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Validity and Practicality of the Physics E-Module Based on the Orientation, Identify, Discussion, Decision, and Engage in Behavior Model to Improve Students' 21st Century Skills

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Abstract: The development of science and technology in the 21st century requires skills for an individual to be able to compete, which are called 4C skills. Initial studies show that students' 4C skills still need to be improved. The physics e-module based on the orientation, identify, discussion, and engage in behavior model is an important aspect that supports improving students' 21st century skills. This research aims to determine the validity and practicality of e-modules. The instrument used to collect data was a validity and practicality test questionnaire. The physics e-module based on the orientation identify, discussion, decision, and engage in behavior can be used in the learning process. Judging from the results of validity and practicality, the physics E-module based on the orientation, identify, discussion, decision, and engage in behavior model to improve students' 21st century skills has valid and practical criteria with an average validity value (Aiken's value) of 0, 93 with valid criteria. The teacher's practicality score is 89.6% with very practical criteria and the students' practicality is 87.4% with very practical criteria. This means that e-modules can be applied to physics learning and in theory can improve students' 21st century competency abilities.

Keywords: E-module; OIDDE; Skills of the 21st century

Introduction

In the 21st century, science and technology are always undergoing very rapid development (Rahayu et al., 2022; Sakuliampaiboon et al., 2015; Subakti et al., 2023). The development of Science and Technology in the 21st century brought popular changes that resulted in a change in learning paradigms characterized by changes in curricula, media and technology (Baro'ah et al., 2023; Hasan et al., 2023). The 21st century learning paradigm suggests that an educator must use digital technology, means of communication and appropriate networking to access, manage, blend, evaluate and create information to function in a learning process (Beardsley et al., 2021; Budiana, 2022; Usmeldi, 2016). Implementation of learning using Science and Technology is expected to be more effective and efficient.

In the 21st century, it takes an individual to compete in what is called a 21st-century skill or 4C, which consists of critical thinking, creativity, communication, and collaboration (Amadi, 2023; Kennedy et al., 2020; Öztürk, 2023). This 21st century skill is an innovation of the new skills of the 21st Century (Desnita et al., 2024; Khoiri et al., 2021; Lay et al., 2018). Therefore, in the face of this era, learning must be able to produce students who have a variety of skills to success in life (Mulyana et al., 2023).

The skills of the 21st century play a vital role in the learning process of physics, because learning physics not

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only focuses on mastering facts, concepts, principles, and laws, but also involves other skills, such as the ability to find information, use technology, apply scientific methods, and critical thinking skills (Aldilla et al., 2023; Hudha et al., 2016).

Physics is a part of the natural sciences that strengthens the ability of analytical thinking in solving various problems related to events around us. In order for students to use the scientific mentality in various circumstances of their lives, learning physics is expected to be able to instill and nurture habits of thinking and acting critically scientific and innovative (Aldilla et al., 2023; Latifah, 2016). So, students will be better at dealing with complex challenges and problems in a critical and innovative way.

Based on the above explanation, we can see the importance of 21st century skills for students in the study of physics. But the fact that 21st-century learners' skills are found is still low. Based on the problem, a solution is needed to solve it. The solution chosen in this study is to develop the teaching material of the e-module physics based on the model of Orientation, Identify, Discussion, Decision, and Engage in Behavior. In today's technological developments, most students are more interested in teaching materials that use other media such as personal computers/laptops, even smartphones than textbooks (Andani et al., 2023). E-modules can be a means to help and streamline teaching learning activities so that effective interaction between students and teachers can be formed so that students can improve their activity in improving learning outcomes (Aldilla et al., 2023). The e-module integrates the learning model of Orientation, Identify, Discussion, Decision, and Engage in Behavior that can improve the skills of 21st century students.

The learning model of Orientation, Identify, Discussion, Decision, and Engage in Behavior is one of the alternatives and answers to the implementation of ethical learning and learning in the 21st century (Fitria, 2022). The OIDDE learning model is an acronym for Orientation, Identify, Discussion, Decision, and Engage in behavior. The OIDDE learning model is a new learning model developed by Hudha (2016) Poor State University. OIDDE learning model as a model of learning resulting from collaboration and syntax modification of social and behavioral learning models (Joyce & Well 1978) and Tri Prakoro learning (Akbar 2013). The OIDDE learning model is expected to be a valid, effective and practical learning model to respond to learning needs that raise moral and ethical questions as the 21st century competence demands that humans have the ability to solve problems and behave ethically (Hudha et al. 2016). So this model is very effective when applied in physics learning to enhance the skills of 21st century students.

