NOVATEUR PUBLICATIONS
INTERNATIONAL JOURNAL OF INNOVATIONS IN ENGINEERING RESEARCH AND TECHNOLOGY
[IJIERT] ISSN: 2394-3696 Website: ijiert.org
VOLUME 10, ISSUE 1, Jan. -2023

DEVELOPMENT OF SCIENCE TEACHING MATERIALS BASED ON COMPONENT DISPLAY THEORY (CDT) MODEL TO IMPROVE THE CREATIVE THINKING ABILITY OF ELEMENTARY SCHOOL GRADE V STUDENTS

[1]Siti Noer Aini Moko, [2]Masrid Pikoli, [3]Jusna Ahmad
Gorontalo State University of Basic Education Masters Study Program
General Street Sudirman No. 6 Gorontalo Indonesia
E-mail: sitimoko99@gmail.com

ABSTARCT
This study aims to produce teaching materials for science content based on the CDT model that are valid for improving the creative thinking skills of fifth grade elementary school students. Teaching materials were developed using the 4-D model developed by Thiagarajan, et al (1974) which includes define, design, develop, and disseminate stages. The research instrument used was a teaching material validation sheet. The data analysis used is percentage. The results of the study revealed that the CDT-based science teaching materials 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 91%, material accuracy obtaining a percentage 89%, stimulating curiosity 100%, creative thinking tools 90%, use of the term symbol or icon in the material 93%, material presentation techniques 90%, learning support and presentation 95 %. In the aspect of design quality, the indicator size of teaching materials obtains a percentage of 87%, the cover design of teaching materials obtains a percentage of 93%, and the design of the contents of teaching materials 90%. 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 93%. Teaching materials developed can improve creative thinking skills based on validation from validators who have obtained valid criteria.

Keywords: Development of Teaching Materials, CDT Model, Science Lessons

INTRODUCTION

Based on the results of observations at one of the schools in Gorontalo Regency, data was obtained that in the material for the Digestive System, Blood Circulatory System, and Ecosystem there were several deficiencies in the books that the researchers found, including (1) The indicators in the teacher's book did not cover all basic competencies in the learning process, such as knowledge competence in its indicators is still not visible, (2) The material in the student book is not sufficient, so that the knowledge that students get is still small, and (3) Students cannot recognize the organs of the body clearly. Based on the problems raised, these problems arise by several factors that should be considered.

Factors causing the emergence of the problems put forward include: First, teachers are not used to developing their own learning materials which has an impact on learning that is monotonous and less varied. Second, the teacher is not used to involving students in every lesson so that students are not actively involved and are used to only receiving learning from the teacher. Third, the lack of other learning resources as material for concept enrichment, which can help students get information on the concepts they are learning. So far, the only source of learning is textbooks, the material of which is not yet contextual

according to the student's learning environment. so it is necessary to develop teaching materials on the material of the Digestive System, Circulatory System, and Ecosystems.

Teaching materials are tools in learning activities which in fulfillment must be in accordance with the desired competence. The development of teaching materials is carried out based on a systematic process so that the validity and reliability of teaching materials can be guaranteed. The use of teaching materials that have been developed can train students' creative thinking skills, compared to students who only use teaching materials in school textbooks.

Overcoming the problems of teaching materials so that students can think creatively and actively during the learning process can be overcome with appropriate models, such as the Component Display Theory (CDT) model. The CDT model is a model whose teaching and learning process encourages students to learn by utilizing their potential optimally by combining behavioral and cognitive perspectives.

According to (Lestari, 2011) that the CDT model has advantages including its description (micro aspect) which is very complete, more robust (reliable) for effective instructional production and performance and content according to students' taxonomic abilities. Another explanation (Septiastuti, 2009) explains that in the learning process with CDT the main stages of presenting the material are motivating students, the teacher explains how to compare, how to solve problems, explains how to analyze data, creates questions and answers on the material being taught and gives examples that are relevant to the sequence material clearly and thoroughly, and the teacher provides LKS to be taught in class and individually.

RESEARCH METHODS

In this study, the Research and Development research approach was used, or better known as development research. Research development is aimed at producing teaching materials for science content that have been declared valid by the expert team. Development research has a model that fits the education system and its implementation. In this regard, one of the development models put forward by experts is the 4-D (four-D) model. The 4-D development research model is a model developed by S. Thagarajan, Dorothy S. Sammel, and Melvyn I. Sammel. It is said to be 4-D because in its implementation it uses 4 structured and systematic stages.

