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Module Discovery Learning Biodiversity Material Based on Gunungkidul Beach to Increasing Interest and Independence in Learning of High School Students

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Abstract: The research carried out aims to determine the feasibility, practicality and effectiveness of the Gunung Kidul beach-based Discovery Learning module, on biodiversity material in increasing high school students' interest and independence in learning. The research carried out is a type of development research using the ADDIE model which consists of several stages, namely analysis, design, development, implementation and evaluation. The product produced in this research is a biology learning module on biodiversity material which is integrated with the Gunung Kidul beach-based Discovery Learning learning model. The learning module developed was validated by expert validators and practitioners, then tested for effectiveness on class X students of SMA N 1 Depok Sleman using the non-equivalent pre-test, post-test control group design technique. Data collection was carried out using direct interview techniques with biology teachers and distribution of student needs analysis questionnaires, assessment of material experts, media experts, learning experts, teacher and student practicality, student learning interest questionnaires, and student learning independence questionnaires. Data analysis uses non-parametric statistical test techniques with the Mann-Withney model, parametric statistical tests with the independent sample t test model and N-gain score. Gunung Kidul beach-based discovery learning learning modules on biodiversity material are feasible, and can be practically used in learning activities and are effectively used in increasing high school students' interest and independence in learning.

Keywords: Biodiversity; Discovery Learning; Independent Learning; Interest Learning

Introduction

The importance of education at this time is not only limited to writing in laws and regulations, but is an obligation for everyone for the survival, progress of the nation and the State, because education is a fundamental component of human capital for consistent development in the new era and has a direct relationship with moral culture, spiritual and physical development experienced by students (Hakimovich et al., 2019). The previous statement is in line with what was stated by Bhardwaj (2016) the importance of education cannot be doubted because it relates to spiritual life which cannot enjoy the world without education, where professional knowledge is able to develop human skills and the existence of formal education can make us experts in various fields such as engineers. Arbangi & Umiarso (2016) also stated that improving the quality of education is related to the process of improving human resources.

Improving human resources can be seen in efforts to improve the quality of education, for example, the development of learning models and media. This statement is in line with what was stated by (Falaha. & Samsudi., 2021) the learning model discovery learning audio-visual aids used in thematic learning can improve student learning outcomes and motivation.

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The development of educational quality through learning models and media needs to be harmonized with situations and conditions so that it has an impact on the aspects of student interest and independence in learning face-to-face participation by students in learning activities due to the COVID-19 pandemic has decreased, especially for children who come from low-income families, it is difficult to support children with special needs, parental reports of significant social-emotional problems continue to increase, and a variety of other problems. (Borba, 2021) also states, the presence of a pandemic has affected the trend of ethno mathematics education or early grade mathematics education because of the role played by the pandemic towards digital technology, philosophy of mathematics education and critical mathematics education.

The problem of developing learning media related to the affective domain is in accordance with the results of observations made in class XI SMA N 1 Depok Sleman which shows that students' learning interest and independence need to be considered. This is indicated by students who do not understand biological material, namely biodiversity, even though curriculum adjustments during the COVID-19 pandemic did not eliminate this material, but were assigned by teachers to students to study independently.

The problems found can also be used as a basis for developing learning media in the form of modules to increase students' learning interest and independence. This is based on the results of interviews conducted with class. The characteristic of the biodiversity module which is thought to be able to increase students' learning interest and independence is the integration of discovery learning and beach-based learning models. This statement is in line with that stated by Junina & Halim (2020) regarding the discovery learning learning model combined with LKPD learning media. Sunarsih et al. (2020) also stated that the potential for biodiversity in the school environment and Wonosobo Regency area can be utilized to develop teaching materials in the form of modules based on the diversity of ecosystems and species that can be found in the area.

Beach areas that are thought to be able to provide information about biodiversity are Krakal, Wedi Ombo, Jungwok, Sedahan, Greweng and Slili beaches in the Gunungkidul Regency area. The type of Gastropoda from the Cypraeidae family found in the intertidal zone of Krakal Beach, Regency, Special Region of Yogyakarta. The several types of Chlorophyta were found on Krakal Beach. Based on the information found, it is necessary to develop a discovery learning module based on Gunungkidul beach to increase high school students' interest and independence in learning.

Method

The research carried out is a type of development research with the ADDIE model (Analysis, Design, Development or Production Implementation or Delivery and Evaluation), as shown in Figure 1. This development model is structured systematically based on a theoretical basis for solving problems. This statement is supported by Spatioti et al. (2022) the ADDIE model which was first discovered at the University of Florida in 1975 is often used by educational designers and training programmers to develop educational and training programs.

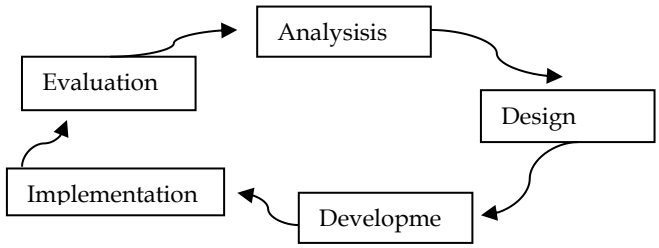

Figure 1. research development model

The product developed in this research was tested first with limited trials by media expert validators, material experts, practitioners, and class XI students to see the readability of the product. After conducting a limited trial, a product trial was carried out to determine its effectiveness and practicality in class X using the cluster random sampling method so that two classes were obtained as treatment and control. Then the two classes obtained were treated with the non-equivalent pre-test post-test control group design technique.

Table 1. Product Trial Design

Class	Pretest	Treatment	Posttest
Experiment class	O_1	X_1	O_2
control class	O_3	X_2	O_4

The data collection technique used in the development research this time was a combined technique, namely interviews, observation, questionnaires and documentation. This technique was carried out in order to obtain strong results to support the conclusions in the research conducted. This statement is supported by Johnson & Burke. (2014) data collection using a combined technique is likened to a collection of nets that have hole defects as weaknesses and then put together to build new strengths from each of the weaknesses they have.

The instruments used in the development research this time were test instruments in the form of pre-test, post-test and non-test questions in the form of learning interest questionnaires, learning independence,

practicality by teachers, class X student response questionnaires, eligibility questionnaires for media experts, material experts, assessments biology teacher, and a class XI student needs questionnaire.

