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Development of SSCS-Based E-Modules (Search, Solve, Create, Share) to Practice Creative Thinking Skills of Students on Wave Materials in High School

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Abstract

This study aims to describe the feasibility and characteristics of SSCS-based e-modules to train students' creative thinking skills on wave material and get readability responses from students. This research is a research and development (R&D) with a 3D model with the steps of define, design, and develop. Data collection techniques are non-test techniques that use observational data and questionnaires. Data analysis techniques are descriptive, qualitative, and quantitative methods. The subjects used in this study were physics teachers and class XII students at SMA Negeri 4, 7, and 9 Bengkulu City. The results of this study can be concluded that the SSCS-based e-module developed is included in the very feasible criteria with an average percentage of 88.70% and has the characteristics of an electronic module and is by the SSCS syntax, so it is worth testing and getting a very good response from students towards SSCS-based e-module readability with an average percentage of 81.81%.

Keywords: Development Research, E-Module, SSCS, Creative Thinking Ability, Wave

A. Introduction

Learning is a process that is a system consisting of several components that interact with each other. The components in learning are educational objectives, students, materials or subject matter, approaches and methods, media, learning resources, and evaluation. One of the components in learning is learning resources. Learning resources are used as teaching materials in learning, cannot be separated from the teaching and learning process to achieve educational goals in general and learning goals in schools in particular. One of the teaching materials used in schools is a learning module.

[1] states that teaching materials are materials or materials compiled by teachers systematically that are used by students (students) in learning. Teaching material can be packaged in printed, non-printed form and can also be visual auditive or nonvisual auditive. Teaching materials that have been compiled in educator textbooks can be in the form of textbooks, modules, handouts, worksheets can also be packaged in other forms.

Teaching materials are all forms of materials used to assist teachers/instructors in carrying out teaching and learning activities. The material in question can be written material or unwritten material [2]. Teaching materials are information, tools, and texts needed by teachers/instructors for planning and studying implementation in learning [3]. [4] in his journal said that teaching materials are a very important part of an overall learning process.

According to [5] a module is a book written with the aim that students can learn independently without or with guidance from a teacher. Learning with modules allows students to more quickly master the material to be studied. Modules must be presented in good language, attractive, and equipped with illustrations. In line with the statement, learning by using modules can increase the efficiency and effectiveness of learning in schools, both time, funds, facilities, and energy to achieve goals optimally [6].

Modules are teaching materials that are systematically designed based on a certain curriculum and packaged in the form of the smallest learning unit and allow them to be studied independently in a caertain time unit so that students master the competencies being taught [7].

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The module itself has developed along with technological advances, which used to be in the form of a print module, now innovating into an electronic module known as an e-module [8]. The print module is deemed less able to present material in the form of images and is unable to present videos so that students become bored quickly because it is monotonous and less interesting. E-Modules can help the learning process be more interesting because pictures and videos can be inserted into it. This can help students understand teaching materials because there are learning instructions and understanding concepts in a coherent manner. Students can also repeat or re-learn the material according to their needs because e-modules can be studied alone at home.

The benefits of using e-module media as a learning resource in the learning process include: (1) Can add and expand the horizons of existing content in the classroom, (2) Can stimulate thinking, behave and develop further, and (3) can train independence students in learning. There is content such as images and videos, as well as a user-friendly display that makes it easier for students to use it [9]. This is very useful especially in online learning as it is today.

Based on the results of observations that have been carried out at SMAN 4, SMAN 7, and SMAN 9 in Bengkulu City, information was obtained that the curriculum used in the process of teaching and learning activities is the 2013 curriculum. The teaching materials used in the learning process are printed books, LKPD, modules, and other teaching materials. The information is based on the responses of 6 teachers from the 3 SMANs.

Learning activities in the 2013 curriculum must of course utilize technology not only to maximize the implementation of the curriculum but also as an effort for the efficiency and effectiveness of learning. But this has not happened in most high schools in Bengkulu City, based on the results of observations and questionnaires to obtain the initial data needed in high schools in Bengkulu City which are distributed online to obtain results, there are still teachers who use LKPD , printed books and other teaching materials in the learning process and rarely use e-modules in learning. According to the initial needs questionnaire filled out by students, 94.7% of the 94 students who filled out the questionnaire stated that these students needed other teaching materials in addition to the teaching materials that were already available. In addition, from the questionnaires that have been distributed from 94 students, 95.7% need an interesting e-module to increase intelligence in solving problems on the Wave material in high school. Based on the results of observations carried out in several high schools in Bengkulu City, it was found that learning was still being done online and teachers needed teaching materials that we're able to help the online learning process at school. The teacher also revealed that SSCS-based e-modules are considered to be an alternative in helping students to practice creative thinking skills needed as additional teaching materials when teaching.

