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# Development of Picture and Picture-Based Science Learning Modules in Elementary Schools

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**A B S T R A C T**

The research conducted aims to determine the steps taken in the development of teaching materials in the form of Picture and Picture based learning modules on human respiratory system materials and to determine the level of validity of teaching materials developed. This research is a type of Research and Development (R&D) which refers to the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation). The subjects in this study were grade V students of SDN Serdang Wetan. This research data was obtained by observation, interviews, and questionnaires. The results of the study obtained a material expert validation value of 90% with very valid criteria, media expert validation of 76.6% with valid criteria, and linguists of 80% with valid criteria, the results of module assessment by teachers obtained very valid criteria with a percentage of 90.9%. In small group trials, learning modules obtained a percentage of 87.3% with very valid criteria and large group trials obtained a percentage of 91.3% with very valid criteria.

## 1. Introduction

In the 2013 Curriculum Framework, various disciplines are integrated in one theme, replacing the separation of certain issues into many concocted themes. An integrative thematic learning approach characterizes it, where skills from different fields are combined into a particular theme, creating a more meaningful learning experience that involves diverse aspects of knowledge. For example, in learning integrative themes, science and Indonesian subjects are combined with other disciplines. Science applied in the 2013 Curriculum has a basic empirical approach that emphasizes that natural phenomena can be investigated, explained, and understood through observation, experimentation, and logical analysis, which is different from the causality method (Syofyan & Yuliati, 2017). As part of integration, science reflects the incorporation of content between subjects, in this context encompassing knowledge about living beings.

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In order to improve optimal learning outcomes in accordance with the educational context in Indonesia, educators need to play an active role in delivering material and information to students in the classroom. Educators have a crucial role in motivating students during the learning process to advance the quality of education. One of the subjects that can support students to be active and explore their potential is natural science (IPA). Science learning at the elementary school level also has a positive impact by helping students develop ways of thinking and solving everyday problems supported by the perspective provided. Wardani & Syofyan (2018) He explained that it is very important for students to participate in science education, because science gives them the opportunity to acquire new skills, broaden their horizons, and students can use technology in everyday life.

Science, an integral part of everyday life covered in the Curriculum, is often known as science, and is interesting to study because it is closely related to the natural environment (Octavianingrum & Syofyan, 2019; Hanum et al., 2023). Menurut Amini & Saniyah (2021), Science is called natural science, or science in which it understands things that happen in nature. Science learning gives learners the opportunity to build knowledge through experimentation, not only limited to natural events but also includes information about bodily events involving living organisms. Science education in schools involves critical thinking and learners' ability to solve problems scientifically while interacting with the environment. However, difficulties arise due to the large number of foreign terms that are difficult to understand, making learners less fond of science subjects. One particularly challenging material is human breathing, where it is difficult to visualize the process without teaching materials or learning media.

This is also supported by research submitted by Romaisyah et al., (2018) which states that learners may find it difficult to understand some information in the human respiratory system, especially signs of human respiratory mechanisms and O2 and CO2 exchange processes. In addition, information about the human respiratory system involves complex ideas that make learning difficult for learners and the abundance of foreign languages that make it difficult for learners to understand and understand. According to Manurung et al., (2020), Each student is very diverse in potential and characteristics, so that these differences can also show the characteristics of students when they are solving the problems they face. Based on this, educators need different ways to create teaching materials. Educators must be able to adapt learning to the characteristics of their learners, by providing a successful learning environment, creating lesson plans, and developing teaching materials. According to Syofyan et al., (2020), The most important component of the learning process that must be prepared and mastered by educators is teaching materials. In an effort to meet student competency criteria, education units use a variety of learning resources, including printed and non-printing teaching aids. Examples of print resources include textbooks, LKS, textbooks, and modules, while non-print learning aids involve tapes, audio, and video. Educators can also create alternative teaching materials in the form of learning modules. Although the importance of teaching materials is recognized, educators' busy teaching often makes it difficult for them to make their own teaching materials. Therefore, many publishers and textbook authors design

teaching materials by modifying existing ones. However, research shows that the use of teaching materials without adjustment can make it difficult for students to learn the material, so a learning environment is needed that provides active opportunities to students in the learning process and acceptance of new knowledge.

The learning method of an educator must provide more creative, innovative and interesting teaching so that students become motivated so that they are active in the learning process (Syofyan et al., 2019; Bella et al., 2023). To achieve learning objectives, an educator needs to adopt teaching strategies and create appropriate teaching materials, enabling learners to gain new experiences and information, as well as realize potential and acquire specific skills necessary for effective learning.