Analysis of the research data consisted of analyzing the needs of teachers and students which was carried out descriptively through interviews and questionnaires. Next is the analysis of the feasibility of the product through a questionnaire which is analyzed using a scale likert

Table 2. Guidelines for Product Validation Assessment

Alternative	Score
Inappropriate	1
Not suitable	2
In accordance	3
Perfect fit	4

Table 3. Interpretation of Product Validation Eligibility

Weight Value	Category
81 – 100	Very worth it
61 – 80	Worth it
41 – 60	Pretty decent
21 – 40	Not worth it
≤ 20	Very unworthy

Data analysis in this study was also carried out on product practicality using a questionnaire with the following guidelines:

Table 4. practicality score criteria

Criterion	Score +	Score -
Don't agree	1	4
Disagree	2	3
Agree	3	2
Strongly agree	4	1

Students' interest in and independence in learning in the knowledge aspect as a form of affective domain assessment has validity based on instruments that were qualitatively reviewed by a team of experts or validators. A valid instrument is an instrument that has items that match the grid reference.

Table 5. Interpretation of Product Validation Eligibility

Weight Value	Category
81 – 100	Very practical
61 – 80	Practical
41 – 60	Pretty practical
21 – 40	Less practical
≤ 20	Very less practical

Module discovery learning Gunung kidul beach-based material for biodiversity developed contains one basic competency. So that the use of a knowledge test is in the form of a formative test based on a benchmark reference assessment (PAP). The form of assessment used is Criterion Referenced Assessment (CRA), to see the level of student learning success, the instrument will be validated based on the high sensitivity index of the item. If a test item has a sensitivity index of 1.0 then the test item cannot be done by students who have not studied, but if the test item has a sensitivity index of more than 1.0 then the test item can be successfully done by students who have successfully learned. The results of calculating the validity of the questions are then interpreted based on categories according to Rahmatin et al. (2019)as shown in Table 6.

Table 6. Interpretation of Question Validity Scores

Score Interpretation	Category
0.81< V≤ 1	Very Valid
0.61 < V ≤ 0.80	Valid
0.41 < V ≤ 0.60	Valid Enough
0.21 < V ≤ 0.40	Invalid
V ≤ 0.20	Very Invalid

Subali (2016) states that reliability will apply at the level of a test item whose assessment uses a reference Criterion Referenced Assessment (CRA), therefore, the reliability of the test instrument based on the index of agreement (agreement index) and (kappa index). The calculation results are then interpreted based on the score category according to Sugiyono (2015) as shown in the following table:

Table 7. Interpretation of Question Reliability Scores

Score Interpretation	Category
0.81 < R ≤ 1.00	Very Reliable
0.61 < R ≤ 0.81	Reliable
0.41 < R ≤ 0.61	Reliable enough
0.21 < R ≤ 0.41	Less reliable
R ≤ 0.20	Very Less Reliable

The increase in learning interest and Learning independence of students was analyzed based on the results of the questionnaire given before and after learning in the experimental class and the control class. The results of the questionnaire were analyzed using a scale likert based on alternative answers as shown in Table 8.

Table 8. Scores and Alternative Answers to Learning Interest Analysis

Alternative Answers	Score +	Score -
Strongly Agree (SS)	4	1
Agree (S)	3	2
Disagree (TS)	2	3
Strongly Disagree (STS)	1	4

The results of the student learning interest questionnaire were analyzed using the Gain standard through calculations with the Formula 1.

$$g = \frac{Final\ score - initial\ score}{The\ total\ score\ is\ the\ maximum\ score - the\ initial\ score} \quad (1)$$

The calculation results will then be interpreted based on the following categories:

Table 9. Standard Criteria gain Independent Learning

g value	Criteria
g ≥ 0.7	Height
0.7 > g > 0.3	Currently
g ≤ 0.3	Low

Biology learning activities on biodiversity material carried out in experimental classes using modules discovery learning based on Gunungkidul beach and control class without using modules. Learning activities are directly observed from start to finish. Observations were made to find out whether or not one syntax was implemented in learning activities. Observation analysis will be calculated using the following formula:

$$Execution = \frac{\sum Implemented\ Learning\ Syntax}{\sum Total\ Learning\ Syntax} \times 100\% \quad (2)$$

The results of the calculations are then followed by a descriptive statistical analysis consisting of an analysis of the causal factors and constraints encountered during the process of implementing biology learning activities on biodiversity material. The results of the analysis calculations are then interpreted based on the score category as shown in Table 10.

Table 10. Interpretation of the Learning Implementation Score

Score Interpretation (%)	Category
86 – 100	Very good
76 – 85	Good
60 – 75	Pretty good
55 – 59	Not good
≤ 54	Very Less Good

The increase in student learning interest and independence obtained from the treatment and control classes is known by parametric statistical tests of interval and ratio data using the assisted manova test software SPSS. Then proceed with converting ordinal data into intervals first using Method of Successive Interval (MSI) on Microsoft excel.

The implementation of the Manova test begins with normality and homogeneity tests. The normality test was carried out to find out whether the data came from a normally distributed population or not. The normality test was performed using Shapiro-wilk help software SPSS. The data is said to be normal if the significance level is more than 0.05.

The manova test carried out aims to find out whether the media module discovery learning based ecotourism developed can increase students' interest in learning and independent learning simultaneously or not. Manova test analysis is carried out if all prerequisite tests, namely normality and homogeneity are met, which will then be tested independent sample t test.

Results and Discussion

The product developed in this research orients students to be able to carry out discovery-based learning activities by presenting learning material at the level of biodiversity including gene, species and ecosystem levels as well as presenting learning material for problems and solutions to biodiversity on the coast of Gunungkidul with a touch of the classification of living creatures that have been discovered. in that area. Gunungkidul coastal area.

The results of the initial analysis through interviews with class X biology subject teachers at SMA N 1 Depok Sleman stated that the product developed was in accordance with the basic competencies of class because the curriculum used is curriculum 13.