The problems that have been described previously encourage the authors to develop SSCS-based e-modules to train students' creative thinking skills which are expected to be a solution to the problems described above. According to Pizzini [10], this SSCS model has the advantage that it can provide opportunities for students to practice and hone problem-solving skills. The SSCS model provides opportunities for students to explore ideas independently, requires students to be able to write solutions with systematic completion steps, and requires students to actively discuss during the learning process. The learning stages of the SSCS model include four phases, namely the search, solve, create and share phases. Learning with the structured SSCS model makes this model suitable for use in teaching materials in the form of e-modules. The stages of this systematic SSCS learning model are not only able to build knowledge or cognitive abilities but also students' creative thinking abilities. The concept of waves was chosen because according to the results of research by (Istyowati, Kusairi, & Handayanto, 2017) the material of traveling waves and stationary waves ranks first which is considered difficult, namely as many as 28.89% of students feel that the material of traveling waves and stationary waves is difficult material to learn. studied in physics class XI semester 2.

This research is not the first time to use the SSCS model as the basis for research, the application of SSCS has been applied in several studies, including SSCS to train students' problem-solving skills [10]. SSCS to improve students' analytical critical thinking. SSCS to improve students' ability to formulate

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problems [11]. SSCS to improve creative thinking skills (Ria Ferviana, 2015). The difference between this research and previous studies is that the e-module which will be developed contains material that is equipped with practicum and learning videos, equipped with pictures and learning steps that can train students' creative thinking skills.

Based on these problems, research entitled the development of an SSCS-based e-module (Search, Solve, Create and Share) will be conducted to train students' creative thinking skills on wave material in high school.

B. Research Method

The type of research conducted here is the type of research and development (RnD). According to [12], Research and Development is a research method used to produce certain products and test the effectiveness of these products. The Research and Development (R&D) model used in this study is the 4D development model (Four D Models) developed by Thiagarajan (1974) which stands for Define, Design, Develop, and Dissemination. The process in this research only carried out 3 stages, namely define (definition), design (design), and development (development).

Data analysis in this research is using descriptive, qualitative, and quantitative analysis techniques. Qualitative data in this study were obtained from validator input at the validation stage, input from material experts, media experts, and linguists. While quantitative is data that describes the results of product development in the form of sscs based e-module. The data obtained through the assessment instrument at the time of the trial were analyzed using statistics. This method is expected to understand further data. The results of data analysis are used as the basis for revising the developed product. The response questionnaire was filled out by a physics lecturer at Bengkulu University.

Furthermore, the calculation of each item statement is carried out. The interval data can be analyzed by calculating the percentage of answers on each item using the following formula :

$$P_s = \frac{S}{N} \times 100\% \quad (1)$$

Furthermore, the percentage of eligibility obtained is then interpreted into the eligibility criteria based on Table 1 as follows.

Table 1. Eligibility Criteria

Percentage (%)	Criteria
0% - 55%	Not Feasible
56% - 65%	Less Feasible
66% - 79%	Feasible
80%-100%	Highly Feasible

The developed e-module can be said to be good/feasible if it meets the criteria with a percentage of 56% [13].

Furthermore, it is known that what is found is then carried out a readability test based on the perceptions of students which are interpreted into the criteria of students based on Table 2 as follows.

Tabel 2. Student Perception Criteria

Presentage	Interpretation
0% - 25 %	Very Not Good
26 % - 50 %	Not Good
51 % - 75 %	Good
76% - 100 %	Very Good

Based on the table above, the research can be said to be successful and valid if the questionnaire data processing results in a score of >50% or is in the criteria of "Good" and "Very Good" [14].

