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Development of DBUS-Based E-Modules Using Book-Creators to Improve Students' Critical Thinking Skills

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ABSTRACT

Students' critical thinking skills are needed in everyday life because real-life problems will be more complicated and complex. DBUS (Discovery-Based Unity of Sciences) is one of the well-known learning models that can accommodate hands-on experience. It can gain the strength to accept, store, and apply the concepts that students have learned. This research aims to develop an e-module based on the structure and function of animals based on DBUS using a book creator to develop the critical thinking skills of students with valid and qualified criteria. This study is a study of the development of the ADDIE model. Validation results for material and media obtained a high rating category and values of 0.80 and 0.85. Thus, it can be concluded that DBUS-based e-modules with book creator help can be implemented in learning.

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INTRODUCTION

Education is one of the main sectors of important concern during the Covid-19 pandemic. Moreover, education is the most important part in building a country, in order to have more qualified human resources and be able to compete with developed countries. The Social Health Agency stated that UNESCO has recorded the Covid-19 pandemic making 1.1 billion students out of 123 or 62.3% worldwide unable to study at school (Indahri, 2020). Education, which is an essential key in the nation's life, will suffer a major setback if teaching and learning activities stop, so that in the education sector itself, the Minister of Education and Culture of the Republic of Indonesia on May 18, 2020 announced a circular letter regarding procedures for learning

from home during the Covid-19 pandemic, the letter regulates the teaching and learning process carried out at home online, offline or a combination of both as a social distancing effort (Ministry of Education and Culture, 2020).

Changes and transitions in learning during the pandemic online are the best choices that can be done, in accordance with the circular letter of the Ministry of Education and Culture of the Directorate of Higher Education No. 1 of 2020 regarding the implementation of distance learning which aims to prevent the spread of Corona Virus Disease (Covid) (Khoiriyah &; Qosyim, 2021). In addition, using digital devices requires educators and students to have an adaptive attitude towards online learning that is integrated through the internet network in their respective places (Saputra &; Sujarwanta, 2021). Online learning based on distance learning guidelines from the ministry of education is learning carried out in a network consisting of virtual face-to-face and Learning Management sistem (LMS).

Learning in the 21st century as it is today is expected to improve skills considering that the 21st century is the ease of exploring a variety of data and information without borders, globalization, and internationalization (Hartini, 2017). Learning in the 21st century is expected to be able to produce quality human resources, have skills, and are ready to compete which are summarized in HOTs (High Order Thinking Skills) (Agustine et al., 2020; Mushthofa et al., 2021). HOTs consist of critical thinking and creative thinking skills (Angkol et al., 2017). Critical thinking skills are one of the components of the 4Cs, namely collaboration, critical thinking, creative thinking, and communication which play a very important role in the 21st century (Handayani, 2020).

Khoiriyah et al., (2018) explained in their research that critical thinking is a process that tends to assess accordingly such as problem-solving skills, analyzing and conducting scientific research, and making decisions. In contrast to Khoiriyah et al., Wardhani et al., (2016) revealed that critical thinking is a skill to solve problems by analysis, decision making, and evaluation of the arguments expressed. Based on this opinion, it can be seen that critical thinking is an essential skill that needs to be developed from students.

Students' critical thinking skills are needed in everyday life because life problems will be much more complicated, complex, and heavy over time so critical thinking skills are needed in solving these problems (Agustine et al., 2020; Mushthofa et al., 2021). Critical thinking skills are recognized to support the success of working, studying and living in the present or future era (Setyawati et al., 2020). Reporting from Mushthofa et al., (2021) and Ruku &; Purnomo (2020) that students who have good critical thinking skills will easily provide reasonable reasoning so that it is easier to understand various difficulties in the subject matter. Therefore, critical thinking skills need to be trained through the learning process (Fadlina et al., 2021).

The DBUS (Discovery Based Unity of Sciences) learning model as a result of research related to the development of learning models is a model based on unity of knowledge that can be implemented in the 2013 curriculum. Through the DBUS model, students can gain direct experience, so that they can increase their strength to receive, store, and apply the concepts they have learned. Students are trained to be able to discover for themselves various concepts that are studied holistically, meaningfully, authentically and actively. Development of DBUS model to develop students' ability to learn constructively and meaningfully so as to develop critical

thinking skills (Khasanah, 2018). This DBUS learning can be supported by various kinds of interactive learning to improve critical thinking skills (Afifah et al., 2023). DBUS learning has characteristics to foster spiritual, social attitudes and knowledge of learners (Priyanti et al., 2021). In addition, this model also focuses on students so that students are trained to find, collect, and solve problems (Khasanah, 2016).

Through the DBUS model, students gain direct experience that can add strength to receive, store and apply the concepts they have learned as well as problem-solving skills (Priyanti &; Khasanah, 2021). Based on this background description, the purpose of this study is to determine the validity of DBUS-based e-modules using book-creators in improving students' critical thinking skills.

METHOD

Types of Research

This type of research is development research designed to obtain a product. This research and development is a research oriented to product development. The product produced in this research and development is in the form of an e-module of DBUS-based animal structure and function courses using book-creators to improve the critical thinking skills of Science Education students.