Results of previous research on development research conducted by Anggraini (2019). Revealed that the mathematical module based on the learning model of the OIDDE illustrated comics to enhance the HOTS of Junior High School students on the material of straight line equations in the city of Surakarta is very valid, very practical, and very effective used in the learning process. Sabat (2022) it also revealed that the mathematical e-module based on the OIDDE model to improve the mathematic literacy of the students obtained the results that the e-module based upon the learning model of the OIDDE meets the validity, practicality, and effectiveness aspects so that it can be applied in the learning process.

However, there are several limitations to previous research. First, researchers only develop teaching materials based on the orientation, identify, discussion, decision, and engage in behavior model to see students' HOTS and mathematical literacy. Second, there has been no development of teaching materials in the form of physics E-modules based on the orientation, identify, discussion, decision, and engage in behavior model to improve students' 21st century skills. Therefore, in this research a physics e-module was created based on the orientation, identify, discussion, decision, and engage in behavior model to improve students' 21st century skills in a valid and practical way.

Method

This research is development research by producing a product in the form of a physics e-module based on the orientation, identify, discussion, decision, and engage in behavior model to improve students' 21st century skills. The development model used in this research is the ADDIE model. The ADDIE model consists of 5 stages, namely analysis, design, development, implementation, evaluation. The instrument used in this research was a validity and practicality test questionnaire.

The validity test questionnaire given to validators consists of 4 aspects, namely material substance, learning design, appearance and use of software. E-module validation is carried out by experts who are experienced in the field. The validators used were 4 expert lecturers in their fields.

Product assessments based on questionnaires filled out by experts are analyzed to determine the level of validity of the product being developed. Validity data analysis uses a Likert scale with the following steps: first, giving a score to each answer item with answer items Strongly Agree (5), Agree (4), Undecided (3), Disagree (2), and No Agree (1); Second, adding up the total score of each validator for all indicators; third, determine validity using the Aiken's V formula, namely:

$$V = \frac{\Sigma_s}{n(c-1)} \quad (1)$$

$$s = r - l_0 \quad (2)$$

Information: V = Rater agreement index, l_0 = Lowest validity assessment number (in this case = 1), c = Highest validity assessment number (in this case = 5), n = Number of raters. Validity categories can be seen in table 1.

Table 1. Validity Category (Aikens 1985)

Values	Category
≥ 0.88	Valid
< 0.88	Invalid

Based on Table 1, it can be seen that the validity agreement value criteria obtained are obtained. This validity is carried out using the Aiken's formula and is categorized into two values, namely valid and invalid. The validity of the e-module being developed can be said to be valid if the value obtained exceeds or is equal to 0.88.

Practicality testing is carried out to find out how practical the product being tested in the field is. The practicality test was carried out with 2 physics teachers Lubuk Basung Public High School 3 and 25 class XI students. F1 Lubuk Basung Public High School 3. The practicality test questionnaire given to practitioners consists of 3 aspects, namely ease of use, efficiency of learning time, and benefits.

Analysis of e-module practicality test data also uses a Likert scale, namely giving a score to each answer item with answer items Strongly Agree (5), Agree (4), Undecided (3), Disagree (2), and Disagree (1). Then the calculation of the final value data from the validation results is analyzed on a scale of 0-100 using the formula:

$$P = \frac{X}{Y} x\ 100\ \% \quad (3)$$

Information: P = Final practicality value, X = score obtained, Y = maximum score. The practicality category can be seen in table 2.

Table 2. Practicality Categories (Riduwan 2011)

Intervals	Category
81-100 %	Very practical
61-80 %	Practical
40-60 %	Quite practical
20-40 %	Impractical
0-20 %	Very impractical

Based on Table 2, it can be seen that the practicality agreement value criteria obtained. This practicality is carried out using the practicality formula. The e-module instrument developed can be said to be practical if the score obtained is at least 61% - 80%.