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C. Results and Discussion

The definition stage is the initial stage that must be done before making a design. At this stage, data collection from various sources is carried out by the information needed to determine and define the development requirements. The steps taken at the define stage are as follows:

The first step in this research is the define stage. This stage consists of identifying problems and collecting data obtained through literature studies, observation activities, and needs analysis given to teachers and students. The results of the observation activities showed that SMAN 4, SMAN 7, and SMAN 9 Bengkulu City used the 2013 curriculum, the teaching materials used by physics teachers in schools were printed books, the teaching materials used usually came from YouTube and teaching materials made by themselves. a teacher likes PowerPoint. The learning model used in schools is the Blended Learning and Flipped Classroom learning model. The system of delivering material by teachers of physics subjects in schools is good, it's just that teachers still often use conventional learning methods, already using ICT-based learning media such as PowerPoint presentations in learning. Student responses during the learning process were still less enthusiastic in participating in physics learning, at the time of observation only a few students were eager to work on the sample questions given by the teacher, where students were less enthusiastic in participating in the learning process starting from being absent, watching learning videos on YouTube to do structured tasks and few students respond to the teacher during the physics learning process.

The results of the observation activities, supported by the needs analysis given to teachers and students which are reviewed based on aspects of student responses in learning physics, physics learning experience, and aspects of the need for this SSCS-based e-module which is reviewed based on student assessments, 94.7% of the 94 students who filled out the questionnaire stated that these students needed other teaching materials besides the teaching materials that were already available. In addition, from the questionnaire that was distributed to 94 students, 95.7% needed an interesting e-module to practice creative thinking skills and reviewed based on teacher assessment 100% of the 6 physics teachers who filled out the questionnaire stated that it was necessary to develop an e-module. based on SSCS.

The next step after the define stage is the design stage. This stage is the first step to develop, namely selecting learning materials and media, choosing the e-module format, and doing the initial design of the e-module development. The material that is implied in this research is reviewed based on the results of literature studies, observations, and needs analysis is the Wave material for class XI high school students. The material is adjusted based on the 2013 Revised Edition of the 2016 Curriculum. The Wave material was chosen in this study because many events in everyday life are related to this material, both natural phenomena and the application of technology. Examples of the application of wave events can be seen by students in real terms so that students more easily understand the concept of the material to be delivered.

The selection of the format of the e-module teaching materials in this study was compiled by adopting from existing textbooks and containing material on traveling waves and stationary waves. These teaching materials are packaged in the form of electronic modules (e-modules) based on SSCS by utilizing current technology, namely using professional flip pdf that can be accessed online and can make it easier for students to open them anytime and anywhere equipped with images, text, videos and other.

Based on this, the results obtained from the initial design of this SSCS-based e-module which consists of the initial part of the module containing the cover or cover, the introduction which consists of three main parts, namely opening, content, and closing, table of contents, table list, and list of the picture. The content section of the module contains core competencies (KI), Basic Competencies (KD), learning objectives, SSCS-based appreciation, SSCS-based LKPD, SSCS-based materials, sample questions, and material summaries. The closing section of the module contains formative tests, answer keys, glossary, bibliography, and author's history.

After carrying out the design stage, the next step is the development stage by conducting product validation to determine the feasibility, characteristics, and student responses. Based on the results of the validity test by 2 expert judgments and 1 practitioner, it was found that the feasibility of an SSCS-based e-module to train creative thinking skills on wave material based on 5 aspects of assessment, namely content aspects, presentation aspects, language aspects, media aspects, and contextual aspects.

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Based on the average results of the validation of the five aspects of the assessment, it was found that the SSCS-based e-module to train creative thinking skills developed was in the "very feasible" criteria with an overall average percentage of 88.70% of the maximum score of 100%. This is because several assessment statements on aspects of content, presentation aspects, language aspects, media aspects, and contextual aspects get low scores so that some suggestions or inputs are obtained from the validator.

The suggestions or input from the validator are used as a reference in revising the SSCS-based e-module, both in terms of content, presentation, language, media, and contextual aspects. Revision on the aspect of presenting the material in the form of adding sample questions, and adding evaluation questions to the formative test section, in order to highlight examples of questions related to students' creative thinking skills.

The SSCS-based e-module developed can be said to be feasible if the score intervals on all averages are in the "adequate" or "very feasible" criteria. Based on this statement, it can be concluded that the SSCS-based e-module to train students' creative thinking skills on wave material that has been developed is feasible so that this SSCS-based e-module can be used for testing because it has fulfilled the five aspects of the assessment, namely content aspects, presentation aspects, language aspects, media aspects, and contextual aspects with several revisions.