RESEARCH RESULT

The development of teaching materials in this study focused on science material for grade V Elementary School. This study aims to develop science teaching materials based on the Component Display Theory (CDT) model in elementary schools, determine the validity of the developed teaching materials so that Valid is used.

The product produced in this study is in the form of teaching materials on natural science content. 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 descriptions about the implementation of science learning that involves the use of teaching materials in elementary schools. In the process of developing this teaching material, researchers used two stages contained in the 4D development model, namely Define and Design.

DISCUSSION

Based on the assessment of the three validators that focused on aspects of the Ministry of National Education (2009), namely aspects of content/material quality, language quality aspects, and design/graphic quality aspects, CDT-based science teaching materials developed in general met the valid criteria and were used with several revisions. and improvement of the editorial according to the suggestions of the validators, namely: 1) Improving the editing of sentences to be short and clear and paying attention to the grammar according to KBBI; 2) Change the cover background according to the purpose of the teaching material; 3) Improve indicators by looking back at Bloom's taxonomy levels; 4) Improving the use of letters in accordance with good language rules and by placing punctuation marks correctly; 5) Using numbers or letters in the points in the summary.

The developed CDT-based science teaching materials also describe the five taxonomies contained in one of the CDT components, namely: 1) performance level: remembering and using, in this teaching material the researcher uses a classification of performance levels that are adjusted based on the characteristics of students; 2) Types of teaching content, this teaching material uses a classification of teaching content constructs in the form of facts, concepts, procedures, and principles; 3) The scope of teaching content, in this teaching material there are detailed learning objectives in order to more clearly describe the measurement of ability in each learning objective; 4) Learning presentation, in this teaching material there are two strategy components, namely primary presentation and secondary presentation which contain general matters and specific matters; 5) Learning objectives, in this teaching material there is a sequence of learning objectives, namely in the primary presentation there is material regarding general matters, examples of general matters, and exercises or tests of special matters, while in the secondary presentation there are general matters the context, general matters in the form of explanation assistance, descriptions of general matters, feedback, and finally examples or descriptions of general matters.

Based on the results of the validation, there are several differences in the values of the material expert validators, media experts, and linguists.

1. Material Expert Validator Assessment Results

In the first indicator, namely the completeness of the material, it has an average value of 4.7 with a rating percentage of 93% which is in the very valid category. In the second assessment, namely the breadth of the material, it has an average value of 4.3 with an assessment percentage of 87% which is in the very valid category. Material disorganization has an average value of 4.7 with a percentage of 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 with an assessment percentage of 87% which is in the Very Valid category. Assessment of the accuracy of pictures, diagrams and illustrations has an average value of 4.7 with a rating percentage of 93% which is in the Very Valid category. Lack of notations and symbols has an average value of 4.3 with a rating percentage of 87% which is in the Very Valid category.

In the indicator of stimulating curiosity there are 2 points of assessment, in the assessment of encouraging curiosity it has an accumulated average value of 5.0 with an assessment percentage of 100% which is in the very valid category. The assessment encourages the desire to seek further information, has an accumulated average value of 5.0 with a rating percentage of 100% which is in the very valid category.

In the indicator of creative thinking tools there are 4 assessment items, in the assessment inviting students to seek information has an accumulated average score of 5.0 with an assessment percentage of 100% 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 5.0 with an assessment percentage of 100% which is in the very valid category. In the assessment of illustrations and examples of fostering creative thinking skills, it has an accumulated average value of 4.3 with an assessment percentage of 87% which is in the very valid category. In the assessment presenting learning that involves students in solving problems has an accumulated average score of 4.0 with an assessment percentage of 80% which is in the very valid category.

In the indicator for the use of the term symbol or icon in the material, there are 2 assessment points. In the item for evaluating the consistency of the use of terms, the accumulated average value has an average value of 4.3 with an assessment percentage of 87% which is in the Very Valid category. In the assessment of the consistency of the use of patterns and layouts, the accumulated average value has an average value of 5.0 with a rating percentage of 100% 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 4.3 with an assessment percentage of 87% which is in the Very Valid category. The assessment on conceptual coherence has an accumulated average score of 4.7 with an average rating of 93% which is in the Very Valid category.

