Development Of Science Modules Integrated With The Independent Curriculum For Prospective Elementary School Teachers

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Development Of Science Modules Integrated With The Independent Curriculum For Prospective Elementary School Teachers

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ABSTRACT

This study aims to develop Mathematics and Science or MIPA modules intended for prospective elementary school teachers or PGSD Study Program students, to determine the validity of the MIPA teaching modules that have been developed, and to determine the practicality of the MIPA modules that have been developed. The research method used is a development research model using the 4D development model including the following Define, Design, Develop, and Disseminate. MIPA module developed is declared very valid or very good and can be used with a score of 3.62 b of the math and science modules. To determine the practicality of the teaching module, validation to users and trials were carried out. The results of user validation show that the teaching module developed can be used with a score of 3.50 the results of the product trial show that students can use teaching materials well.

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1. INTRODUCTION

The progress of a country can be indicated by the high produced. Indonesia in terms of the quality of human resources is still very low in quality, as evidenced by Indonesia's PISA ranking in 2018 reported by OEDC (Hewi & Shaleh, 2020) which only ranked 72nd out of a total of 78 countries, the average score in mathematics reached 379 with an average score of 487. Furthermore, for science, the average score of Indonesian students reached 389 with an average score of 489. These scores show that students' ability to think related to math and science is still very low. In addition to improvements in terms of the curriculum which currently implements independent learning, the quality of teachers also needs to be considered. One improvement that needs to be made is to improve the quality of teachers, especially starting from the elementary school level.

Elementary school is the level where students begin to think in a concrete operational manner so that the knowledge they gain will be the basis for higher knowledge. In the process of organizing elementary school education (SD) or Madarasah Ibtidaiyah (MI), an understanding of the cognitive development of primary-age children is very important to be a reference in order to educate and teach (Bujuri, 2018). This results in teachers in elementary schools need to have knowledge that is in accordance with their scientific field. This teacher's knowledge is certainly instilled since the lecture period. The Elementary School Teacher Education Study Program at Universitas Nusantara PGRI Kediri as one of the printers of

prospective elementary school teachers also makes efforts to improve the quality of prospective teachers. PGSD UNP Kediri has implemented an independent learning curriculum through teaching activities in schools. When students take teaching activities at school, of course, scientifically students must have sufficient provision. Not only related to pedagogical skills, but also knowledge related to their science. One of the knowledge that needs to be developed by students is related to the field of Mathematics and Natural Sciences (MIPA).

The field of Mathematics and Natural Sciences is one of the fields that is often presented in practicum and experimental activities where these activities can be a special attraction in classroom learning. Learning through experiments or practicum activities can not only attract interest but also improve critical thinking skills (Primasatya, 2016). According to (Nurmilawati, 2016) practicum is one of the laboratory activities that plays a very important role in supporting the success of the science teaching and learning process. As an effort to facilitate students to be able to carry out experimental or practicum activities, it is necessary to prepare teaching modules that can be used by students both independently and guided. (Prastowo, 2015) states that teaching materials or teaching modules are all materials that are arranged systematically, which display the completeness of the competencies that will be mastered by students and used in lecture activities so that learning objectives can be achieved.

MIPA stands for math and science. According to (Siagian, 2016) Mathematics is one of the sciences that plays an important role in the development of science and technology, both as an aid in the application of other fields of science and in the development of mathematics itself, for example, to be able to understand physics, one must first understand mathematics. understand physics without understanding mathematics first. According to (Carin, Sund, & Lahkar, 2018) students as prospective teachers are also required to have a deeper understanding of concepts, because the understanding of mathematical concepts possessed by students will be transferred later to their students. Meanwhile, according to (Meidawati, 2019) Science or Natural Sciences is a subject that studies events that occur naturally. From another source according to (Eka, 2014) is the concept of natural learning and has a very broad relationship related to human life, so that the MIPA module can make it easier for prospective elementary school teachers to facilitate experimental activities when teaching elementary school students.