The results of the interviews also show that SMA N 1 Depok Sleman still uses conventional learning media such as biology textbooks as an alternative for independent student learning because access to their use is not limited by internet quota. This statement is in line with what was put forward by Juanda et al. (2021) the challenges and possibilities that occur in biology learning activities during the COVID-19 pandemic are learning activities that can be carried out flexibly having challenges of technical problems such as internet networks, another possibility is being able to provide training for students in carrying out independent learning but has challenges related to the ineffectiveness of learning activities due to visual and kinesthetic learning styles and possibilities that provide opportunities for teachers and students to learn various kinds of technology although this also provides challenges where there will be difficulties in provide lessons on biological concepts to students, especially for material that requires practical activities.

Table 11. Basic Competencies in Biology Class X

Basic competencies (cognitive aspect)	Basic competencies (affective aspect)
3.2 Analyze the various levels of biodiversity in Indonesia and their threats and conservation	4.2 presents the results of observations of various levels of biodiversity in Indonesia and proposed conservation efforts

Further analysis was carried out through the distribution of student needs questionnaires to find out other problems related to learning activities, namely related to learning models, learning media and students' interest and learning independence when participating in biology learning activities about biodiversity.

Figure 2. Directions By the Teacher Against Students to fill in the Student Needs Analysis Questionnaire

Figure 3. Filling the Needs Analysis Questionnaire Through *Google Form*

The results of the student needs questionnaire showed that 94% of students stated that they did not have a beach-based biology learning module, even though 79% of students stated that they were interested in reading biology texts. This means that there is a need for innovation in conventional learning media to increase student interest and independence in learning. This statement is in line with what Prawita & Prayitno (2019) stated: biology learning media in the form of generative learning-based modules that can effectively influence students' thinking abilities and reading motivation. The scientific approach used in learning activities is able to provide understanding and encouragement to students to search for, know and understand material from various sources, apart from that the use of the scientific approach in learning activities also aims to provide training to Students are able to organize and communicate concepts, laws or principles from the material they find.

The results of the analysis that has been carried out are then followed by product design activities, learning tools and evaluation tools used in the research. The results of the module framework plan discovery learning based on coastal ecotourism on biodiversity material in line with what was stated by Rizky et al. (2021) in a development research he had conducted, that the learning media developed were prepared based on a guide to the preparation of modules that contained syntax discovery learning, study of related material and practice questions about the material presented. Implementation of the product developed in learning activities in the experimental class using the Gunungkidul beach-based Discovery Learning module. Meanwhile, the control class used the 5M learning model for three meetings using a biology textbook. The results of the learning device design in this research are in line with the stages of learning media development that have been carried out (Rizky et al., 2021).

The design of the evaluation tool used in this research is in the form of pre-test post-test questions in the form of multiple choices totaling 20 items to see learning outcomes, distribution of interest and independence questionnaires in learning, practicality questionnaires, and student response questionnaires to products developed in experimental classes and control class as well as observation sheets for learning implementation. This statement is in line with that stated by Suciyati & Adian (2018) that the first stage of designing biology learning modules in learning plant morphology and anatomy is to create a basic reference test through preparing and presenting questions. as an evaluation tool for products being developed.

The design results that have been carried out are then continued at the development stage. The activities carried out at this stage are evaluating the feasibility of the product by validators and practitioners and looking at the readability of the product by class XI MIPA students at SMA N 1 Depok Sleman as explained in Table 12.

Table. 12 Results of Module Eligibility Analysis by Media Members

Aspect	Score	Average	Mark	Category
Learning	8	4	100	Very Worth it
Material	9	3	100	Very Worth it
Visual	13	3	81	Very Worth it

Table 12 states that the product developed is very suitable for use in learning activities. This statement is in line with what was stated by Sunarsih et al. (2020) that learning modules based on local potential in biodiversity material are suitable for use in learning activities based on validator assessments on aspects of content presentation and language. Dewi & Listyarini (2022) also stated that the green chemistry-based practicum module is very suitable for use in learning activities, because the quality, use of language and practicality of the learning media developed has an

organized format of use, presentation, has appeal, provides motivation and presents writing. by using fonts and sizes that are clear and easy to read. The results of the feasibility of the Discovery Learning module on Biodiversity material based on Gunungkidul beaches are also in line with the interpretation of assessment (Riduwan, 2013).

Table 13. Results of Analysis of Module Feasibility Assessment by Material Experts

Aspect	Score	Rate-Rata	Mark	Category
Material eligibility	22	4	92	Very Worth it
Material Accuracy	16	4	100	Very Worth it
Didactic	20	3	83	Very Worth it
Construction	31	3	86	Very Worth it
Technical	9	3	100	Very Worth it

Table 13 states that the product developed is very suitable for use. This statement is in line with what was stated by Haka et al. (2020) that learning media in the form of biology learning modules based on local wisdom from West Lampung are suitable for use in learning activities because the presentation of material concepts based on the references used is very interesting, and the presentation of images and sentences used in The learning media developed is very interesting based on the assessment of material experts. Obtaining a feasibility score based on the assessment of material expert validators is also in line with the interpretation of the assessment based on references (Riduwan, 2013).

Further validation was carried out on learning tools, learning media, interest and independence questionnaires in learning, and product practicality questionnaires after learning in the experimental class as well as student response questionnaires to products developed after learning. The questionnaire instrument was validated qualitatively by learning experts who understand the substance or material being tested on students. The validation process was carried out using face validity. Then the validation results are corrected according to the validator's suggestions and comments.

The implementation of learning activities is adapted to the Discovery Learning syntactic model which consists of providing stimuli, identifying problems, collecting data, processing data, proving, and finally the syntax of drawing conclusions. Meanwhile, the control class is adapted to the syntax of the 5M learning model, namely observing, asking questions, gathering information, associating and communicating biodiversity issues that are studied using learning media in the form of printed books. Apart from that, the syllabus for the experimental class and control class based on the aspect of content presentation has a compatibility between the material and indicators of competency achievement as well as a compatibility between core competencies and basic competencies. The learning tool in the form of a syllabus used in physics learning activities based on the Discovery Learning approach with the help of a virtual laboratory, obtained an average percentage of 90%, meaning the syllabus designed for learning activities is very valid and reliable. for learning activities. The results of the feasibility of the RPP obtained in this development research are also in line with the assessment criteria based on (Riduwan, 2013).

