

## **DEVELOPMENT OF SCIENCE STUDY CONTENT BASED ON THE GAL'PERIN MODEL TO IMPROVE STUDENT SCIENCE COMMUNICATION ABILITY CLASS V ELEMENTARY SCHOOL**

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### **ABSTRACT**

This study aims to produce science content teaching materials based on the gal'perin model that are valid to improve the science communication skills of fifth grade elementary school students. Teaching materials are developed using the 4D model which includes the stages of define, design, develop, and disseminate. The research instrument used was a teaching material validation sheet. The data analysis used is percentage. The results of the study revealed that the science teaching materials based on gal'perin had fulfilled the validity aspect because they had gone through the validation stage from the validator with an assessment based on 3 aspects, namely the content/material quality aspect on the material suitability indicator with basic competence obtaining an average percentage of 90, the accuracy of the material obtained percentage of 90%, stimulating curiosity earns a percentage of 93%, scientific means of communication obtains a percentage of 91%, use of the term symbol or icon in the material obtains a percentage of 96%, techniques for presenting material obtains a percentage of 96%, support and presentation of learning obtains a percentage of 88%. In the aspect of design quality, the indicator size of teaching materials obtained a percentage of 86%, the cover design of teaching materials obtained a percentage of 94%, and the design of the contents of teaching materials 85%. In the aspect of language quality, the use of the term symbol or icon gets a percentage of 100% and conformity with language rules gets a percentage of 86%. Teaching materials developed can improve science communication skills based on validation from validators who have obtained valid criteria.

**Keywords:** Gal'Perin Learning, Science Communication, and Science Lesson

### **INTRODUCTION**

The learning model is a conceptual framework that describes systematic procedures in organizing learning systems to achieve certain learning goals and serves as a guide for learning designers and teachers in planning and implementing learning activities.

Learning development is a technique that is carried out by means of management in finding solutions to problems that occur in a lesson or efforts to optimize the use of existing learning resources, with the aim of improving the quality of education and creating an easier and more enjoyable learning atmosphere for students. There are several learning development models known in education, including: the Dick and Carey Briggs and Wager learning development model, the Bela H. Benathy model, the Gerlach and Ely model, the Kemp model, the PPSI model, the IDI model, the galperin model, the Addie model.

Of the several learning development models mentioned earlier, there is one development model that is the focus of the author, namely the development of learning with the Gal'perin design. Gal'perin learning design can answer the problems faced by teachers in learning, including problems regarding; (1) What is to be learned? (purpose); 2. What procedures and resources should there be so that the desired level of learning (activities and resources) 3. How do we know that learning has taken place (evaluation). 4. Easy to use 5. Easy

to evaluate the learning process.

The Galperin learning model is one of the learning models developed by Pert Jakovlevich Galperin. Rosamedia (5 January 2013). Stated "The Galperin Learning Model is: A type of teaching that emphasizes student activity which consists of four stages of activity namely: (1) Orientation, (2) Training, (3) Feedback, (4) Continuation".

The Galperin learning model has advantages over other models, one of which is to review the teaching and learning process and provide direction to the teacher, where at the time of giving training, the teacher always accompanies and guides students so that the teacher can find information about student mistakes and provide advanced according to the abilities of students, so that students can correctly understand each problem discussed and can provide an increase in student learning outcomes, while other theories are usually only directed at the results of the teaching and learning process without knowing more deeply whether students have able to understand the problems that exist in the lesson. Galperin's lesson model is very suitable to be applied in science subjects, considering that science lessons are subjects that require students' thinking skills to be more active in the teaching and learning process.

## **RESEARCH METHODS**

In this study, the Research and Development research approach was used, or better known as development research. Development research is research that aims to produce science content teaching materials that have been declared valid by the expert team. The product that has been produced in this research is the Development of Teaching Materials in Science Content Based on the Gal'perin Model to Improve Science Communication Skills in Class V Elementary Schools

## **RESEARCH RESULT**

The product produced in this study is a science content teaching material based on the Gal'perin model. In this study, researchers used the 4D model (Four-D). The stages contained in the model include: define, (defining), design (planning), development (development), and dissemination (dissemination).

This research begins with a preliminary study or needs analysis activities that have previously been adjusted to the schedule of activities. But this aims to collect information and an overview of the implementation of science learning which involves the use of teaching materials for science lesson content based on the Gal'perin model. In the process of developing this teaching material, researchers used two stages found in the 4D development model, namely Define, and Design, and Develop

### **1. Results of the Defining Stage (Define)**

At the define stage, this is the stage of identifying the problem developed by the researcher. This stage is the initial stage, where the purpose of this stage is to establish and define development requirements through several main steps, namely

#### **a. Beginning-End Analysis**

The initial-end analysis aims to obtain information about the fundamental problems faced by teachers and students in the science learning process in the classroom which form the basis for designing products in the form of teaching materials. At the beginning the activities carried out included library research and field studies as well as interviews with teachers and students in elementary schools.