One of the most important elements in education that has an important effect is the curriculum. According to (Eka, 2013) the curriculum greatly contributes to realizing the process of developing the quality of students' potential. In the independent learning curriculum, it strongly supports the development of character, potential and students (Kemendikbudristek, 2022). The independent curriculum has main characteristics, as an improvement from the previous curriculum, namely 1) Project-based teaching and learning activities to develop soft skills and character profiles of Pancasila students consisting of faith 2) The concept of learning materials that focus on deepening literacy and numeracy which is one of the basic competencies 3) Educators or teachers have the freedom to design learning activities that are tailored to the abilities of students and in accordance with the context of local content (Rosmana, Iskandar, Fauziah, Azzifah, & Khamelia, 2022). However, in the development of this MIPA module, the role of the independent curriculum is the material presented in the MIPA module which is developed based on the content standards for the basic education level in the independent curriculum, so that with this module prospective elementary school teachers, especially Basic Education Study Program students, get provisions for teaching elementary school students in the independent curriculum learning. Based on this background, it is necessary to design an integrated module of the independent learning curriculum for prospective elementary school teachers.

So that in this study aims to develop a Mathematics and Science or MIPA module intended for prospective elementary school teachers or PGSD Study Program students, and to determine the validity of the MIPA teaching module that has been developed, as well as to determine the practicality or response of the MIPA module practitioners that have been developed.

2. METHODS

The learning device development process includes 4 stages namely: Define, Design, Develop, and Disseminate. However, this research is only limited to the development stage (Ibrahim, 2002). This is

because the development research carried out is only intended for its own purposes, so the dissemination stage is not carried out.

1. Defining Stage

   This stage focuses on analyzing the situation faced by the teacher, student characteristics, concepts to be taught, and ends with learning objectives or learning outcomes. This stage consists of five steps, namely curriculum analysis, student analysis, concept analysis, task analysis, and mapping learning objectives.

2. Design Stage

   This stage consists of 3 steps, namely (1) preparation of benchmark reference tests, tests are prepared based on the results of the formulation of specific learning objectives. This test is a measuring tool for changes in behavior in students after teaching and learning activities; (2) selection of media according to objectives, to convey subject matter; (3) format selection.

3. Development Stage

   The purpose of this stage is to produce MIPA learning modules that have been revised by experts, so that they are suitable for use in limited trials. This stage includes: validation of learning devices followed by revision and limited trials on students. The validation stage according to (Putri, 2015) is a method used to measure the validity of the device developed, namely the MIPA module, by making a validation sheet, the contents are adjusted to the existing rules and in accordance with the device that has been made, then the validation sheet is submitted to validators who are competent in their fields or learning device experts for assessment.

4. Deployment Stage

   The deployment stage, this stage is the stage of disseminating teaching materials that have gone through sharing the validation and trial stages. According to (Zunaidah & Amin, 2016) this disseminate can also be done by feasibility testing in class implementation before being distributed outside the agency. In this study what was done was without disseminate this was due to time constraints.

The following is a picture of the 4D development flow which consists of four stages, namely defining, designing, developing, and disseminating. However, in this study it is only limited to the development stage.