Result and Discussion

The development model used in this research is the ADDIE model which consists of analysis, design, development, implementation and evaluation. The analysis stage is the first step in the ADDIE model which is carried out to see the problems that occur in the field. Next is the design stage, where researchers design the product being developed, namely a physics e-module based on the orientation, identify, discussion, decision, and engage in behavior model to improve students' 21st century skills. After the product is designed, we proceed to the development stage, we start creating and compiling teaching materials that are developed into good and validated e-modules. The following is an overview of the e-module that has been developed which can be seen in the image below.

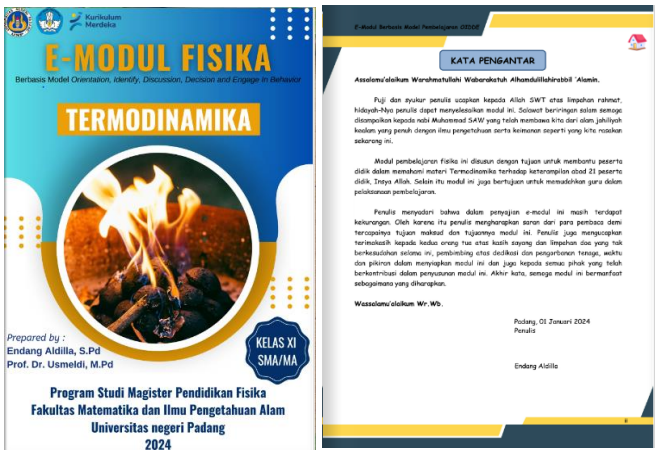

Figure 1. E-module cover and e-module foreword

The cover on the e-module is designed with an attractive color combination. On this cover there is the title, agency logo, Tut Wuri Handayani logo, Independent Curriculum logo, an image according to the contents of the e-module, and the author's identity. A good cover can make people interested in seeing and reading the contents of the final cover. A good cover of teaching materials must also be able to represent what is contained in it.

The e-module consists of several learning activities. In learning activities, instructions for using e-modules, introduction, learning outcomes, initial competencies, thermodynamics material, evaluation, feedback, self-assessment and references. The development carried out in this e-module is to include the syntax of the orientation, identify, discussion, decision, and engage in behavior model and the 4C indicators, namely 21st century skills, in learning activities. The syntax of the

orientation, identify, discussion, decision, and engage in behavior model at the beginning is student orientation to encourage students to solve problems given in the form of cases that are appropriate to students' real lives, then the next syntax is continued based on the presentation of problem orientation which is carried out by linking with indicators of students' 21st century skills. The evaluation contained in the e-module aims to strengthen new concepts discovered by students. And references are made so that students can learn independently.

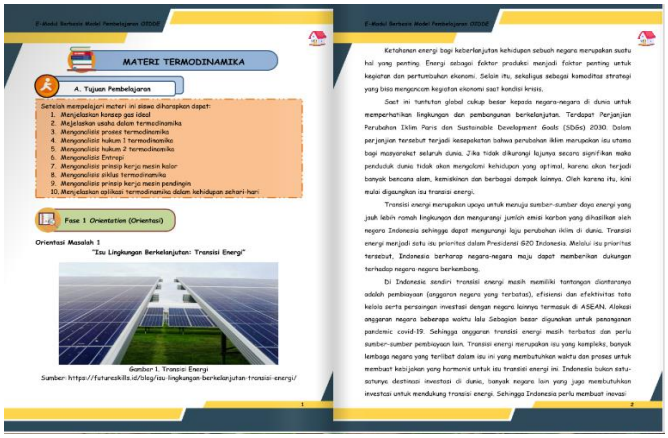

Figure 2. Part of learning activities

Validity Results of the Physics E-module Based on the Orientation, Identify, Discussion, Decision, and Engage in Behavior Model

The physics e-module based on the orientation, identify, discussion, decision, and engage in behavior model was validated by four validators consisting of 2 physics education lecturers at Padang State University, 1 education lecturer at Sebelas Maret State University, and 1 education lecturer at the Open University Jakarta. Aspects of e-module validation assessment include material substance, learning design, appearance and use of software. The research results show that the class XI physics e-module is valid, as can be seen in table 3.

