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# Development of Interactive E-Modules Based on Kvisoft Flipbook with Discovery Learning Models on Arthropod Material to Improve Student Learning Outcomes

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**A B S T R A C T**

Education is a learning activity that determines the success of achieving student learning outcomes in class. So, to achieve learning goals by increasing student learning outcomes, it is necessary to have a good and correct learning process with the help of facilities, good learning methods.This study aims to determine the effect of an interactive e-module based on kvisoft flipbook with the discovery learning model on arthropod material on student learning outcomes. This research uses development research (R&D) with the ADDIE model which consists of five stages, namely Analysis, Design, Development, Implementation, and Evaluation. This research reached the evaluation development stage. Phase testing for e-module development in the form of validation (media expert, material expert and pedagogic expert) and testpracticality and student response. The results of the validation analysis are in the very valid category. Practicality is in the very practical category used in learning, and student responses are in the very good category and are well received by students in learning.

## 1. Introduction

Education is a long-term human resource investment that is strategically important for the survival of human civilization throughout the world. One way to encourage national growth and development is through education (Yuliasari, 2017). The welfare and growth of a nation can be seen from the level of education, so education is an important capital for advancing a nation. The importance of education in producing quality human beings (Widyawati, 2016).This is important because given the development of science and technology, the world of education requires the right innovation. 21st century learning is a learning innovation designed for the 21st century generation to keep

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up with technological developments.21st century learning is an effort to facilitate students to get the best learning experience for students so that,achieve learning objectives effectively. The new competencies of 21st century education consist of the ability to think critically and learn effectively. The new competencies of 21st century education consist of the ability to think critically and think critically and think critically and effectively. The new competencies of 21st century education consist of critical thinking skills and the ability to think critically and learn effectively.

The new essence of 21st century education consists of abilities Education is a long-term human resource investment that is strategically important for the survival of human civilization throughout the world. One way to encourage national growth and development is through education (Yuliasari, 2017). The welfare and growth of a nation can be seen from the level of education, so education is an important capital for advancing a nation. The importance of education in producing quality human beings (Widyawati, 2016).This is important because given the development of science and technology, the world of education requires the right innovation. 21st century learning is a learning innovation designed for the 21st century generation to keep up with technological developments.21st century learning is an effort to facilitate students to get the best learning experience for students so that,achieve learning objectives effectively. The new competencies of 21st century education consist of the ability to think critically and learn effectively. The new competencies of 21st century education consist of the ability to think critically and think critically and think critically and effectively. The new competencies of 21st century education consist of critical thinking skills and the ability to think critically and learn effectively.

## 2. Methodology

This research is research and development (Research and Development) with the ADDIE model which consists of stages, namely the Analysis, Design, Development, Implementation, Evaluation, (Dick, W & Carey, L, 2005).each stage can be seen in Table 1. This research was conducted at the Masters Program in Biology Education, Faculty of Teacher Training and Education (FKIP), University of Riau (UNRI). This research was conducted on class X students of SMA Negeri 15 Pekanbaru for the 2021/2022 academic year. The research took place from November 2021 to June 2022.

The population in this study were all class X students of SMAN 15 Pekanbaru which consisted of 4 classes for the 2021-2022 academic year. In determining this sample, the authors used a sampling technique carried out by simple random sampling technique or simple random research sample consisting of 2 classes, namely the control class in class X MIPA 4 (35 people) and the experimental class in class X MIPA 3 (35 people). Types of data Primary data is data on student learning outcomes, secondary data obtained not from direct observation results from research sources in the form of scientific articles or scientific journals that have been researched by researchers or researchers first. Data collection

techniques used were observation and interviews with Biology teachers, questionnaires, and through cognitive tests.

Table 1. ADDIE Stages

| Development Stages | Data | Instrument |
|---|---|---|
| Analysis | Observations, interviews and test results of problem analysis | Observation and interview questionnaires, test questions, curriculum. |
| Design | Draft interactive e-module design based on kvisoft flipbook design Learning Devices | Software Usage : kvisoft flipbook with canva.com<br>Making Syllabus and RPP<br>Question sheet<br>Questions pretest and posttest |
| Development | Validation results<br>Practicality test<br>Limited trial<br>Test instrument questions | Instrument validation sheet<br>Validation sheets (material experts, media/IT and pedagogics)<br>Practicality questionnaire<br>Student response questionnaire one to one and small group<br>Questions pretest and Posttest |
| Implementation | Field test:<br>Learning outcomes | Test questions (pretest and posttest) |
| Evaluation | At this stage an overall evaluation is carried out on the achievement of using interactive e-modules based on kvisoft flipbook using the discovery learning model | |

The questionnaires used were validation questionnaires, practicality questionnaires and product trials. Validation sheets were given to material experts, media experts and pedagogic experts. based on the percentage of criteria presented in Table 2.