In the supporting indicators and presentation of learning there are 6 assessment points. In the item for assessing the integrity of meaning in chapters/subchapters/paragraphs, it has an accumulated average score of 4.7 which is in the Very Good category. The percentage of the assessment is 93% which is in the Very Valid category. Clarity of activity instructions has an accumulated average value of 4.7. Percentage of assessment is 93% which is in the Very Valid category. In the assessment of the generator of learning motivation, it has an accumulated average value of 5.0 with a rating percentage of 100% 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 score of 4.7 with a percentage of 93% which is in the Very Valid category. In the introductory assessment, it has an accumulated average value of 4.7 with a rating percentage of 93% which is in the very valid category. The assessment of the bibliography section has an accumulated average value of 5.0 with a rating percentage of 100% which is in the very valid category.

2. Media Expert Validator Assessment Results

The teaching material size indicator has an average value of 4.3 with an assessment percentage of 87% which is in the very valid category.

In the cover design indicator for teaching materials there are 3 assessment items, in the assessment of the letter size of the title of teaching materials it is more dominant, it has an average value of 5.0 with an assessment percentage of 100% 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 4.7 with a percentage of 93% which is in the Very Valid category. The shape, color, size, proportion of the appropriate object has an average value of 4.3 with an assessment percentage of 87% which is in the very valid category.

In the indicators of design content of teaching materials there are 7 points of assessment, in the assessment of the layout of the elements of consistent teaching materials it has an average value of 4.3 with an assessment percentage of 87% which is in the Very Valid category. The proportional print area rating has an average value of 4.3 with an assessment percentage of 87% which is in the Very Valid category. Not using too many letters has an average value of 5.0 with a rating percentage of 100% which is in the Very Valid category. The use of letter variations (bold, italic, all capital, small capital) has an average value of 4.3 with an assessment percentage of 87% which is in the Very Valid category. Spacing between normal lines has an average value of 4.3 with an assessment percentage of 87% which is in the Very Valid category. Being able

to express the meaning/meaning of objects has an average value of 4.7 with a rating percentage of 93% which is in the Very Valid category. All matching illustrations have an average value of 4.3 with a rating percentage of 87% which is in the Very Valid category.

3. Results of the Language Validator Assessment

In the indicator of conformity with the level of intellectual development students have an average value of 5.0 with a percentage of 100% which is in the very valid category.

In the conformity indicator with language rules there are 3 assessment points, in the assessment of grammatical accuracy it has an average value of 4.3 with an assessment percentage of 87% which is in the very Valid category. Spelling accuracy has an average value of 4.7 with a percentage of 93% which is in the Very Valid category. The clarity of instructions and directions has an average value of 5.0 with a rating percentage of 100% which is in the very valid category.

Based on the aspect of the validator's assessment, it can be seen that the highest score is on the aspect of language quality and the lowest is on the aspect of design/graphic quality. If the percentage of the average assessment of the three validators based on aspects is in the very valid category, it is used with a percentage of 92%. This can explain that the CDT model-based science teaching materials meet the very valid validity criteria used in learning

The advantages of the developed CDT model-based science teaching materials are:

1. Facilitate teachers in delivering science learning material in class V
2. Relevant to the topics contained in the book theme 3, theme 4, and theme 5
3. Using the CDT model design which can improve students' creative thinking skills in science content
4. In accordance with the learning objectives
5. Has good design quality, because it has been validated by media design experts.

There are also weaknesses in the CDT model-based science teaching materials developed, namely:

1. Teaching materials based on the CDT model developed only cover 3 materials in odd semesters
2. Requires special abilities and skills for teachers so that teachers are required to work more professionally
3. Requires a good teacher's willingness and motivation for the success of the student learning process

It is hoped that by developing natural science teaching materials based on the CDT model, it can improve the ability to think creatively because in natural science teaching materials students are trained to be able to think creatively through practice questions, each chapter in the teaching materials has exercises on the ability to think creatively based on indicators, so that through these activities creative thinking skills can be increased.

CONCLUSION

Based on the discussion of the research results that have been described, it can be concluded that the development of science teaching materials based on the CDT model for the elementary school level can be categorized as valid for use in the science learning process because it meets the validity requirements.

In addition, this research can also be a science teaching material based on the Component Display Theory (CDT) model, which 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. serve as a reference for developing similar studies.