Table 14. Results of the validation analysis of the Learning Interest Questionnaire

Aspect	Score	Average	Mark	Category
Material	13	3	81	Very Worth it
Construction	19	4	95	Very Worth it
Language	11	4	92	Very Worth it

Table 14 states that the interest in learning questionnaire instrument is very suitable for use in this research, and is in accordance with the assessment criteria based on Riduwan (2013) reference. This is thought to be because the interest in learning questionnaire contains personal aspects that are able to see students' feelings of enjoyment in participating in learning activities, psychological aspects that are able to see how students carry out their responsibilities, learning activities as well as situational aspects that are able to see how students pay attention in activities. This statement is in line with what was stated by Ningrum & Ridlo (2018) that before being used in a subject, student interest instruments need to be reviewed by an expert, this aims to obtain the feasibility or validity of the instrument to be used.

Table 15. Results of the Analysis of Learning Independence Questionnaire Validation

Aspect	Score	Average	Mark	Category
Material	15	4	94	Very Worth it
Construction	19	4	95	Very Worth it
Language	12	4	100	Very Worth it

Table 15 states that the student learning independence questionnaire instrument is very suitable for use to determine the effect of the product being developed, and is in accordance with the assessment criteria based on (Riduwan, 2013). The results of the feasibility analysis are suspected because the instrument contains aspects that are able to measure learning motivation such as students' desire to learn independently, students' self-confidence such as their

confidence in the results of work carried out independently and evaluations carried out, and being able to see or monitor the ability of learning outcomes. students independently. This statement is in line with that stated by Brata et al. (2021) where student learning independence is seen using the Fishers self-directed learning questionnaire which contains aspects of self-management, desire to learn, and self-directed learning. control is able to see how time management is carried out by students in learning activities, students' interest in participating in learning activities and carrying out learning independently, as well as how students use time in learning activities.

Table 16. Results of the Teacher Practicality Questionnaire validation analysis

Aspect	Score	Average	Mark	Category
Material	8	4	100	Very Worth it
Construction	20	4	100	Very Worth it
Language	12	4	100	Very Worth it

Table 16 states that the questionnaire instrument for the practicality of using the modules developed is very suitable for use with scores obtained in accordance with Riduwan (2013) assessment reference. The validation results of the questionnaire are thought to be due to the substance being able to see the practicality of the media being developed, through the formulation of statements that are in accordance with the objectives of the questionnaire, and in its construction the questionnaire was able to see the practicality of the media through the formulation of clear statements and complete ideas. This statement is in accordance with what was stated by Miaz et al. (2019) that testing the practicality of educational learning media can be carried out using a questionnaire instrument given to practitioners (teachers) and students, where the instrument is in the form of a questionnaire which is distributed containing aspects of assessing the ease of use of the media. learning, benefits obtained from learning media, displays, and time used in learning activities when using learning media.

Table 17. Results of Student Response Questionnaire validation analysis

Aspect	Score	Average	Mark	Category
Material	8	4	100	Very Worth it
Construction	19	4	95	Very Worth it
Language	12	4	100	Very Worth it

Table 17 states that the questionnaire instrument for student responses to the product being developed is very suitable for use, and the assessment scores obtained are in accordance with the interpretation according to Riduwan (2013). Obtaining the feasibility of the student response questionnaire is thought to be due to the suitability of the statements between the students' class level, clear instructions for filling in, the formulation of statements using good and correct language and the formulation of statements in accordance with the measurement objectives of the questionnaire used. This statement is in line with what was stated by Mumpuni et al. (2022) that to find out students' responses to the development of learning modules to study biodiversity related to efforts to preserve local wisdom through distributing questionnaires to find out its shortcomings. on the learning media developed, the attractiveness of the learning media developed, students' understanding of the material through the learning media developed and to find out students' suggestions and opinions regarding the learning modules developed.

Next, what needs to be validated is the knowledge test instrument for students which consists of a pre-test and post-test. This instrument was validated in two stages, namely qualitatively with validators or expert lecturers, then continued with empirical testing using the CRT (criterion referenced test) method. This statement is in line with that stated by Widi (2021) where tests are a tool used in educational assessment in terms of the knowledge, skills, intelligence and attitudes possessed by each individual. The types of tests used in education consist of performance tests, norm reference tests (NRT) and criterion reference tests (CRT), the types of tests used in CRT are pretesting, formative tests, testing diagnostic and summative testing and in experimental research usually in the form of a pre-test and post-test. The results of statistical tests on the pre-test and post-test questions show that the questions used in the research are valid, based on the average of the pre-test item validity test results, R count (0.465) > from R table (0.329) as well as on the questions. post-test where the calculated R (0.424) > the R table (0.329) based on the reliability coefficient (Cronbach alpha) using SPSS as shown in Table 18.

Table 18. Results of the Analysis of the Reliability Coefficient of the Problem

Reliability Statistics Pre test		Reliability Statistics Post Test	
Cronbach's Alpha	N of Items	Cronbach's Alpha	N of Items
0.378	21	0.72	21

The validity of the test instrument was continued with a reliability analysis which stated that the pre-test questions in this study were reliable because the calculated R value (0.378) > R table (0.329), as did the results on the post-test questions. where the results of the Cronbach's alpha statistical test show calculated R (0.725) > R table (0.329). This statement is in line with that stated by Hadi & Manurung, (2019) that the pre-test

questions are said to be reliable because the Cronbach's alpha statistical test results show R count (0.38) > R table (0.35) as well as post-test questions where R count (0.41) > (R table (0.35).

Furthermore, the previously validated product was tested on a limited basis at SMA N 1 Depok Sleman, to obtain assessments from practitioners or biology teachers for students in class X and class XI MIPA SMA N 1 Depok Sleman as explained below:

Table 19. Results of Media Assessment Analysis by Teachers

Aspect	Score	Average	Mark	Category
Learning	8	4	100	Very Worth it
Material	28	4	100	Very Worth it
Visual	14	4	88	Very Worth it