Table 2. Criteria for Validity

| No | Score Average Interval | Category |
|---|---|---|
| 1 | $3.25 \leq x < 4$ | Very Valid |
| 2 | $2.5 \leq x < 3.25$ | Valid |
| 3 | $1.75 \leq x < 2.5$ | Invalid |
| 4 | $1 \leq x < 1.75$ | Invalid |

(Modification: Riduan, 2007)

The questionnaire used in the form of a practicality questionnaire is used to see the practicality of the e-module teaching materials. The practicality analysis of this e-module teaching material is determined based on the percentage of criteria presented in Table 3.

Table 3. Practicality Criteria

| No | Mark (%) | Criteria |
|---|---|---|
| 1 | 80<x≤100 | Very Practical |
| 2 | 60<x≤80 | Practical |
| 3 | 40<x≤60 | Pretty Practical |
| 4 | 20<x≤40 | Less Practical |
| 5. | 0<x≤20 | Impractical |

(Modification: Riduan, 2007)

Data processing was carried out after the pretest and posttest data were collected using the SPSS program. Guidelines for making decision criteria for the value of pretest and posttest effectiveness can be seen in Table 4.

Table 4. Criteria for Learning Outcomes

| Mark | Category |
|---|---|
| $X \geq 85$ | Very good |
| $75 \leq X < 85$ | Good |
| $65 \leq X < 75$ | Enough |
| $55 \leq X < 65$ | Not enough |
| $X < 55$ | Very less |

(Modification: Riduan, 2007)

## 3. Results and Discussion

This research has produced interactive e-module teaching materials based on kvisoft flipbook with the discovery learning model. The results of the development were then tested for validation, practicality and limited trials to find out the responses of students and then implemented to see the effect of e-module teaching materials in improving student learning outcomes. The analysis phase is the initial stage in this study which consists of: curriculum analysis, student needs analysis, material analysis, and media analysis.

Curriculum analysis. Based on the results of interviews with the Biology teacher at SMA N 15 Pekanbaru, information was obtained that the school had implemented the 2013 Curriculum, so that interactive e-module teaching materials based on kvisoft flipbook with the discovery learning model that will be developed can improve student learning outcomes in arthropod material referring to the 2013 curriculum. Biology learning in class must be guided by Core Competencies (KI) and Basic Competencies (KD). The results of the analysis of the developed curriculum are analysis of core competencies and basic competencies in the analysis of arthropod material. Analysis of student needs, The results of interviews with Biology teachers at SMA N 15 Pekanbaru stated that learning in the classroom still uses conventional methods that are less varied and innovative in the teaching materials used in learning. So that new innovations are still needed such as the development of teaching materials that can be used in learning that are able to attract the attention of students. Based on this analysis, researchers are interested in developing products in the form of e-module teaching

materials. Material analysis. Based on the results of the analysis that has been carried out, it can be said that it is necessary to develop innovative and interesting interactive e-module teaching materials for arthropod material. The development of the development of e-module teaching materials is expected to improve student learning outcomes so that the learning objectives are expected to be achieved. The description of the material will be poured in the form of pictures on the selected material, namely arthropod material and made in the form of learning material components in the basic components and learning indicators with the aim of knowing what components will be studied in the learning process. Media analysis, obtained information that the school has never used e-module teaching materials in the learning process on arthropod material which can have a good impact on students, namely it can improve student learning outcomes.

The design stage of interactive e-module teaching materials based on kvisoft flipbook with discovery learning models on arthropod material is designed according to the format of the module to be modified. The formal e-module can be seen in Table 5.

Table 5. Kvisift Flipbook-Based Interactive e-Module Format with The Discovery Learning Model

| **Developed e-Module Format** |
|---|
| 1. Page title |
| 2. Foreword |
| 3. List of contents |
| 4. Map of the position of the syllabus material |
| 5. DL model indicator manual |
| 6. Learning 1 |
| 7. Concept maps |
| 8. Matter (crustaceae and myriapoda) |
| 9. Summary |
| 10. Exercise 1 |
| 11. Learning 2 |
| 12. Concept maps |
| 13. Material (arachnids and insects) |
| 14. Summary |
| 15. Exercise 2 |
| 16. Evaluation questions |
| 17. Answer key |
| 18. Glossary |
| 19. bibliography |
| 20. Author profile |
| 21. Cover |

Modification: Ministry of Education and Culture 2017

The results of the interactive e-module designs that have been designed on canva.com will be downloaded and published on the kvisoft flipbook can be seen in Figure 2. The following are the results of the e-modules that have been developed in Figure 1.