After obtaining the feasibility of the SSCS-based e-module, it is known the characteristics of the SSCS-based e-module to train students' creative thinking skills which have been analyzed using an e-module characteristic analysis sheet which includes important points that should exist in the electronic module component, namely 1) e -This module provides physics learning in accordance with KI and KD; 2) the material presented is contextual which is equipped with examples and practice questions to make it easier for students to understand the material; 3) e-modules contain instructions for e-modules to make it easier for students to learn e-modules; 4) this e-module also includes practice questions/assignments; 5) there is a summary; 6) e-module uses easy-to-understand language; 7) the material is presented in its entirety; 8) there is information about references/references that support the learning materials in the module; 9) this e-module is easy to use without having to use other media simultaneously to learn it; 10) this e-module is suitable for use during online and offline learning; 11) presentation and delivery language in e-modules that can make users feel motivated to learn it; 12) the module is easy to use using uncomplicated media; 13) there is an emphasis on creative thinking skills that can be used in presenting problems; 14) there are aspects of SSCS or the assistance provided makes it easier for students to understand concepts and solve problems; 15) there are variations of SSCS or assistance provided and used; 16) presenting SSCS content that is quite attractive with appropriate placement; 17) displaying aspects of creative thinking (Fluency, flexibility, Elaboration and Originality); 18) activities in e-modules to train creative thinking skills. So, based on the characteristics of the developed SSCS-based e-module, it already contains electronic module components and has fulfilled the syntax of the SSCS learning model (Search, Solve, Create, and Share).

The feasibility and characteristics of the SSCS-based e-module have been known, so it was tested to determine the students' responses to the SSCS-based e-module that had been developed. Based on the results of student responses to the readability of SSCS-based e-modules carried out at three schools, it is known that SSCS-based e-modules to train students' creative thinking skills on wave materials that have been made get readability responses with very good criteria which include aspects of presentation, material, and benefits. From these three aspects, it can be concluded that the overall response of students to the readability of the SSCS-based e-module is very good with an average score of 81.81%.

The results of this study are relevant to the results of research conducted by Triyanto et al. (2017) in his research entitled "Module Development Based on Search Solve Create Share Models on Excretion System Materials to Improve Analytical Thinking Skills for Xi Mipa Class Students at SMA Negeri 8 Surakarta" The results of this study stated that the feasibility of student modules was considered very well qualified by the assessment of material experts. with the fulfillment of 84.42%; module development expert 96.09%; and 100% design and readability expert; the feasibility of the teacher module is considered very well qualified by the assessment of material experts with 84.42% fulfillment; module

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development expert 92.97%; 100% design and readability expert; and qualified well by the expert assessment of learning devices 75%; the average practitioner rating is 92.57%; and the average student assessment is 91.88%; and from these problems, it was found that the SSCS model-based module was effective for improving analytical thinking skills as indicated by the average N-gain of 0.43 with moderate qualification and sig t-test results (0.000 < 0.05). As well as the characteristics of the SSCS model-based module developed based on the syntax of the SSCS learning model which contains indicators of students' analytical thinking abilities which are visualized in the objectives, materials, activities, and module evaluation questions.

When doing product development there are several obstacles. The obstacles faced when developing this SSCS-based e-module include the difficulty of making or finding questions on a stationary wave and traveling wave materials that can train students' creative thinking skills and also obstacles in making learning videos in e-modules. because it is difficult to get a soundproof place to get a clean recording without any outside noise interference.

D. Conclusion

Based on the results of the development described above, it can be concluded that: 1) The SSCS-based E-Module to train creative thinking skills on wave material based on the average results of the overall validation test on the five aspects of the assessment can be concluded that it is feasible to be used for testing because it has fulfilled the content aspects, presentation aspects, language aspects, media aspects, and contextual aspects with a percentage of 88.70% which are included in the "Very Eligible" criteria; 2) The characteristics of the SSCS-based e-module to train creative thinking skills on wave material have been developed in terms of their feasibility, including and meeting the characteristics of the electronic module and SSCS syntax (Search, Solve, Create, and Share); 3) The SSCS-based e-Module to train creative thinking skills on wave material based on the average results of the overall student response to the readability of the e-module is in very good criteria which include aspects of presentation, material, and benefits with a percentage of 81.81%.

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