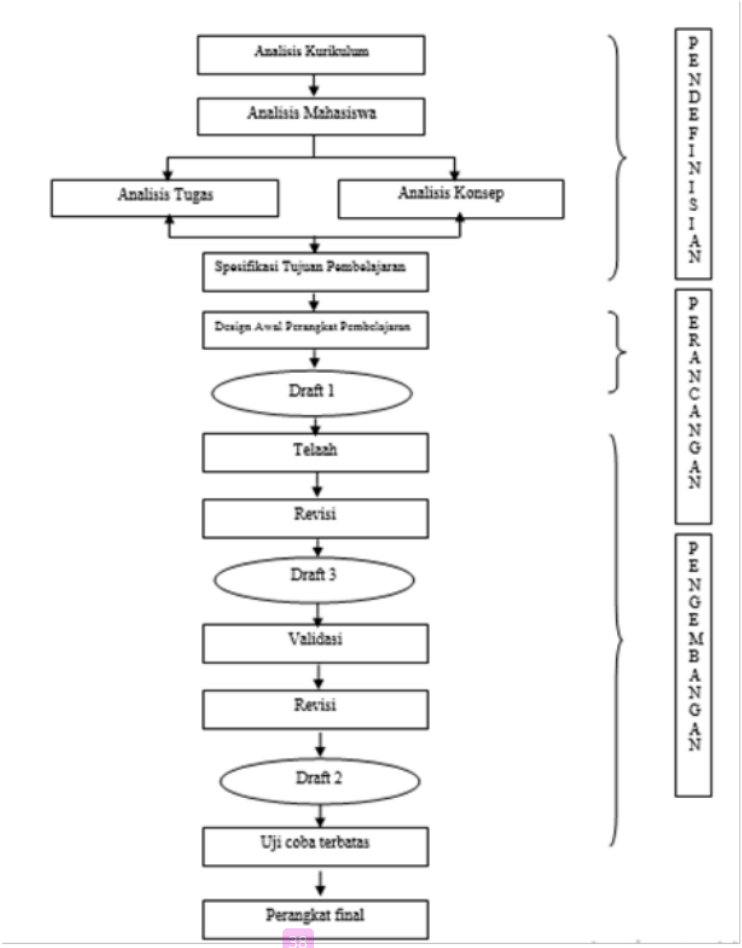


Figure 1. The Dodule Development Model Used Is The 4-D Model
(Ibrahim, 2002)

Testing

The design of the MIPA teaching module trial was carried out through 4 stages, namely.

1. Expert Test Stage, namely Material Experts and Teaching Module Experts.
2. User Test Stage.
3. Limited trial of 6 students.
4. Revision is a process of improving the application after obtaining input obtained from validation and trial activities.

Data Collection Instruments

The data collection instruments in this research and development are as follows.

1. MIPA module validation sheet given to teaching module experts and material experts.
2. The questionnaire given is a user response questionnaire.

3. The test given contains questions to determine critical thinking skills for students, namely as prospective elementary school teachers.

Data Analysis

The collection technique is quantitative and qualitative descriptive analysis techniques. Quantitative descriptive data analysis. Analyze the validation questionnaire using the formula:

$$\text{Validitas} = \frac{\sum skor\ total}{jumlah\ item \times jumlah\ respon}$$

Table 1. Criteria for module validation average score
(Bungin, 2009)

Skor Rata-rata	Kriteria Skor
1,00-1,75	Tidak baik
1,76-2,50	Kurang baik
2,51-3,25	Baik
3,26-4,00	Sangat baik

3. FINDINGS AND DISCUSSION

Initial Product Description

The product developed is a teaching module that contains practicum instructions for mathematics and science MIPA material intended for prospective elementary school teacher students. The teaching module is equipped with brief material related to the practicum being carried out, the necessary materials and tools and activity steps during the practicum along with practice questions that support understanding of the concepts of MIPA material. The material in the module is in accordance with the learning materials for Mathematics and Science of the independent curriculum in elementary schools.

Expert Validation Results and Revisions

After the MIPA module was developed, the module was then validated to experts in Mathematics and Science learning. The results of the validation include.

Table 2. Results of Mathematics and Science Learning Expert Validation

No.	Assessment Aspect	Score
1	Aspek *Self Instruction*	3.86
2	Aspek *Self Contained*	4.00
3	Aspek *Stand Alone*	4.00
4	Aspek *Adaptive*	3.00
5	Aspek User Friendly	4.00

In accordance with the calculation formula described earlier, the score of the validation of mathematics and science material experts is 3.77 based on this score, if converted to the table of validity criteria and the usefulness of the instrument, the result is that the MIPA teaching module developed is very valid, very good and can be used. While comments from mathematics and science material experts for suggestions, namely the question section on flat building material previously covered all learning

objectives and the next suggestion is that each student experiment activity should be asked to make conclusions from the results of the experiments carried out.

The following are the results of validation of MIPA teaching modules obtained from teaching material experts, along with the suggestions that have been given.