Figure 1. Display of The e-Module

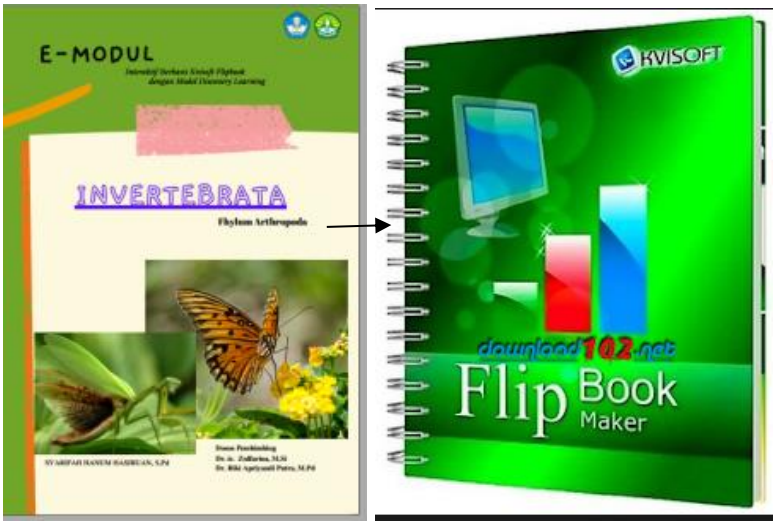


Figure 2. E-module Applied to Kvisoft Flipbook

The Development Stage at this stage is followed by validating the e-module teaching materials by the five validators. The results of the validation of interactive e-module teaching materials based on kvisoft flipbook with the discovery learning model.

1. The results of expert validation of e-module teaching materials can be seen in Table 6.

Table 6. Results of e-Module Material Assessment Validation

| No | Assessment Component | Average |
|---|---|---|
| 1 | Content feasibility aspect | 3,11 |
| 2 | feasibility of presentation of the material | 3.00 |
| 3 | Aspects of language feasibility | 3.00 |
| | Average | 3.04 |

The results of product material validation based on Table 6 show the average value for interactive e-modules based on kvisoft flipbook with the discovery learning model with a mean score of 3.04 in the valid category. Criteria for validity is determined according to predetermined criteria. According to Sugiyono (2015), criteria in the range of $2.5 \leq x < 3.25$ are included in the valid category. The highest rating lies in the assessment aspect of content feasibility with an average of 3.11. The aspect of assessing the feasibility of presenting material and language feasibility obtained the same average value of 3.00. So it can be concluded that the product is suitable for use based on the material on condition that all suggestions and criticisms from the validator improve.

2. The results of the Media/IT e-module validation can be seen in Table 7.

Table 7. The Validation Results of the Media/it e-Module Assessment

| No | Assessment Component | Average |
|---|---|---|
| 1 | E-module size | 4.00 |
| 2 | E-module cover design | 3.50 |
| 3 | E-module content design | 3.70 |
| | Average | 3.73 |

The results of product media/it validation based on Table 7 show the mean value for interactive e-modules based on Kvisoft Flipbook with the discovery learning model with a mean score of 3.73 in a very valid category. The highest rating lies in the e-module size assessment component with an average of 4.00. The second highest rating is in the e-module content design assessment component with an average of 3.70 and the lowest rating is in the e-module cover design assessment component with an average of 3.50. With this the results of the product media/it validation are suitable for use in the field with notes that the validator must revise them.

3. The results of the validation of educational experts by the three validators on the e-module can be seen in Table 8.

Table 8. Results of e-Module Pedagogic Validation

| No | Validators | Average |
|---|---|---|
| 1 | Validators 1 | 3.70 |
| 2 | Validators 2 | 4.00 |
| 3 | Validators 3 | 3.80 |
| | Average | 3.83 |

Based on the results of Table 8, the results of product validation by educational experts show the average value for interactive e-modules based on Kvisoft Flipbook with the discovery learning model with a mean score of 3.83 in a very valid category. The highest rating was obtained from validator 2 with an average of 4.00 and the second highest rating was obtained from validator 3 with an average of 3.80 and the lowest rating was obtained from validator 1 with an average of 3.70. This shows that the product is feasible for use in the field with a note that it must be revised.