According to Deviana (2018) states that one of the printed educational resources is modules. Modules are components of educational material that are arranged systematically as well as logically. The module consists of a collection of learning activities that have been thought out and arranged in such a way that later students are able to master the learning objectives (Gunawan, 2022). According to Mahadiraja & Syamsuarnis (2020) Modules are desirable systems that have been selected in an effort to produce a more efficient, relevant, and successful education system, with the aim of helping students master certain learning objectives, modules are one type of learning resource that is packaged comprehensively and methodically. According to (Syofyan et al., 2020) Modules are a set of teaching resources that are optimally designed and coherent and contain assessments, procedures, and content that can be used by students themselves to develop the necessary competencies. Modules differ from other printed teaching materials by allowing learners to learn independently, actively, and participate in the teaching and learning process, preventing boredom, and influencing changes in learner behavior through the relevance of the module to the surrounding environment.

In accordance with this, researchers try to ensure the truth, researchers try to collect data by conducting field observations, questionnaires, and interviews. The observation was carried out at a State Elementary School in Tangerang Regency, Legok District, namely SDN Serdang Wetan, Class VA in science subjects. According to the findings of interviews with educators, ready-to-use thematic books have been used in teaching and learning activities, and students are actively involved in teaching and learning activities. However, because VA graders are considered unable to solve problems, educators have not linked learning to difficulties that arise in the real world, including social, economic, and environmental challenges. In addition, learners have not received any training on how to create a work that is relevant to real-world situations.

Other data was also obtained from interviews with VA class educators at SDN Serdang Wetan which were conducted on November 4, 2022. From the results of the interview, it was determined that the lecture approach was used by teachers to deliver material about the respiratory system in humans. Based on the results of

preliminary interviews, it was also found that the books used in learning media only use thematic books used to explain the material of the human respiratory system. The respiratory system in humans cannot be explained more effectively by the use of learning media that are only seen from thematic books, due to the lack of coloring in the picture of the respiratory system because the image is only black and white. In addition, learning media does not include students in active learning. Students only see pictures of the human respiratory system, while educators still control classroom activities. Coupled with the large number of practice questions and the lack of reference material for students to answer the questions. In fact, science learning should focus more on the active involvement of students in the teaching and learning process.

The results of preliminary questionnaires and preliminary interviews conducted by researchers and then analysis researchers. Based on the data collected, it is necessary to develop the use of teaching materials in the form of ready-made modules by taking into account the needs and characteristics of class V students. To deal with problems that exist in science learning in the human respiratory system, researchers want to develop module-shaped teaching materials that can facilitate educators and students in the teaching and learning process with characteristics that have been adjusted to the personality of students, namely, using module-shaped teaching materials based on Picture and Picture models.

According to Amin & Sumendap (2022) states that Picture and Picture is a learning model using various images that concern learning material. According to Fatimah (2021) expressed the opinion that, the Picture and Picture learning model is a learning method using various images arranged or installed sequentially as learning aids. In this case, educators introduce the material while communicating the competencies that must be achieved. The educator then shows the pictures related to the subject. So the Picture and Picture learning model is a cooperative learning model that uses image media for learning tools. In its implementation, the various images are installed sequentially so as to form a logical image. According to Wahyudi et al., (2021), Students are more studious and active in the classroom when using Picture and Picture-based learning models. Therefore, this study aims to determine the level of validity of teaching materials in the form of picture and picture-based modules for elementary school grade V science learning on respiratory system material in humans.

## 2. Methodology

Research methods are systematic steps taken by researchers to answer the formulation of research problems. In this section, it must be described what/who is the object of research, how the procedure for conducting research, how data collection techniques, and how data analysis techniques. Research methods must be described in detail. For qualitative research, it is necessary to add the presence of researchers, research subjects, informants who help along with ways to dig up research data, location, and duration of research as well as a description of checking the validity of research results. For literature research such as systematic

literature review and others, it is necessary to explain the research procedures carried out clearly.

Research and Development or R&D is used in this research to create products that suit the needs of students and educators. Research and Development based on Sugiyono (2019) said that development and research is one way that products used in learning and education are made and tested for the effectiveness of their products. In this context, teaching materials in the form of Picture and Picture-based science learning modules are produced as the final product. The teaching materials created, developed with reference to the ADDIE Development model. According to Cahyadi (2019), The ADDIE model is divided into five stages, namely, evaluation, implementation, development, analysis, design. This development model is one of the teaching material development strategies that are often used. This ADDIE Development Model was chosen because it is more methodical and because each stage includes assessment stages so that it is more comprehensive. The ADDIE model contains five stages: namely (1) Analysis, (2) Design, (3) Development, (4) Implementation, and (5) Evaluation.