Table 3. Teaching Material Expert Validation Results

No.	Assessment Aspect	Score
1	Aspek Ukuran Modul	3.00
2	Tata Letak *Cover* Modul	3.62
3	Tipografi *Cover* Modul	3.50
4	Ilustrasi Kulit Modul	4.00
5	Tata letak isi modul	3.08
6	Tipografi Isi Modul	3.54
7	Ilustrasi Isi Modul	3.60

In accordance with the calculation formula described earlier, the score of the teaching material expert validation is 3.48 based on this score, if converted to the table of validity criteria and the usefulness of the instrument, the result is that the MIPA teaching module developed is very valid, very good and can be used. While comments from teaching material experts for suggestions, namely there is writing titles and subtitles that are still inconsistent, writing a bibliography is not in order, and improving the layout of sentences that are still not right.

From the two validators, namely material experts and teaching material experts, the average validation results of the MIPA module were 3.62 with a very good category. This is in accordance with research conducted by (Iskandar & Andriyani, 2019) in a study entitled the development of trigonometric teaching materials to improve students' mathematical critical thinking skills, in the study obtained validation results of 4.60 with a very good category. The structure of the MIPA module developed also aims to improve critical thinking skills, which will be presented in the next article.

User Validation Results and revisions

Validation of users is done by asking lecturers who teach MIPA laboratory courses at level III in the PGSD Study Program where the trial is at FKIP Universitas Nusantara PGRI Kediri, to fill out a validation questionnaire. The results of validation from users are as follows.

Table 4. Teaching Material Expert Validation Results

No.	Assessment Aspect	Score
1	Aspek *Self Instruction*	3.00
2	Aspek *Self Contained*	4.00
3	Aspek *Stand Alone*	4.00
4	Aspek *Adaptive*	3.00
5	Aspek User Friendly	4.00
6	Aspek Ukuran Modul	3.00
7	Tata Letak Cover Modul	3.00
8	Tipografi Cover Modul	4.00
9	Ilustrasi Kulit Modul	4.00
10	Tata letak isi modul	3.00

11	Tipografi Isi Modul	4.00
12	Ilustrasi Isi Modul	3.00

In accordance with the calculation formula described earlier, the score of the teaching module user validation is 3.50 based on this score, if converted to the validity criteria table and the usefulness of the instrument, the result is that the MIPA teaching module developed is very valid, very good and can be used. While comments from teaching material experts for suggestions are not consistent in the presentation of teaching modules for each material and in the cover design of the MIPA module have not used illustrations according to the contents of the module. The use of illustrations serves to illustrate the contents of the module and attract readers' interest. In accordance with the opinion (MULYATI, 2002) that illustrations serve to clarify or concretize information, help memory and understanding, attract the interest and attention of readers.

Results Limited trial and revision

Limited trials were conducted on 6 students of the PGSD FKIP Study Program at Nusantara PGRI University, Kediri. In this limited trial there are several notes including the following.

Table 5. Teaching Material Expert Validation Results

No.	Findings
1	Students tend not to read the instructions in the teaching module.
2	There are some learning steps that are difficult for students to understand so they need to be improved.

During the trial process, students tended to pay more attention to the directions given than reading the work instructions in the teaching module. Students need to read many times to be able to understand the work instructions, this means that it is necessary to make effective work procedure sentences so that it is easy for students to understand in doing the practicum. In addition to effective work procedure sentences, one of the efforts to make students interested in reading and understanding the module is to make the MIPA module look more attractive, namely according to (Triana Indrawini, Amirudin, & Widiati, 2017) contrasting colors should be chosen in writing teaching materials so that teaching materials are clear and easy to read so that readers can receive messages properly. This is also reinforced by (Smaldino, Lowther, & Mims, 2012) which reveals that to be easy to read the text color must contrast with the background color.

The results of this limited trial show that the teaching module developed can be used by students on a limited basis but with some notes of improvement. From the results of the limited trial, revisions were made.

4. CONCLUSION

The development of MIPA modules intended for prospective elementary school teachers or PGSD Study Program students has been validated by experts and users with the results that the teaching modules developed are very valid, very good and can be used. The product has also been tested on a limited basis. The trial results show that students can use the teaching modules developed well.