4. Overall e-module validation results. Can be seen in Table 9.

Table 9. Overall e-Module Validation Results

| No | Validation Aspect | Average | Category |
|---|---|---|---|
| 1 | Validation of e-module materials | 3.04 | Valid |
| 2 | Validation of e-module media | 3.73 | Very Valid |
| 3 | Validation by educational experts | 3.80 | Very Valid |
| | Average | 3.52 | Very Valid |

Table 9 The results of the overall validation of the kvisoft flipbook-based interactive e-module with the discovery learning model obtained a mean value of 3.52 in a very valid category. This shows that the e-module is feasible to continue at the next stage. After the product design is validated through the assessment of material experts, experts media, and education experts. Researchers will make revisions to product design developed based on suggestions or input provided by the validator. Suggestions or input by the validator**as**following:The e-module page does not yet exist,Provide the source of each image,Adjust the modified e-module structure with the discovery learning model,How is said interactive e-module,The stages of the discovery learning model with customized e-modules, And Aspects of the questions on the validation sheet with the e-module to be validated.Validation results and suggestions for improvement from the validator. Used to make revisions to e-module products before practicality and limited trials. Based on the suggestions from the validator, improvements were made to the learning e-module product.Products are evaluated by users to find out their opinion about the product by means of product responses (Sumintono & Widhiarso, 2015).

The next stage is practicality testing and limited trials with assessments using e-module teaching materials involving three high school biology teachers. In the limited trial, the one to one test involved three students and the small group trial involved 20 students.This test is done to find out product practicality and the attractiveness of e-module teaching materials. Plomp (2013) claims that practicality is related to the representation of practitioners (teachers) and consumers, which takes into account product usability and ease of use for teachers and students.

5. Test results practicality by biology teachers can be seen in Table 10**.**

Table 10. Practicality Test Results

| No | Respondents | Average | Category |
|---|---|---|---|
| 1 | Respondent 1 | 87.5 | Very Practical |
| 2 | Respondent 2 | 86.6 | Very Practical |
| 3 | Respondent 3 | 87.5 | Very Practical |
| | Average | 87,2 | Very Practical |

The practicality test results show a result of 87.22 in the very practical category. Based on the highest rating obtained from respondent 1 with an average value of 87.50 in a very practical category with criticism and suggestions, namely page

numbering does not yet exist, the teacher's response as respondent 1, e-module teaching materials are very good innovations that can help teachers because they are interactive so that teaching activities are more fun and can motivate teachers to innovate learning on other biology materials. The teacher's assessment as respondent 2 obtained an average value of 86.67 in the very practical category with criticism and suggestions, namely not being consistent in writing fonts on the e-module, not a few writing that lacks letters. Respondents also gave an assessment of the e-module, namely the e-module teaching material is very innovative, so that it makes readers curious about what the e-module teaching material contains, increases the user's enthusiasm for reading, teachers are interested in making innovative teaching materials like this e-module.

The teacher's assessment as respondent 3 obtained a value with an average of 87.50 in the very practical category with criticism and suggestions by the third respondent, that is, not all students can use this e-module teaching material because students have difficulty accessing the e-module because they have to use internet data, facilities there is no free internet data at school. However, the third respondent also gave an assessment of the e-module, namely this is one of the good learning innovations to use, provided that it must be equipped with facilities that support this learning. Teachers are happy and feel very helpful and facilitate teachers in the learning process and not a few teachers want to be taught how to make interactive e-modules.

According to Masita (2018) a product is declared practical if the learning activities using the product are carried out well, resulting in easy learning for students. The criteria for practicality used are in accordance with Riduwan and Sunanrto (2017) that practicality values in the range of $80<x\leq100$ are included in the very practical category.

6. Limited trial results

The results of the one to one test by 3 respondents by students can be seen in table 11.

Table 11. One to One Response Test Results

| No | Respondents | Average | Category |
|---|---|---|---|
| 1 | Respondent 1 | 86,2 | Very Practical |
| 2 | Respondent 2 | 87.5 | Very Practical |
| 3 | Respondent 3 | 83.7 | Very Practical |
| | Average | 85.8 | Very Practical |

Table 11 shows that the results of the one to one test by students with the overall score of the respondents obtained an average of 85.8 in the very practical category. Students are very happy with this e-module which makes it easier for students. e-modules can be used wherever and whenever students want to use practical e-modules without incurring costs by downloading the e-module files. E-Modules that use the Kvisoft Flipbook application can be accessed offline and don't have to incur a lot of costs because they are in the form of soft files (Susanti, 2015).Students prefer to use e-modules over textbooks and traditional teaching methods (Putra, Wirawan, & Pradnyana, 2017).Results of the second limited trial,

namely the small group test. the results of the responses of the small group of students can be seen in table 12.