The development in this study uses the ADDIE development model. The ADDIE development model is an effective and efficient learning design model and the interactive process that is the evaluation results of each phase can bring learning development to the next phase. This model consists of 5 main phases or stages, namely Analyze, Design, Develop, Implement, Evaluate. The details of each stage of ADDIE model development are explained in the next sub-chapter.

Research Setting

The research was conducted on students III of the Science Education Study Program, Tidar University, which is located at Jalan Kapten Suparman 39, Potrobangsan, North Magelang. This research will be conducted in February-September 2023.

Population and Sample

The research sample used in this study was students of Science Education FKIP semester II. Research sampling technique by choosing one randomly selected class.

Research Procedure

The development of DBUS-based e-modules using book-creators is carried out in stages with the ADDIE model with the development steps in Figure 1 below (Sugiyono, 2015).

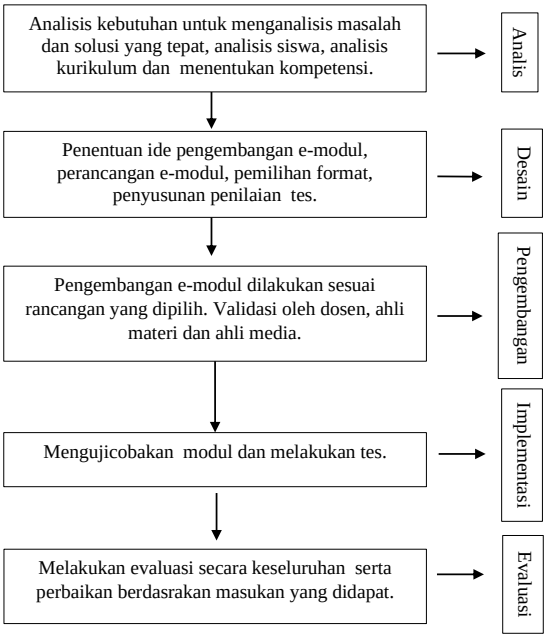

Figure 1. ADDIE Model Research Procedure Chart

Data, Instruments, Data Collection Techniques, and Data Analysis Techniques

The instruments in this study are E-Module validation sheets and critical thinking problem validation. All instruments are analyzed first using validity tests. The data collection technique used is a questionnaire. This technique consists of validation of E-Modules and critical thinking questions to measure the results of modules and critical thinking problems.

Table 1. E-module validation grid

Number	Research Aspects
1	**Material validation**
	Aspects of Material Substance
	Linguistic Aspects
	Aspects of Presenting Critical Thinking Skills
	Aspect of DBUS
2	**Media validation**
	E-Module Media Anatomy Display
	Use of Words and Language
	Media Access E-Module

Table 2. Critical Thinking Question Validation Grid

Number	Research Aspects
1	Content
2	Serving
3	Use of words and language

The data from the validity of DBUS-based e-modules using Book-Creator and critical thinking problems were carried out quantitatively obtained from three validators, namely material validators, media validators, and critical thinking question validators then analyzed and determined the average indicator value given by each validator. The validity of the module can be proven by determining the number of rating categories, the smallest is 2 and the most is

7. Aiken's validity coefficient is obtained through calculations with coefficient values between -1 to 1 (Supahar, 2015).

RESULTS AND DISCUSSION

The result of this research is to produce DBUS-based e-modules using book-creators in improving students' critical thinking skills. The development of the e-module uses the ADDIE model which consists of 5 stages, namely analysis, design, development, implementation and evaluation. The limitation of DBUS-based e-module research and development is that only analysis, design, and development are carried out because e-modules and critical thinking problems have not been implemented for students.

The first stage is the analysis stage, namely by analyzing the curriculum and learning objectives. Curriculum analysis is carried out by describing the curriculum in the Science Education Study Program. The results of the analysis resulted that the curriculum in the Science Education Study Program underwent changes or curriculum updates in 2022. The next analysis is to review existing courses by looking at and compiling course learning outcomes from animal structure and function courses.

The results of the course study are used as a reference in formulating learning achievement indicators and learning objectives. The curriculum analysis stage and learning objectives produce the content of the learning e-module material contained in the development of the e-module.

The design stage is the stage in planning and compiling the DBUS-based E-Module structure framework with the help of Book Creator. The choice of DBUS learning model is because this learning model is a learning that unites scientific studies with religious values (Khasanah, 2018). In addition, the DBUS model contains a unity of science approach that provides students with an overview of various points of view and enhances meaningful learning (Afifah et al., 2023). The e-module developed contains several elements, namely material substance, interesting information related to material discussion, student activities which include local wisdom orientation, analytical statement, observation and data collection, data processing, association base on religion, and generalization and awareness, as well as evaluation. The DBUS stages have been contained in the e-module which is useful in providing facilities for students to carry out activities during learning. The integration of the DBUS model in the e-module is expected to provide opportunities for students to explore, be active, and create a pleasant learning atmosphere due to interactive learning tools (Darmadi, 2021).