REFERENCES

1. Anidom, A. J., Hartini, S., & Wati, M. (2015). Development of teaching materials on substance and form based on the ability to think creatively at junior high school level. Physics Education Scientific Periodical, 3(1), 25-31.
2. Arikunto, Suharsimi. 2016. Research Procedures A Practice Approach. Jakarta: Rineka Cipta
3. Hamzah B. Uno, Learning Model; Creating Creative and Effective Teaching and Learning Processes, Jakarta: Bumi Aksara, 2011, pp. 213.
4. Haryanto. 2007. Science for Grade VI Elementary Schools. Jakarta: Erlangga
5. Hidayanto, D. N. (2016). The development of social studies learning in elementary schools is based on the Component Display Theory (CDT) prescription. Journal of Educational Sciences, 6(2).
6. Hizbullah and Nuhayati, Selvi. 2018. Learning Natural Sciences in Elementary Schools. Makassar: Eastern script.
7. Husain, H., & Katili, M. R. (2022). DEVELOPMENT OF DIGITAL GRAPHIC DESIGN TEACHING MATERIALS BASED ON MERRILL CDT FOR CLASS X MULTIMEDIA STUDENTS OF STATE VOCATIONAL SCHOOLS 1. Educational Technology Journal, 2(1).
8. Ismail, S., Yusuf, F. M., & Ahmad, J. (2020). The Validity of Teaching Materials Based on Guided Inquiry Learning Models on the Structure and Functions of Plant Tissues for Class VIII of Middle School. Jambura Edu Biosphere Journal, 2(1), 22-29.
9. Kuswandari, R. E., & Suryanto, S. (2015). Application of Component Display Theory (CDT) Model in the Development of Interactive Multimedia for Computer Network Courses. Journal of Educational Technology Innovation, 2(2), 179-189.
10. Laliyo, L. A. R. (2012). The influence of learning strategies and spatial cognitive style on the results of learning chemical bonding in class XI students of SMA Negeri in Gorontalo. Journal of Education and Learning (JPP), 19(1), 14-27.
11. Laliyo, L. A. R. 2018. CDT Merril in Learning Science. Gorontalo: Ideas Publishing.
12. Lestari, I. 2013. Development of Competency-Based Teaching Materials: According to the Education Unit Level Curriculum, Padang: Akademia.
13. Majid, Abdul. 2014. Authentic Assessment of Learning Processes and Outcomes. Bandung : PT. Rosdakarya youth
14. Maslichah, Ash'ari. 2006. Application of the Science-Technology-Society Approach in Learning Science in Elementary Schools. Yogyakarta: Sanata Darma University.
15. Merril, M. D. 1983. Component Display Theory: Instructional Design Theories And Model: An Overview Of Their Current Status. Hillsdale, New Jersey: Lawrence Erlbaum Ass.
16. Nana Sudjana. (2010). How to Learn Active Students in the Teaching and Learning Process. Bandung: Algensindo's New Light
17. Oka, G. P. A. (2017). Development of interactive teaching materials based on component display theory (CDT) in multimedia courses majoring in educational technology, FIP UNDIKSHA. Imedtech E-Journal, 1(1).
18. Purwantu, Evaluation of Learning Outcomes, Yogyakarta: Student Library. p.45
19. Said, S. S., Mohamad, E., Pikoli, M., Sihaloho, M., Laliyo, L. A., Ischak, N. I., & Salimi, Y. K. (2022). Identification of Students' Creative Thinking Ability in Solving Open Ended Problems on Electrolyte and Non-Electrolyte Solution Material. Jambura Journal of Educational Chemistry, 4(2), 91-98.

20. Sanjaya, Vienna. 2013 Curriculum and Learning Theory and Practice of Education Unit Level Curriculum Development (KTSP). Kencana Prenada Media Group: Jakarta
21. Samatowa, Usman. 2018. Learning Science in Elementary Schools. west Jakarta
22. Honey, B. A., Rewah, F., & Poli, E. E. (2020). COMPONENT DISPLAY THEORY (CDT) LEARNING MODEL IN IMPROVING GEOGRAPHY LEARNING OUTCOMES IN SMA. GEOGRAPHIA: Journal of Geography Education and Research, 1(2), 32-36.
23. Shobrina, N. Q., Sakti, I., & Purwanto, A. (2020). Design Development of E-Module-Based Physics Teaching Materials on Momentum Material. Journal of Coil Physics, 3(April 1), 33-40.
24. Sugiyono. (2011). Quantitative Qualitative Research Methods and R&D. Bandung: Alphabet
25. Sujana. 2014. Basics of Natural Science: Concepts and Applications. UPI Press: Bandung
26. Sujana, Jayadinata. 2018. Learning Science in Elementary Schools. UPI Sumedang Press: Bandung
27. Wedyawati, Lisa. 2019. Learning Science in Elementary Schools. Deepublish: Yogyakarta
28. Widodo and jasmine, 2008. A guidebook for compiling teaching materials. Jakarta: PT. Elex Media Komputido