Table 12. Small Group Response Test Results

| No | Assessment Aspects | Average | Category |
|---|---|---|---|
| 1 | Display Aspect | 87.5 | Very Practical |
| 2 | Aspects of Material Presentation | 86.6 | Very Practical |
| 3 | Benefits Aspect | 86.6 | Very Practical |
| | Average | 86.9 | Very Practical |

Table 12 shows that the results of the small group test by respondents obtained an average of 86.9 with a very practical category. Students are very happy with the e-module. Interest in reading increases. According to Uno, HB (2010) the product is declared practical, if the learning activities using the product are carried out well, so that learning ease occurs for students. Can be used as independent teaching materials.The fundamental purpose of teaching materials in the form of modules is to enable independent learning for readers (Daryanto, 2013).

The implementation phase is carried out by applying the development results on a large scale. To determine the experimental class and the control class in this study, a prerequisite test was carried out on all class X MIPA students first. Classes with normally distributed and homogeneous data can be used in the implementation stage. From the results of the prerequisite test it can be determined that class X MIPA 4 is used as the control class and class X MIPA 3 as the experimental class. The research design can be seen in Table 13.

Table 13. Research Design

| Class | *Pretest* | Treatment | *Posttest* |
|---|---|---|---|
| Experiment | Y0 | X | Y1 |
| Control | Y2 | - | Y3 |

Information:
X : Treatment with e-module media
Y0: : Pretest (before being given treatment)
Y1 : posttest (after treatment)
Y2 : Pretest (before being given treatment)
Y3 : posttest (after treatment)

The implementation stage was carried out to see the effect of an interactive e-module based on kvisoft flipbook with the discovery learning model on arthropod material on student learning outcomes. The learning outcomes of students in the study were seen from a comparison of learning outcomes between the control class and the experimental class based on the results of the pretest and posttest. The experimental class was given treatment in the form of using e-module teaching materials while the control class was given textbook teaching materials. The learning outcomes of students in the control and experimental classes can be seen in Table 14.

Table 14. Student Learning Outcomes

| Class | Pretest | | Posttest | |
|---|---|---|---|---|
| | **Mark** | **Criteria** | **Mark** | **Criteria** |
| **Control** | 51.03 | Very less | 69,74 | Enough |
| **Experiment** | 47,88 | Very less | 80.51 | Good |

The results of the students' pretest scores for the control class with an average score of 51.03 with very low criteria, and a mean posttest score of 69.74 which has increased with sufficient criteria. While the results of the pretest scores in the experimental class with an average of 47.88 with very low score criteria. After getting treatment using an interactive e-module based on kvisoft flipbook with the discovery learning model, the posttest score results with an average of 80.51 in the good category. The development of interactive e-module learning media also shows that the results of the development are effective for use in improving student learning outcomes, this can be seen from the fact that students are happier in the learning process using e-modules.

This evaluation stage is the stage to see whether the interactive e-module based on Kvisoft Flipbook with the discovery learning model that has been developed is successful and meets initial expectations or not. Development of an interactive e-module based on kvisoft flipbook with the discovery learning model. The validation results for the e-module development as a whole are very valid and the level of practicality of the e-module development results is also very practical. The results of student responses to the developed e-module also showed a very good positive response.

The learning outcomes of students in the control class and the experimental class also show differences in learning outcomes. Based on the results of hypothesis testing, it shows that there is an influence on the development of interactive e-modules based on kvisoft flipbook with the discovery learning model on student learning outcomes. Therefore, the development of an interactive e-module based on kvisoft flipbook with a discovery learning model that has been developed and has gone through various stages of testing can be used as an alternative teaching material in schools, especially at the high school level (SMA) class X.

## 4. Conclusion

Based on the results of the research conducted, it can be concluded that the interactive e-module teaching materials based on kvisoft flipbook with the discovery learning model that has been developed have very good quality, this can be seen from the validation test which obtains a very valid category, and practicality tests with very good categories. practical and interactive e-module teaching materials based on kvisoft flipbook with the discovery learning model have a real influence in improving student learning outcomes.

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