A series of trial activities, including small group trials and large group trials. It aims to develop teaching materials in the form of Picture and Picture-based science learning modules. The subjects in this study were students of the VA class of SDN Serdang Wetan. Data collection techniques used include interviews, observations, documentation, and questionnaires. The questionnaire in question is a preliminary student study questionnaire, an expert validation questionnaire, and a student response questionnaire is a data collection instrument used.

Data analysis techniques used include testing the validity of teaching materials or products that have been produced, assessment questionnaires by class teachers, and student response questionnaires. The product validity test is carried out by three experts, namely media experts, linguists, and material experts. The purpose of expert validation experts is to determine the level of product validity in the form of teaching materials for learning modules developed. The formula used to measure the level of validity of teaching materials in the form of learning modules developed is as follows:

$$NP = \frac{\text{Number of Scores}}{\text{Maximum Number of Scores}} \times 100\%$$

With the caption NP is the percentage amount. Then the percentage of validity is explained with the criteria for the validity of teaching materials in the form of modules in Table 1.

Tabel 1. Module Qualification Validation Criteria

| **Value (%)** | **Description** |
|---|---|
| 81-100 | Very Valid |
| 61-80 | Valid |
| 41-60 | Quite Valid |
| 21-40 | Less Valid |
| <20 | Invalid |

Meanwhile, student response questionnaires are processed using student response criteria as listed in Table 2.

Tabel 2. Student Response Criteria

| Value (%) | Information |
|---|---|
| 81-100 | Very Valid |
| 61-80 | Valid |
| 41-60 | Quite Valid |
| 21-40 | Less Valid |
| <20 | Invalid |

## 3. Results and Discussion

### *Analyze (Analysis Levels)*

At the analysis stage, the initial stages were carried out in the form of observation, interviews, and distributing preliminary study questionnaires to students to analyze the needs of VA class education participants. The results of observations, it was found that in classroom learning, educators have never used and applied other teaching materials except for LKS books used from the government, educators also tend to use the lecture method only when explaining material in class. This is relevant to the results of interviews conducted by researchers with VA class teachers, who stated that in learning teachers usually only use textbooks and there are no teaching materials or other learning methods.

### *Design (Design Phase)*

At the design stage, researchers draft the concept of learning modules that will be made by researchers. The concept design of the learning module is made using Storyboard. Storyboar is a concept or description of the contents of the module that will be produced by the researcher. Storybaord is created as shown in Figure 1.


Figure 1. Storyboard Module

In addition to making storyboards, at this stage also preparation of supporting images that will be displayed in the learning module and choosing the material to be displayed in the learning module. The material that will be displayed in this module is material about the human respiratory system, with material reviews that are understanding the human respiratory system, organs of the human respiratory system, respiratory diseases, and how to maintain the human respiratory system. In searching for images, researchers use several sites such as Canva or Tweezers. Researchers download all the supporting images needed to create learning modules, researchers use Canva applications to create learning modules. Here is a look at the Canva application that can be seen in Figure 2.

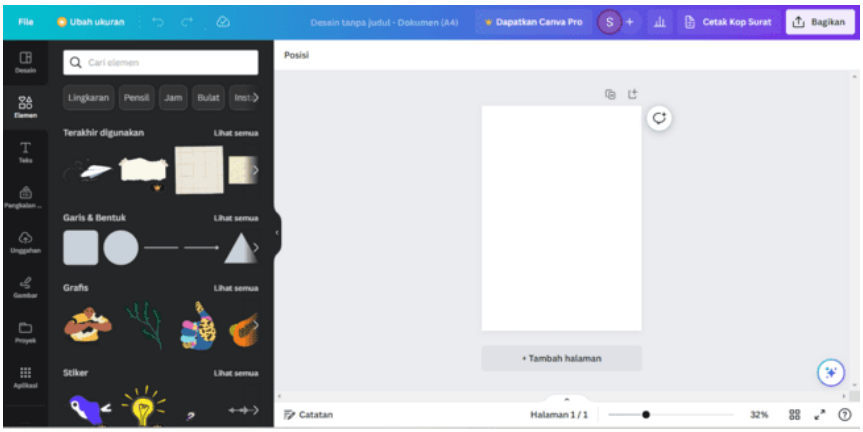


Figure 2. Canva App

***Development (Development Stage)***

At the development stage, the realization of the design stage is carried out. In this case, the researcher carries out the development stage in accordance with the storyboard that the researcher has made before and then made again as a whole into a complete learning module with. The results of product development are shown in Figure 3.


Figure 3. Developed Module Display

After the product or learning media has been made, the next stage is an assessment or validation by experts before the developed learning module is used in the learning process. There were three experts who validated the learning modules that the researchers developed in this study. The three experts are media experts, material experts, and linguists. The three experts are lecturers from Esa Unggul University. The three experts are also competent expert lecturers in the fields in accordance with the assessment (Table 3).