Table 19 states that the product developed is very suitable for use in learning activities, the assessment results obtained are in accordance with the feasibility interpretation according to (Riduwan, 2013). The assessment results obtained are thought to be because the Gunungkidul beach-based biodiversity material is presented according to learning indicators and basic competency material, apart from that the product developed is integrated with the Discovery Learning learning model which directs students to carry out learning activities independently, and can provide examples in close visual form. related to student activities in the environment around the students so that they are considered capable of attracting students' interest in carrying out learning activities. This statement is supported by Haka et al. (2020) the biology learning module based on local wisdom from West Lampung which was developed is very suitable for use in learning activities because the material is presented in language, the material components are integrated with local wisdom, learning objectives and the graphic components of learning media are very useful. interesting. This statement is in accordance with what was stated by Usman et al., (2019) that the ethnoscience-based science learning module developed is suitable for use in learning activities because the use of language that presents integrated ethnoscience material content in the module is very feasible. based on the assessment of science practitioners or teachers. Next, test the readability of the product through an assessment of 15 students of class XI MIPA SMA N 1 Depok Sleman based on the top 15 categories as follows:

Table 20. Results of Media Feasibility Analysis According to Students

Aspect	Score	Average	Mark	Category
Learning	101	3	79	Worth it
Material	315	3	82	Very worth it
Visual	244	4	95	Very Worth it

Table 20 states that the readability analysis of the product developed is very suitable for use in biology learning activities with score interpretation in accordance with Riduwan (2013) feasibility assessment reference. The analysis results obtained are thought to be because the aspects presented in the module have supported biology learning activities in terms of appearance, as well as the content and form of evaluation, then the product which is integrated with the Discovery Learning learning model also supports students' independent learning activities with a visual display that is closely related to the activity. students in the surrounding area. This statement is in accordance with what was stated by Sulaiman et al., (2019), the booklet based on macroscopic fungal diversity obtained a readability score from students of 89.6. This means that the learning media developed can be used as complementary material in biology learning activities which is in line with Im Toy et al. (2018) that the Discovery Learning learning model is a learning model that is able to make it easier for students to discover new knowledge through their own scientific process activities.

Next, the application of the product developed to see its effectiveness in increasing students' interest and independence in learning uses a quasi-experimental method with a non-equivalent pretest-posttest control group design by learning practitioners or biology teachers, and directly observed by researchers. This statement is supported by Syaifulloh et al. (2022)that the Discovery Learning learning model has a positive impact on students' science process skills and student learning outcomes in learning. This also received support from Fahmi et al. (2019) that learning activities that apply the discovery method enable students to understand important ideas from a scientific discipline because they provide direct experience to students, for example the use of teaching materials that present questions or problems that must be resolved.

The product effectiveness test begins with a descriptive analysis of learning interest which states that the standard deviation data between the experimental class and the control class includes homogeneous data. However, the results of descriptive statistical tests are not enough to know the effectiveness of the product in increasing students' interest in learning, because descriptive statistical tests are tests that do not provide conclusions. This statement is in accordance with what was descriptive statistical tests are tests that have methods and procedures, this test also aims to organize, summarize and describe the data that has been collected.

Table 21. Standard Analysis Results gain Student Learning Interest

Class	Average value		Average score*n-gain*	Category
	Pre-Test	Post-Test		
Experiment	51.33	54.58	0.07	Low
Control	50.78	49.39	-0.03	Low

The results of the analysis of learning interest based on standard gain in Table 21 show that the product developed has a big influence on the learning interest of experimental class students compared to the control class. This is thought to be due to the different learning models implemented. This statement is in line with what was stated by Dimitrov & Rumrill Jr (2003) randomize design method pre-test post-test control group which consists of experimental and control groups that have the same conditions but different treatment, can influence research results, The application of conventional learning models through student observation sheets, students saw an increase in student interest in learning by 60%, while the value obtained from implementing the Discovery Learning learning model through student observation sheets was 68.30%. This means that there is an increase in student interest in learning when using the Discovery Learning learning model by 8.30%.

Table 22. Results of Analysis of the Normality Test of Student Learning Interests

Class	Shapiro-Wilk			Category
	Statistics	Df	Sig.	
Pre experiment	0.91	36	0.00	Not Normal Distributed
Post Experimen	0.95	36	0.13	Normal Distributed
For Control	0.95	36	0.20	Normal Distributed
Post Control	0.84	36	0.00	Not Normal Distributed

Table 22 states that the significance value obtained, the data is not normally distributed because the significance value obtained is <0.05 so that the t test can only be continued with the Mann Withney non-parametric statistical test. This statement is in line with what was stated by Ali & Bhaskar (2016) the cause Parametric test results are not normally distributed when the normality assumption is not met. This is supported by Nahm (2016), in principle traditional statistical tests such as the t test and variance require the fulfillment of assumptions such as the data being normally distributed and having the same variance, but if these are not met then the steps taken are non-parametric statistical puzzles.

Table 23 is the result of the homogeneity test after the normality test which states that the significance value obtained is not homogeneous because the significance value is <0.05. This statement is supported by Ellizar et al. (2019) the homogeneity test results are 0.030 < 0.05, meaning the data is not homogeneous data. Test statistics used in determining module influence discovery learning based on Gunungkidul Beach in increasing student interest in class X MIPA 1 SMA N 1 Depok Sleman is a non-parametric test using mann withney, because the two prerequisite tests carried out previously did not meet the criteria. Test results mann withney the learning interest of class X MIPA 1 SMA N 1 Depok Sleman is presented in the Table 24.

Table 23. Results of the Homogeneity Test Analysis of Student Learning Interests

Parameters	Levene Statistic	df 1	df2	Say.
Based on Mean	5.54	3	140	0.00
Based on Median	5.58	3	140	0.00
Based on Median and with adjusted df	5.58	3	60.553	0.00
Based on trimmed mean	5.53	3	140	0.00

Table 24. Results of Non-Parametric Test Analysis Man Withney Based on Experimental Class Study Interest Data

Test Statistics[a]	
	Results of Learning Interest Based on Questionnaire
Mann-Whitney U	166.50
Wilcoxon W	832.50
WITH	-.54
Asymp. Sig. (2-tailed)	0.00

Table 24 states that the product developed in this research is effective in increasing students' interest in learning. This is thought to be due to the study of material and the integration of learning models that are appropriate to students' daily activities. This statement is in accordance with what was stated by (Jones & Christensen, 2022), biodiversity is the diversity of living creatures such as animals and plants that exist in the world or in a habitat which has an important role in life, supporting all life processes, while tourism is a socio-cultural and scientific phenomenon.