The teaching materials used in schools come from publishers, not the result of development from the teacher, where the material in teaching materials is still general in nature, this can be seen from the students' activities for self-study in books which are still minimal, so students tend to get bored using books in the learning process. These teaching materials are more dominant in material and practice questions that are still considered difficult.

### **b. Student Analysis**

This analysis is the process of identifying the problems encountered when carrying out the learning process in class. This analysis was carried out through direct observation. Preliminary data analysis is carried out to determine the material and analyze the needs which will later be used as a basis for research in compiling the product being developed.

In observation activities, it is carried out when the learning process takes place, namely, in class V of elementary school. The results of the observations made show that the ongoing science learning process is still centered on the teacher and communication is still conditioned in one direction.

Overcoming this problem, with the existence of science teaching materials based on the Gal'perin model, it is hoped that it can provide facilities or referrals for students in learning science.

### **c. Task Analysis**

Researchers made observations of the learning process in order to analyze it in order to provide an overview of the product design being developed. This analysis is used to facilitate researchers in designing science content teaching materials based on the Gal'perin model.

### **d. Concept Analysis**

Concept analysis is carried out by identifying material topics to be used in the learning process to suit the teaching materials being developed. In this activity the researcher analyzed the science material in elementary schools and looked at the curriculum that was implemented using the Gal'perin model-based science content teaching materials.

This analysis phase includes general tasks and specific tasks for learning, which refer to KI and KD which are specifically developed on the material Sound and the Sense of Hearing, Plants and Animals, Light and Sense of Sight.

### **e. Destination Specifications**

This research aims to develop teaching materials based on the Gal'perin model that are interesting for learning science in elementary schools. Determine the validity of teaching materials that have been successfully developed so that they are suitable for use in achieving learning objectives.

### **1. Design**

At this stage, several tools were prepared to design teaching materials for science content. At this stage there are 2 steps taken, namely as follows:

- 1) Collection of Materials and Images for Teaching Materials. Collection of various material on science content from several sources to be summarized and then poured into teaching materials. The collection of images is also intended to get the best clear and attractive examples of images.
- 2) Designing Teaching Materials based on the Gal'perin Model of Natural Science Lesson Content. In making

teaching materials based on the Gal'perin model, researchers utilize one of the applications, namely Photoshop. This application is used by researchers to determine media designs, images, and the appearance or background color of teaching materials. In the initial view, the preface and table of contents are included to make it easier for the reader. After that, writing is included in the form of material that is in accordance with the topic of learning so that it can be read clearly. In the material section, several pictures are given to make it easier for students to understand the contents of the material.

## **2. Results of the development stage (Devolp)**

To test the validity of teaching materials, it is carried out through the development stage contained in the 4D development model. The development stage consists of two steps, namely:

### **a. Media Design Expert Assessment**

This expert assessment is the validation stage. The assessment in question is the assessment of the material contained in teaching materials. As for the results of the material expert validation, namely, the assessment consists of 3 validators with an assessment of the quality of the content/material aspect which consists of 6 main indicators, namely the suitability of the material with competence, the accuracy of the material, stimulating curiosity, means of scientific communication, the use of terms, symbols or icons in material, presentation techniques, support and presentation of learning where the six indicators consist of 22 assessment items. Table 4.2 shows the average score for assessing the quality of content/material aspects of each validator, namely validator 1, validator 2, and validator 3 having different ratings. In the first indicator, namely the completeness of the material, it has an average value of 4.3 which is in the Very Valid category. Sukarjo (2006:23) and an assessment percentage of 86% which is in the Very Valid category (Arikunto, 2010:44). In the second assessment, namely the breadth of the material, it has an average value of 4.6 which is in the Very Valid category. and the percentage of the assessment is 93% which is in the Very Valid category. Material coherence has an average value of 4.6 which is in the Very Valid category. and the percentage of the assessment is 93% which is in the Very Valid category.