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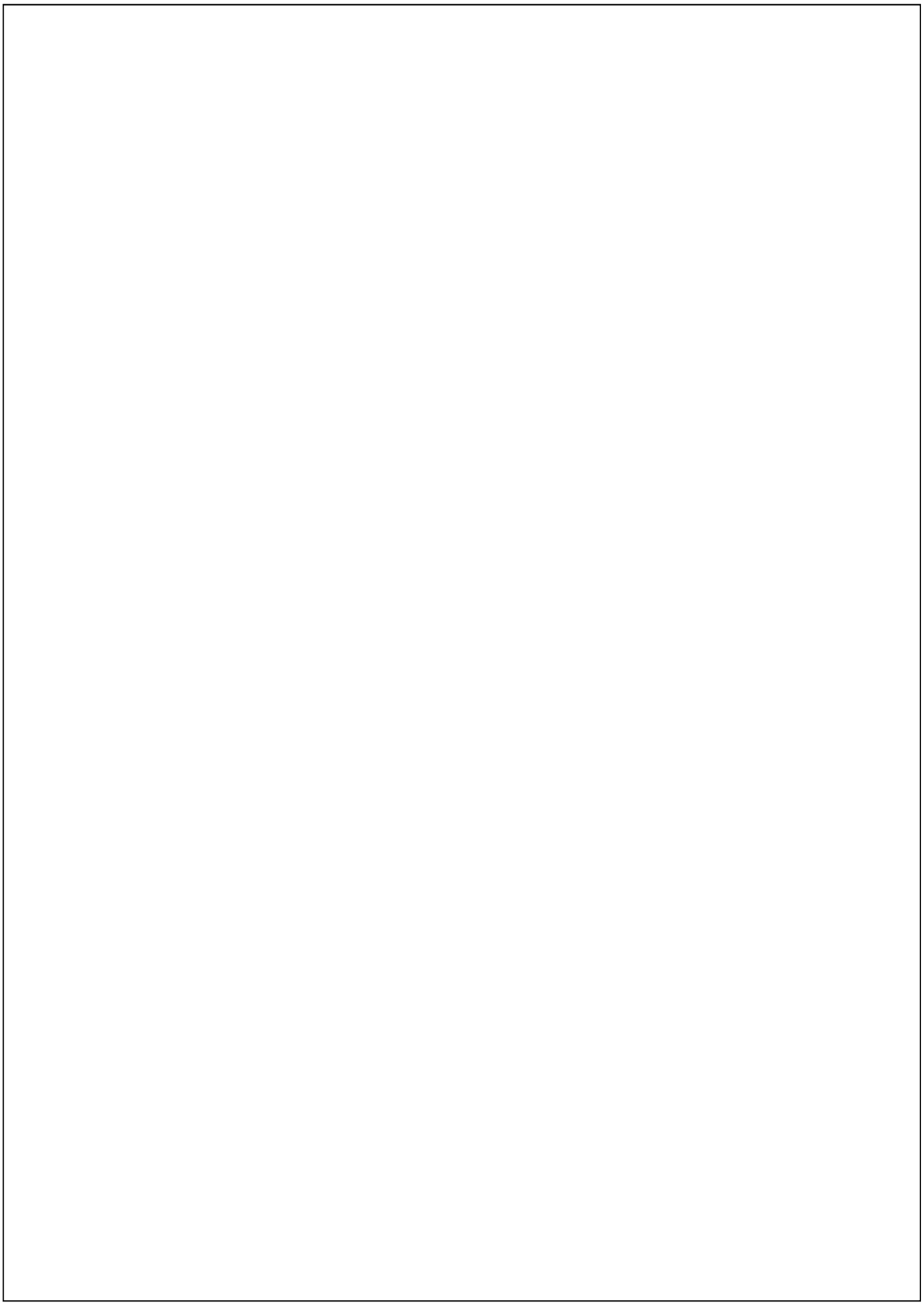
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