Table 25. Results of Non-Parametric Test Analysis Mann Withney based on Standard Score Data*Gain*

Test Statistics	
Score Result Gain Interest in Learning	
Mann-Whitney U	263.50
Wilcoxon W	929.50
WITH	-4.34
Asymp. Sig. (2-tailed)	.00

The results of the non-parametric Mann Whitney test in this study were carried out twice, namely based on a questionnaire and a standard score. Table 36 also states that the products developed have an influence on increasing students' interest in learning, which is supported by Rosnidar et al. (2021) that learning activities carried out using the Discovery Learning model are able to increase students' interest in learning, because the Discovery Learning model is able to encourage students to identify and search for information about the problems they want to know, thereby helping students to build the knowledge they already have. This is in line with Tohir's (2022) statement that motivation is one of the things that plays an important role in encouraging someone to do something actively, and

Ali & Bhaskar (2016) Mann Withney non-parametric statistical test is a statistical test which aims to test the 0 hypothesis for both samples if they have the same median value or as an alternative statistical test if one of the observed samples tends to be larger than the other sample, In their writing, Ali & Bhaskar also state that this test is a test carried out to compare data X and Y and is a test to calculate the probability of X > Y through hypothesis 0 which states that P (X > Y) = p (X < Y) = ½ while the alternative hypothesis is p (X > Y) ≠ ½ .

Module effectiveness discovery learning on increasing student learning independence was also measured using a questionnaire filled in by students before and after participating in learning activities. The effectiveness test begins with a descriptive test states that the data obtained from the descriptive test is homogeneous data, however this test cannot provide conclusions regarding the effectiveness of the product which is in line with the statement of Kaliyadan & Kulkarni (2019) descriptive analysis is a statistical test which provides a summary of an observed sample without providing a conclusion even though its primary goal involves inferential statistics.

Table 26. Standard Analysis Results gain Student Learning Independence

Class	Average Value		N-gain Score	Category
	Pre Test	Post Test	average	
Experiment	50.50	58.11	0.14	Height
Control	45.19	48.33	0.05	Low

The next test is the standard test, table 38 states that the product developed has a significant effect on student learning independence, this is thought to be because the product developed is integrated with the discover learning model. This statement is in line with what was stated by Saptarini et al. (2022) that the Discovery Learning model can influence students' metacognition, this is because the Discovery Learning model provides opportunities for students to be directly involved in developing and solving a problem which can make students easily identify errors. correct errors found and easily correct method errors made in independent learning activities.

Table 27. Results of the Analysis of Student Learning Independence Normality Test

Class	Shapiro-Wilk			Category
	Statistics	Df	Say.	
Pre Experiment	0.986	36	0.927	Normal Distributed
Post Experiment	0.951	36	0.109	Normal Distributed
Pre Control	0.954	36	0.142	Normal Distributed
Post Control	0.965	36	0.301	Normal Distributed

The effectiveness of the product in increasing learning independence this time was also measured using the MANOVA statistical test which began with normality and homogeneity tests as prerequisite tests. Table 39 states that the significant value obtained indicates that the data is normally distributed, because the obtained value is > 0.05 in accordance with Fauzi & Respati (2021), the normality test results obtained > 0.05 indicate that the data is normally distributed. Next, a t test was carried out to determine the effectiveness of the product developed in increasing student learning independence using a homogeneity test.

Table 28. Results of Analysis of Student Learning Independence Homogeneity Test

Test of Homogeneity of Variances				
	Levene Statistic	df1	df2	Say.
Based on Mean	2.13	3	140	0.09
Based on Median	1.89	3	140	0.13
Based on Median and with adjusted df	1.89	3	121.262	0.13
Based on trimmed mean	2.12	3	140	0.10

The next analysis shown in table 41 states that the data obtained is homogeneous data because the value obtained is > 0.05. Based on this statement, testing the product's effectiveness in increasing learning independence can be carried out using the Independent Sample T Test parametric test.

Table 29. Test Analysis Results Independent Sample T Test Based on the Answers to the Learning Independence Questionnaire

Independent Sample Test		F	Say.	T	Df	Say. (2-tailed)
Results of the Questionnaire	Equal variances assumed	0.93	0.33	8.41	70	0.00
Independent learning	Equal variances not assumed			8.41	69.38	0.00

Table 29 states that the product developed is effective in increasing learning independence, because the significance value obtained is <0.05, this is thought to be because the presentation of the product is in accordance with the design of the discovery learning model which is superior in providing experience for students to be directly involved in learning activities, which supported by Khairani & Prodjosantoso (2023) that learning activities carried out using the Discovery Learning model are able to increase the percentage of student activity. The integrated biology learning module of the Discovery learning model can help students understand plant material independently or in groups, and is able to direct students to be active in learning activities supported by Kasman & Suhartini (2022) sig acquisition. The 2-tailed test obtained using the independent sample t test is 0.04 < 0.05. This means that there is a significant influence on students' learning independence when using the Spermatophyta module compared to printed books in learning activities.

The influence of the product on student learning independence this time is supported by learning results which show that the experimental class is higher than the control class which is thought to be due to the latest twist on conventional products being developed. Discovery learning model with a laboratory-based videos can improve student learning outcomes compared to conventional learning models.

A product that is effective in increasing interest and independence in learning is also very practical to use in learning activities based on the results of completing teacher questionnaires. This is thought to be because the design, size and use of sample images can be found in the school environment. and even in the environment around students which is supported by Aprilia & Harlita (2022) e-module which is an integrated learning model Discovery Learning which is practically used in biology learning on environmental change material based on teacher assessment which includes several aspects, namely, benefits, presentation of material and appearance and in line with the statement of Prihandono et al. (2017) that science learning modules based on local potential are very practical to use in learning activities. Apart from that, the product developed received a very good response from students which is in line with the statement of Wulandari et al. (2016), the results of fulfilling the student response questionnaire to the integrated learning module using the Discovery Learning approach on algebra function limits after learning obtained a score of 3.03 on a scale of 4. The acquisition value shows that the learning module has good criteria and is effectively used in learning activities.

Teaching and learning activities in this research were analyzed based on the results of observers' observations during the activities where learning activities between the experimental class and the control class could be carried out in their entirety but there were still obstacles such as very limited learning time due to adjustments to the post-COVID-19 pandemic situation, and the school environment which is under renovation. This statement is in line with what was stated by Asyrofahnti et al. (2018) that school facilities such as laboratories and school gardens play a role in biology learning activities, where laboratories can be used as an alternative for class X biology learning activities.