Tabel 3. Expert Validation Recap

| **Validator** | **Percentage (%)** | **Description** |
|---|---|---|
| Material Member | 90% | Very Valid |
| Media Member | 76,6% | Valid |
| Linguist | 80% | Valid |
| Sum | 246,6 | |
| Averange | 82,2% | Very Valid |

From table 3, an average percentage of 82.2% is obtained. Based on the module validity criteria, the value of 82.2% is included in the very valid criteria so that it can be said that the Picture and Picture based science learning module on human respiratory system material that has been developed and validated by experts has a good level of validity in terms of expert validation results.

In addition to assessment or validation by three experts, an assessment was also carried out from the class teacher on the modules developed. The purpose of conducting module assessments by teachers is because researchers need teacher opinions to assess whether the product developed is good for use in the learning process in the classroom in terms of material, language, and media (Table 4).

Tabel 4. Class Teacher Assessment Recapitulation

| **Assessed aspects** | **Percentage (%)** | **Information** |
|---|---|---|
| Material | 94% | Very Valid |
| Media | 90% | Very Valid |
| Language | 88,8% | Very Valid |
| Sum | 272,8 | |
| Averange | 90,9% | Very Valid |

From Table 4, a percentage of 90.9% is obtained. Based on the criterion of validity, the value of 90.9% falls into the very valid criteria. So it can be said, in the context of learning, Picture and Picture based learning modules that have been developed and validated by experts, have the potential to be used effectively in the learning process in the classroom with human respiratory system material.

***Implementation (Implementation Phase)***

After the module developed has been validated by three experts and class teachers, the next stage is to implement or test. In this study, two trials were conducted, namely small or limited group trials and large group trials. The small

group trial was conducted on May 30, 2023 and the large group trial was conducted on May 31, 2023. A small group trial was tested on 10 students. Learners in small groups were randomly selected and came from different classes from the research subjects, i.e. from VB classes. While the large group test was carried out on the VA class with a total of 34 students.

***Evaluation (Evaluation Phase)***

After students finish using Picture and Picture based learning modules, researchers submit response questionnaires to students for evaluation. This aims to determine the response of students to the learning modules they have used. The data on the results of student responses in small group trials and large group trials are shown in Table 5.

Tabel 5. Small Group Trial Questionnaire Recapitulation

| **Sum** | **Percentage (%)** | **Criterion** |
|---|---|---|
| 524 | 87,3% | Very Valid |
| Final Grade Percentage $= \frac{524}{600} \times 100\% = 87{,}3\%$ | | Very Valid |

From the questionnaire data table of student responses in small group trials, Picture and Picture based learning modules get a final grade percentage of 87.3% included in the very valid criteria. In other words, the Picture and Picture based science learning module that has been developed can already be used in classroom learning (Table 6).

Tabel 6. Large Group Trial Questionnaire Recapitulation

| **Sum** | **Percentage (%)** | **Criterion** |
|---|---|---|
| 1.864 | 91,3% | |
| Final Grade Percentage $= \frac{1.864}{2.040} \times 100\% = 91{,}3\%$ | | Very Valid |

From table 6, Picture and Picture based learning modules get a final score percentage of 91.3% obtained from 34 respondents. By converting quantitative data into qualitative data, the final score of 91.3% is included in the Very Valid criteria. Thus, the Picture and Picture based science learning module that has been developed can already be used in classroom learning.

This research and development has produced learning products in the form of Picture and Picture based science learning modules that have been validated by experts. To create a varied learning environment, teachers can use these learning modules in the classroom to help deliver subject matter that can attract the interest and attention of students. According to (Syofyan *et al*., 2019; Sari et al., 2023) Teaching materials or learning materials are all things that become curriculum content that must be mastered by students so that students can meet competency standards for each subject in certain educational units, therefore they must master all teaching resources contained in curriculum content. The teaching materials

developed are in the form of printed teaching materials, which are in the form of picture and picture-based modules. According to Octavianingrum & Syofyan (2019), The learning model is a guideline in carrying out the learning process in the classroom that has been arranged and planned to achieve learning objectives effectively, with the learning model also educators can make variations of learning when learning takes place in the classroom in order to arouse student learning motivation in the classroom. So in making the development of teaching materials in the form of this module, researchers use the Picture and Picture learning model in the module.

## 4. Conclusion

Based on the analysis above, it can be concluded that the advantages of picture and picture-based learning modules are more attractive to students to do learning in the classroom. This is because having interesting pictures and colors to look at, as well as the tasks in the module increase the interest in learning students, especially about the respiratory system in humans. However, the weakness of product development in this study is the search for quality printing at affordable prices, mastery of the Canva application, and making image illustrations. The results of the study show that module development is given an assessment from experts and educators with very valid categories.

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