In the material accuracy indicator there are 3 assessment points, in the concept deficiency assessment it has an average value of 4.3 which is in the Very Valid category. and the percentage of the assessment is 93% which is in the Very Valid category. Assessment of the accuracy of pictures, diagrams and illustrations has an average value of 4.6 which is in the Very Valid category. and the percentage of the assessment is 93% which is in the Very Valid category. And the lack of symbol and symbol notation has an average value of 4.6 which is in the Very Valid category. and the percentage of the assessment is 93% which is in the Very Valid category. In the indicator of stimulating curiosity there are 2 points of assessment, in the assessment encouraging curiosity it has an accumulated average value of 4.3 which is in the Very Valid category. and the percentage of the assessment is 86% which is in the very valid category. In the assessment encouraging the desire to seek further information has an accumulated average value of 4.3 which is in the Very Valid category. and the percentage of the assessment is 86% which is in the very valid category.

In the indicator of science communication facilities there are 4 assessment items, in the assessment inviting students to seek information has an accumulated average value of 4.6 which is in the Very Valid category. and the percentage of the assessment is 93% which is in the Very Valid category. In the assessment of presenting material that can be applied by students, it has an accumulated average score of 4.3 which is in the Very Valid category. and the percentage of the rating of 86% which is in the very Valid category. In the assessment of illustration pictures and examples of growing science communication skills, it has an accumulated average value of 4.3 which is in the Very Valid category, and the percentage of 86% which is in the very Valid

category. And in the assessment presenting learning that involves students in solving problems has an accumulated average score of 5 in the Very Valid category. and the percentage of 100% rating which is in the very Valid category.

In the indicators of the use of the term symbol or icon in critical material, there are 2 assessment points. In the item for assessing the consistency of the use of terms, the accumulated average value has an average value of 4.6 which is in the Very Valid category. and the percentage of the assessment is 93% which is in the Very Valid category. In assessing the consistency of the use of patterns and layouts, the accumulated average value has an average value of 5 in the Very Valid category. and the percentage of 100% rating which is in the very Valid category.

In the material presentation technique indicator, there are 2 assessment points. In the item for evaluating the consistency of the use of patterns and layouts, it has an accumulated average value of 4.6 in the Very Valid category. and the percentage of the assessment is 93% which is in the Very Valid category. The assessment on conceptual coherence has an accumulated average value of 5 in the Very Valid category. and the percentage of 100% rating which is in the very Valid category.

In the supporting indicators and presentation of learning, there are 6 assessment points. In the assessment of the assessment of the completeness of meaning in chapters/sub-chapters/paragraphs, an accumulated average value of 4.3 is in the Very Valid category. and the percentage of the assessment is 86% which is in the very valid category. The clarity of activity instructions has an accumulated average value of 4 in the Valid category. The percentage of the assessment is 80% which is in the Valid category. In the assessment of the generator of learning motivation, it has an accumulated average value of 4.6 which is in the Very Valid category. and the percentage of the assessment is 93% which is in the Very Valid category. In the assessment of competency test questions at the end of each chapter it has an accumulated average value of 4.3 which is in the Very Valid category. and the percentage of the assessment is 86% which is in the very valid category. In the introductory assessment it has an accumulated average value of 4.6 which is in the Very Valid category. and the percentage of the assessment is 93% which is in the Very Valid category. And the assessment of the Bibliography section has an accumulated average value of 4.6 which is in the Very Valid category. and the percentage of the assessment is 93% which is in the Very Valid category.

### **b. Media design validator assessment**

Validation was also carried out on aspects of media design carried out by material experts. The results are that the assessment consists of 3 validators with an assessment of the quality of the media aspect which consists of 3 main indicators, namely the size of teaching materials, the design of teaching material covers, and the design of teaching material contents, where the three indicators consist of 11 assessment items. Table 4.3 shows the average scores for assessing the aspects of media quality for each validator, namely validator 1, validator 2, and validator 3 having different ratings. In the first assessment, namely the suitability of the size of teaching materials with ISO standards, it has an average value of 4.3 which is in the Very Valid category. Sukarjo (2006:23) and an assessment percentage of 86% which is in the Very Valid category (Arikunto, 2010:44).

In the cover design indicator for teaching materials p, namely the font size for the title of teaching materials is more dominant, it has an average value of 4.6 in the Very Valid category. and the percentage of the assessment is 9.3% which is in the Very Valid category. The color of the title of the teaching material in contrast to the background color has an average value of 5 in the Very Valid category, and a percentage of 100% is in the Very Valid category. Shape, color, size, appropriate object proportions have an average value

