)			Jumlah Tiap Pernyataan	Tiap Aspek ( $\sum x$ )	Skor Rata-rata ( $\bar{x}$ )	Kategori
		1	2	3				
Integrasi-interkoneksi	1	4	4	3	11	33	3,67	Sangat Baik
	2	4	4	3	11			
	3	4	4	3	11			
Model Kajian Integrasi-interkoneksi	4	4	4	3	11	11	3,67	Sangat Baik
Manfaat Integrasi-interkoneksi	5	4	4	3	11	11	3,67	Sangat Baik
<b>Jumlah skor</b>		20	20	15	55	55	3,67	Sangat Baik

Table 4: Integration-interconnection Expert Assessment

#### (d) Science Teacher Assessment

Product assessment was carried out by 3 science teachers. The results of this product assessment can be seen in Table 5. In addition to providing assessments, science teacher experts also provide suggestions and input on the products being developed.

Aspek	Butir (N)	Penilai (n)			Jumlah Tiap Pernyataan	Tiap Aspek ( $\sum x$ )	Skor Rata-rata ( $\bar{x}$ )	Kategori
		1	2	3				
Materi	1	4	4	4	12	55	3,67	Sangat Baik
	2	4	4	3	11			
	3	4	4	3	11			
	4	4	4	3	11			
	5	4	3	3	10			
Integrasi-interkoneksi	6	4	4	3	11	23	3,83	Sangat Baik
	7	4	4	4	12			
Media	8	4	4	2	10	17	2,83	Baik
	9	3	2	2	7			
<b>Jumlah Skor</b>		35	33	27	95	95	3,44	Sangat Baik

Table 5: Science Teacher Assessment

#### 4.3 Results of Trial Analysis

In this development research, product trials only reached the small-scale trial stage. A small-scale trial was conducted with 1 class of subjects with 20 class IX students at SMP IT Permata Hati Banjarnegara. Of the 20 student response data, 2 data were not included because they did not meet

the requirements, so only 18 student response data were included in this study. The limited trial student response data is presented in Table 6.

Aspek	Butir (N)	Responden (n)	Jumlah Respon Tiap Pernyataan	Tiap Aspek ( $\sum x$ )	Skor Rata-rata ( $\bar{x}$ )	Kategori
Media	1	18	17	128	0,89	Setuju
	2	18	12			
	3	18	18			
	4	18	17			
	10	18	17			
	11	18	12			
	12	18	18			
	13	18	17			
Materi	5	18	17	142	0,98	Setuju
	6	18	18			
	7	18	18			
	8	18	18			
	14	18	17			
	15	18	18			
Manfaat	16	18	18	36	1,00	Setuju
	17	18	18			
	9	18	18			
	18	18	18			
<b>Jumlah Skor</b>			306	306	0,96	Setuju

Table 6: Small Scale Trial Results

## 5.CONCLUSION

The conclusions that can be drawn from this study are as follows: 1. A product in the form of a science module based on integration-interconnection on light material for grade VIII SMP/MTs students using a procedural model by the Puslijaknov team. 2. The quality of the Science module developed according to material experts has a Very Good category (SB) with an average score of 3.80; according to media experts, it has a Good category (B) with an average score of 3.19; according to integration-interconnection experts, it has a Very Good category (SB) with an average score of 3.67; and according to the science teacher, it has a very good category (SB) with an average score of 3.44. 3. Student responses to the Science Module developed in small-scale trials are Agree (S) with an average score of 0.96. These results indicate that the Science module can be accepted by students as teaching material during the learning process as well as for independent study

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