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Conclusion

Gunungkidul beach-based discovery learning module products on biodiversity material are suitable

for use in learning activities based on teacher assessment results ranging from 88-100 in the very appropriate category, and students ranging from 79-95 in the appropriate to very appropriate category. The resulting learning media products are also included in the practical category based on teacher and student assessments which range between 95-100. The feasibility and practicality of the product produced also states the effectiveness of the product in increasing students' interest in learning based on parametric test results of 0.00 <0.05, and student learning independence based on non-parametric test results of 0.00 <0.05, which means that the product produced has an effect on increasing class students' interest and learning independence. X SMA N 1 Depok Sleman Yogyakarta.

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The author states that the data published in this article, including the collection, analysis and interpretation of data, in writing the manuscript and in the decision to publish research results, there is no conflict of interest with any party.

Reference

Ali, Z., & Bhaskar, S. B. (2016). Basic statistical tools in research and data analysis. *Indian Journal of Anaesthesia*, *60*(9). https://doi.org/10.4103/0019-5049.190623

Aprilia., U. W., & Harlita., K. P. (2022). Validity and Practicality of Discovery Learning E-Modules on environmental change material to Empower Critical Thinking Skills. *Jurnal Penelitian Pendidikan IPA*, *8*(3). https://doi.org/10.29303/jppipa.v8i3.1726

Arbangi, D., & Umiarso. (2016). *Manajemen Mutu Pendidikan* (D. Arbangi & M. M. P. Umiarso (Eds.)). Kencana.

Ardan, A., M., A., Yusmina., H., Amiruddin., S., & D, D. G. (2015). Needs Assessment to Development of Biology Textbook for High School Class X-Based the Local Wisdom of Timor. *International Education Studies*, *8*(4), 52–59. Retrieved from https://eric.ed.gov/?id=EJ1060901

Asyrofahnti, N., Rahayu, E. S., & Dewi, N. K. (2018). Analysis on utilization of biology laboratory and school environment in biology learning for tenth grade students of senior high school in Jepara Regency. *Journal of Innovative Science Education*, *7*(2), 136–144. https://doi.org/10.15294/jise.v7i2.23792

Bhardwaj, A. (2016). Importance of Education in Human Life: a Holistic Approach. *International Journal of Science and Consciousness*, *2*(2), 23–28. Retrieved from https://shorturl.asia/F8dgR

Borba, M. C. (2021). The future of mathematics education since COVID-19: humans-with-media or humans-with-non-living-things. *Educational Studies in Mathematics*, *108*, 385–400. https://doi.org/10.1007/s10649-021-10043-2

Brata, W. W. W., Wibowo, F. C., & Rahmadina, N. (2021). Implementation of discovery learning in a digital class and its effect on student learning outcomes and learning independence level. *F1000Research*, *10*(386), 386. https://f1000research.com/articles/10-386

Dewi, N. K., & Listyarini, R. V. (2022). Development of Green Chemistry-Based Practicum Module for Senior High School to Promote Students' Environmental Literacy. *Jurnal Pendidikan Sains Indonesia*, *10*(3), 641–653. Retrieved from https://jurnal.unsyiah.ac.id/JPSI/article/view/25163

Dimitrov, D. M., & Rumrill Jr, P. D. (2003). Pretest-posttest designs and measurement of change. *Work*, *20*(2), 159–165. Retrieved from https://content.iospress.com/articles/work/wor00285

Ellizar, E., Putri, S. D., Azhar, M., & Hardeli, H. (2019). Developing a discovery learning module on chemical equilibrium to improve critical thinking skills of senior high school students. *Journal of Physics: Conference Series*, *1185*(1), 12145. https://doi.org/10.1088/1742-6596/1185/1/012145/meta

Fahmi, F., Setiadi, I., Elmawati, D., & Sunardi, S. (2019). Discovery learning method for training critical thinking skills of students. *European Journal of Education Studies*. https://doi.org/10.46827/ejes.v0i0.2540

Falaha., Z. F., & Samsudi., P. A. P. B. (2021). *The*

Effectiveness of Discovery Learning Model using Audio-Visual Media (Vol. 10, Issue 1, pp. 32 – 38). https://doi.org/10.15294/jpe.v10i1.33827

Fauzi, A., & Respati, D. K. (2021). Development of Students' Critical Thinking Skills Through Guided Discovery Learning (GDL) and Problem-Based Learning Models (PBL) in Accountancy Education. *Eurasian Journal of Educational Research*, *95*, 210–226. https://doi.org/10.14689/ejer.2021.95.12

Haka, N. B., Anggoro, B. S., Hamid, A., Novitasari, A., Handoko, A., & Puspita, L. (2020). The Development of Biology Module Based on Local Wisdom of West Lampung: Study of Ecosystem Material. *Journal of Physics: Conference Series*, *1467*(1), 12013. https://doi.org/10.1088/1742-6596/1467/1/012013

Hakimovich, H. N., Khodiyevna, R. R., Mustafakulovna, M. O., & Narzulloevna, A. S. (2019). Education System Mission In The Conditions Of Civil Society Development. *Journal of Critical Reviews*, *7*(5). https://doi.org/10.31838/jcr.07.05.173

Im Toy, B. A., Karwur, F. F., Costa, J. F., Langkun, J. F., & Rondonuwu, F. S. (2018). Design of biology teaching materials based on discovery learning with scientific approach for class 10th in senior high school. *Biosfer: Jurnal Pendidikan Biologi*, *11*(1), 68–77. https://doi.org/10.21009/biosferjpb.11-1.7

Johnson, R., & Burke., C. L. (2014). *Educational Research: Quantitative, Qualitaive, and Mixed Approaches* (5th ed.). London: Sage Publication.