Table 3. Validity of the Physics E-module

Aspect	Value	Category
Material substance	0.93	Valid
Learning design	0.92	Valid
E-module display	0.96	Valid
Utilization of software	0.91	Valid
Average	0.93	Valid

Based on the table above, the material substance aspect received an average validation value of 0.93 in the valid category, the learning design aspect received an average validation value of 0.92 in the valid category, the e-module display aspect received an average validation value of 0 .96 in the valid category, and in the software utilization aspect the average validation value is 0.91 in the valid category. Then the overall average of the 4 aspects of product validation assessed was 0.93 in the valid category. So that the physics e-module based on the orientation, identify, discussion, decision, and engage in behavior model can be used in physics learning.

Good teaching materials can facilitate students to better explore the natural surroundings (Brunner et al., 2020; Cebesoy et al., 2018; Fischer et al. 2018; Latifah et al., 2020). Therefore, the presentation of material can be said to be good if the teaching materials used are valid and suitable for use (Azriyanti 2023). The validity of the e-module can be seen from the attractive e-module display design, easy to operate, good image and video quality, and the language is communicative and clear (Angraena et al., 2021; Fadieny et al., 2021; Nilyani, 2023).

The validity of an e-module can also be determined through content validation. E-modules are suitable for use in the learning process if they comply with content validation (Cahyani et al., 2023; Fadieny et al., 2021; Novisya et al., 2021). Furthermore, the E-module will be valid if it has been declared valid by experts (Ramadayanty et al., 2021; Syahiddah et al., 2021).

Practical Results of the Physics E-module Based on the Orientation, Identify, Discussion, Decision, and Engage in Behavior Model

Practicality is the use of learning media that has been developed. To find out the practicality of the learning media that has been developed, researchers conducted product trials (Yanto 2019). Practicality is carried out to measure the extent of product limitations when applied in the learning process (Aswirna et al., 2020). The teacher practicality test was carried out by 2 physics teachers at Lubuk Basung Public High School 3. The teacher response questionnaire regarding the practicality of the physics e-module based on orientation, identify, discussion, decision, and engage in behavior that was developed consisted of three aspects, namely ease of use, efficiency of learning time, and benefits. The results of teacher practicality can be seen in table 4.

Table 4. Practicality Test Results by Teachers

Aspect	Value (%)	Category
Ease of use	91.40	Very practical
Learning time efficiency	90.00	Very practical
Benefit	88.00	Very Practical
Average	89.60	Very Practical

Table 4 states the results of the practicality test by the teacher. It is known that the average practicality score carried out by teachers is 89.60% with very

practical criteria. So the physics e-module based on orientation, identify, discussion, decision, and engage in behavior is practically used by teachers in the learning process.

Not only teacher responses, student responses are also needed to determine the ease and practicality of physics e-modules based on orientation, identify, discussion, decision, and engage in behavior. The practicality test of students was carried out by class XI.F1 Lubuk Basung Public Senior High School 3. Practicality test assessments by students are given through practicality questionnaires by students. The results of the practicality questionnaire by students can be seen in table 5.

Table 5. Practicality Test Results by Students

Aspect	Value (%)	Category
Ease of use	86.90	Very practical
Learning time efficiency	88.00	Very practical
Benefit	87.00	Very practical
Average	87.40	Very practical

Based on table 5 states the results of practicality tests by students. It is known that the average practicality score by students is 87.40% with very practical criteria. So the physics e-module based on orientation, identify, discussion, decision, and engage in behavior is practically used by students in learning activities.

Practicality is the use of learning media that has been developed. To find out the practicality of the e-module that has been developed, a product trial was carried out (Aswirna et al., 2020). Practicality is carried out to measure the extent of product limitations when applied in the learning process. The practicality seen in the product includes ease of use, efficiency of learning time, and benefits (Mardian et al. 2022).

The results of the practicality data analysis in tables 4 and 5 of the physics e-module based on the orientation, identify, discussion, decision, and engage in behavior model to improve students' 21st century skills are very practical for use by educators and students.

Conclusion

The physics e-module based on the orientation identify, discussion, decision, and engage in behavior model can be used in the learning process. Judging from the results of validity and practicality, the physics E-module based on the orientation, identify, discussion, decision, and engage in behavior model to improve students' 21st century skills has valid and practical criteria with an average validity value (Aiken's value) of 0.93 with valid criteria. The teacher's practicality score is 89.60% with very practical criteria and the students' practicality is 87.40% with very practical criteria. This means that e-modules can be applied to physics learning and in theory can improve students' 21st century competency abilities.

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Conflicts of Interest
The authors declare no conflict of interest.

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