of 4.6 which is in the Very Valid category, and a percentage of 9.3% is in the Very Valid category. In the Instructional Material Content Design Indicator there are 7 points of assessment, in the assessment of the consistent layout of the teaching material elements it has an average value of 4 which is in the Valid category. and the percentage of 80% rating is in the Valid category. The proportional print area assessment has an average value of 4.3 in the Very Valid category. and the percentage of the assessment is 86% which is in the Very Valid category. In the assessment Not using too many fonts has an average value of 4.3 which is in the Very Valid category. and the percentage of the assessment is 93% which is in the Very Valid category. In the assessment of the use of letter variations (bold, italic, all capital, small capital) it has an average value of 4.3 which is in the Very Valid category. and the percentage of the assessment is 93% which is in the Very Valid category. In the assessment Spacing between normal lines has an average value of 4.3 which is in the Very Valid category. and the percentage of the assessment is 93% which is in the Very Valid category. In the assessment being able to express the meaning/meaning of objects has an average value of 4.3 which is in the Very Valid category. and the percentage of the assessment is 93% which is in the Very Valid category. In the overall assessment of matching illustrations it has an average value of 4.3 which is in the Very Valid category. and the percentage of the assessment is 93% which is in the Very Valid category.

**c. Language validator assessment**

Validation is also carried out on aspects of language carried out by language validators. The results of the assessment consisted of 3 validators with an assessment of the quality aspects of linguists consisting of 2 main indicators, namely conformity with student development and conformity with Indonesian language rules, where the two indicators consisted of 4 assessment items. Table 4.4 shows the average score for the language aspect of each validator, namely validator 1, validator 2, validator 3, the three validators have different ratings. The indicator for the use of the term symbol or icon has 1 point of assessment. In the suitability assessment with the level of intellectual development students have a very good assessment score from the validator. Validator 1 with a score of 5, validator 2 with a score of 5 and validator 3 with a score of 5, the scores of the three validators are accumulated to get an average value of 5.0 in the Very Valid category. Sukarjo (2006:23) and the percentage of the assessment is 100% which is in the Very Valid category (Arikunto, 2010:44). On indicators of conformity with language rules, there are 3 assessment points. In assessing language accuracy, it has an accumulated average value of 4.6 which is in the Very Valid category and the percentage of 9.3% is in the Very Valid category. In assessing spelling accuracy, it has an accumulated average value of 4.3 which is in the Very Valid category and the percentage of 8.6% is in the Very Valid category. In the assessment of clarity of instructions and directions, it has an accumulated average value of 4.6 which is in the Very Valid category and the percentage of 9.3% is in the Very Valid category.

**Table 1 Recapitulation of Data Validation Results of Gal'perin-Based Teaching Materials**

No	Aspect	Indicator	Average Score	Percentage	Category
1	Material Expert Validity	The suitability of the material with basic competence	4,5	90%	Very Valid
		Material accuracy	4,5	90%	Very Valid
		Stimulate curiosity	4,6	93%	Very Valid
		Student science communication facility	4,5	91%	Very Valid
		The use of the term symbol or icon in the material	4,8	96%	Very Valid

No	Aspect	Indicator	Average Score	Percentage	Category
		Material presentation techniques	4,8	96%	Very Valid
		Support and presentation of learning	4,4	88%	Very Valid
2	Media Design Expert Validity	Material size	4,3	86%	Very Valid
		Teaching materials cover design	4,7	94%	Very Valid
		Teaching material design	4,2	85%	Very Valid
3	Linguist Validity	Use of the term symbol or icon	5,0	100%	Very Valid
		Conformity with the rules of language	4,3	86%	Very Valid

### 1. Results of Revision of Teaching Materials

Draft 1 or the initial design of Gal'perin-based science teaching materials was revised based on suggestions and comments from the validator. As for some improvements to teaching materials that have been presented in table 4.5

**Table 2 Validator suggestions and comments**

Validators	Suggestion	Repair
Material Expert	Correct the writing of uppercase, lowercase and punctuation. Writing that is not in accordance with KBBI	Improve writing and be more thorough in the use of uppercase, lowercase and punctuation marks and pay attention to the grammar according to KBBI
Media Expert	We recommend that you use original images, not illustrative images	Replace images in the form of illustrations with original images/photographs themselves
Linguist	Avoid using symbols	Replacing symbols in teaching materials with bullet numbering
	The indicators are adapted to operational verbs	Improve indicators by looking back at Bloom's taxonomy levels
	We recommend that words in foreign languages be italicized	Correct the words in teaching materials that use a foreign language by italicizing the foreign language

### CONCLUSION

In this study it can be concluded that the expert team's evaluation that the development of teaching materials for science content based on the Gal'perin model to improve the science communication skills of fifth grade elementary school students has fulfilled the element of validity with a very valid category, this is indicated by the validity value for the material aspect. 91.3%, media design aspects 88.3% and language aspects 93%. As for suggestions that can be conveyed by the author, Natural Science teaching materials based on the Gal'perin model can be used as a reference for developing Science teaching materials for other Science materials, besides that this research can also be a reference for developing similar research.

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