The structure of the E-Module covers the entire contents of the E-Module according to the material raised, namely the structure and function of animals. The preparation of E-Modules is adjusted to the criteria of good and correct E-Modules so that they are suitable for use in the lecture process. Figure 2 is the e-module design developed.

Figure 2. DBUS-based E-Module Design

The next stage is to develop an e-module which is the realization of the product according to the design. The next stage is to validate the e-modules that have been developed. This validation is done to determine the level of validity of the e-module. Validation is carried out by two validators who are experts in the field of science learning media. The validation questionnaire consists of two aspects of assessment, namely media validation and material validation. The validation results are summarized as suggestions and inputs as a basis for revising the e-module. At this stage, data analysis is also carried out on the results of the e-module assessment obtained by experts in order to obtain data on the validity value of the e-module.

The validity of DBUS-based E-Modules obtained a fairly high value and met the criteria. This explains that the DBUS-based E-Module meets the validity requirements and can be used to support the knowledge transfer process in the classroom(Arafah *et al*., 2012). Learning with the latest curriculum requires teaching materials that make students easily understand the material taught themselves and can be accessed at any time such as electronic (Supriyati et al., 2020). DBUS-based E-Modules using Book Creator are said to be feasible because the conclusion of a learning product development can be seen based on its validity value (Nisak & Susantini, 2013) and fulfillment of at least with valid categories (Mahjatia *et al*., 2020).

Table 3. Material and media validation assessment

Assessment aspect	V-Aiken's Value	Category
Material validation		
Aspects of Material Substance	0,81	High
Linguistic Aspects	0,75	Moderate
Aspects of Presenting Critical Thinking Skills	0,83	High
Aspects of DBUS	0,83	High
Average	**0,80**	**High**
Media validation		
E-Module Media Anatomy Display	**0,88**	High
Use of Words and Language	**0,88**	High

Media Access E-Module	**0,81**	High
Average	**0,85**	**High**

Table 3 has explained that DBUS-based E-Modules meet the high category with values of 0.80 for material validation and 0.85 for media validation. Validation of material consisting of material substance where the material contained in the E-Module is in accordance with learning outcomes (Prastowo, 2014), so that it has a high value of 0.81. Then, the next aspect is the linguistic aspect including several indicators, namely language compatibility with PUEBI, the use of communicative and effective language. The use of Indonesian in accordance with the spelling of the Indonesian in the E-Module can get a decent category on the linguistic aspect (Puspitadewi et al., 2014). The aspect of presenting critical thinking skills is in accordance with critical thinking criteria, so it has a value of 0.83 with a high category. Similarly, the DBUS aspect has been integrated in the E-Module so that it has a high value.

Media validation was carried out using a questionnaire consisting of the anatomical display of the E-Module, the use of the E-Module, and the access to the E-Module media by obtaining a high V-Aiken category score. Display of E-Modules with the help of qualified Book Creators that encourage readers to discuss and practice their critical thinking skills. The use of electronic-based teaching materials can lead to discussions that can stimulate critical thinking, because through discussion students not only express opinions, but also hear and assess the opinions of others so as to grow cognitive abilities (Rismayanti et al., 2022).

The next validation activity is the critical thinking problem instrument. The assessed validation sheet is then analyzed where the validity results are listed in table 4.

Table 4. Validation assessment of critical thinking problems

Assessment aspect	V-Aiken's Value	Category
Content	0,91	High
Serving	0,85	High
Use of words and language	1,0	High
Average	**0,91**	**High**

Based on table 4, it can be concluded that critical thinking problems have a value of 0.91 with a high category. This is a reference to test the effectiveness of DBUS-based e-modules in the next research activity plan. The content aspect, the presentation aspect, and the word and language aspect obtained a high category because the overall problem has been integrated critical thinking based on Ennis indicators.

DBUS-based e-modules and critical thinking problems are evaluated and revised. Furthermore, validity assessments are used to improve e-modules and revised critical thinking problems. So that it can be tested on students. This research can be used as a reference for future researchers who want to develop research on the Discovery Based Unit of Science (DBUS) learning model. In addition, this research can be a new design in developing e-modules that are integrated with DBUS learning models and book creators. This research can also be a learning innovation for educators to apply the Discovery Based Unit of Science (DBUS) model in various other courses.

CONCLUSIONS AND SUGGESTION

Conclusions

Students' critical thinking skills are needed in everyday life because life problems will be much more complicated, complex, and heavy over time so critical thinking skills are needed in solving these problems. The DBUS (Discovery Based Unity of Sciences) learning model as a result of research related to the development of learning models is a model based on unity of knowledge that can be implemented in the 2013 curriculum. Students are trained to be able to discover for themselves various concepts that are studied holistically, meaningfully, authentically and actively. The results of material and media validation get a value with a high category, namely material validation is 0.80 and media validation is 0.85, while the validation results of critical thinking questions get a value of 0.91 with a high category. The results of the validity of DBUS-based e-Modules and critical thinking problems can be used and implemented in the learning process.

Suggestion

Suggestions intended for the next researcher include: (1) Other researchers can continue research related to other courses and materials; and (2) Subsequent research can develop the design and use of other research models in order to obtain optimal results.

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