Jones, M. E., & Christensen, A. E. (2022). Learning to Read. In *Constructing Strong Foundations of Early Literacy* (pp. 33–46). Routledge. Retrieved from https://api.taylorfrancis.com/content/chapters/edit/download?identifierName=doi&identifierValue=10.4324/9780429284021-3&type=chapterpdf

Juanda, A., Shidiq, A. S., & Nasrudin, D. (2021). Teacher Learning Management: Investigating Biology Teachersâ€TM TPACK to Conduct Learning During the Covid-19 Outbreak. *Jurnal Pendidikan IPA Indonesia*, *10*(1), 48–59. https://doi.org/10.15294/jpii.v10i1.26499

Junina, I., & Halim, A. (2020). The effect of discovery learning-based worksheet on students' metacognition skill and learning outcomes. *Journal of Physics: Conference Series*, *1460*(1), 12100. https://doi.org/10.1088/1742-6596/1460/1/012100

Kaliyadan, F., & Kulkarni, V. (2019). Types of variables, descriptive statistics, and sample size. *Indian Dermatology Online Journal*, *10*(1), 82. https://doi.org/10.4103/idoj.IDOJ_468_18

Kasman, R., & Suhartini, S. (2022). Development of integrated spermatophyta module potential of local plants on students' independence and concept mastery. *Biosfer: Jurnal Pendidikan Biologi*, *15*(2), 332–343. https://doi.org/10.21009/biosferjpb.28085

Khairani, R. N., & Prodjosantoso, A. K. (2023). Application of Discovery Learning Model Based on Blended Learning to Activities and Learning Outcomes. *Jurnal Penelitian Pendidikan IPA*, *9*(10), 8974–8981. https://doi.org/10.29303/jppipa.v9i10.4402

Miaz, Y. Y., Miaz, Y., Kenedi, A. K., Monfajri, S. W., & Helsa, Y. (2019). Educative learning media for elementary school students. *5th International Conference on Education and Technology (ICET 2019*, 722–727. https://doi.org/10.2991/icet-19.2019.173

Mumpuni, K. E., Susilo, H., Rohman, F., & Ramli, M. (2022). Designing a module for learning plant biodiversity: An effort for conservation of local wisdom. *Biosfer: Jurnal Pendidikan Biologi*, *15*(1), 85–96. https://doi.org/10.21009/biosferjpb.22663

Nahm, F. S. (2016). Nonparametric statistical tests for the continuous data: the basic concept and the practical use. *Korean Journal of Anesthesiology*, *69*(1), 8–14. Retrieved from https://synapse.koreamed.org/articles/1156310

Ningrum, E. B. M. S., & Ridlo, S. (2018). Development of Assessment Instrument Android-Based Studentsâ€TM Interest In Learning Mathematics SMP With CPS Model. *Journal of Research and Educational Research Evaluation*, *7*(2), 181–188. https://doi.org/10.15294/jere.v7i2.25436

Prawita, W., & Prayitno, B. A. (2019). Effectiveness of a Generative Learning-Based Biology Module to Improve the Analytical Thinking Skills of the Students with High and Low Reading Motivation. *International Journal of Instruction*, *12*(1), 1459–1476. Retrieved from https://eric.ed.gov/?id=EJ1201245

Prihandono, T., Waahyuni, S., & Pamungkas, z S. (2017). Development of Module Based on Local Potential Integrated SETS in Junior High School. *The International Journal of Social Sciences and Humanities Invention*, *4*(9), 3939–3944. https://doi.org/10.18535/ijsshi/v4i9.07

Rahmatin, N., Pramita, D., Sirajuddin, S., & Mahsup, M. (2019). Pengembangan Modul Pembelajaran Bangun Ruang Dengan Metode Creative Problem Solving (CPS) Pada Siswa Kelas VIII SMP. *JTAM (Jurnal Teori Dan Aplikasi Matematika*, *3*(1), 27–33. https://doi.org/10.31764/jtam.v3i1.760

Riduwan. (2013). *Skala Pengukuran Variabel Penelitian*. Bandung: CV Alfabeta.

Rizky, S. A., Mulyaningsih, N. N., & Bhakti, Y. B. (2021). Development of discovery learning based physics learning module in energy discussion. *Jurnal Pendidikan Dan Pembelajaran*, *28*(1), 1–6. Retrieved from https://pdfs.semanticscholar.org/5980/9518157b2

5ace9ac4b97f8fa67d04485cd58.pdf

Rosnidar, R., Yusrizal, Y., Mustafa, M., & Susanna, S. (2021). Application of Discovery Learning Model in Increasing Student Interest and Learning Outcomes. *Jurnal Penelitian Pendidikan IPA*, *7*(4), 542–548. https://doi.org/10.29303/jppipa.v7i4.745

Saptarini, D., Sukirman, & Santoso. (2022). The Effectiveness of Discovery Learning Model on Students' Metacognitive. *ANP Journal of Social Science and Humanities*, *3*, 40–46. https://doi.org/10.53797/anp.jssh.v3sp2.5.2022

Spatioti, A. G., Kazanidis, I., & Pange, J. (2022). A comparative study of the ADDIE instructional design model in distance education. *Information*, *13*(9), 402. https://doi.org/10.3390/info13090402

Subali, B. (2016). *Pengembangan Tes Peserta Penyelidikan Validitas dan Reliabiitas secara Empiris*. UNY Press.

Suciyati, A., & Adian, T. (2018). Developing the fun and educative module in plant morphology and anatomy learning for tenth graders. *JPBI (Jurnal Pendidikan Biologi Indonesia*, *4*(1), 53–60. https://doi.org/10.22219/jpbi.v4i1.5334

Sunarsih, S., Rahayuningsih, M., & Setiati, N. (2020). The Development of Biodiversity Module Using Discovery Learning Based on Local Potential of Wonosobo. *Journal of Innovative Science Education*, *9*(1), 1 – 11. https://doi.org/10.15294/jise.v8i1.31178

Syaifulloh, M., Indana, S., & Agustini, R. (2022). Profile of the Implementation of Discovey Learning Model in Science Learning. *IJORER: International Journal of Recent Educational Research*, *3*(1), 71–87. https://doi.org/10.46245/ijorer.v3i1.187

Tohir, A. (2022). Learning Interest and Discipline on Learning Motivation. *International Journal of Education in Mathematics, Science and Technology*, *10*(2), 424–435. https://doi.org/10.46328/ijemst.2290

Widi, W. E. (2021). *Teori dan Praktik Penelitian Kuantitatif, Kualitatif, PTK, R & D*. Jakarta: Bumi Aksara.

Wulandari, S. P., Budiyono, B., & Slamet, I. (2016). The development of learning module with discovery learning approach in material of limit algebra functions. *Proceeding of ICMSE*, *3*(1), 165. Retrieved from https://scholar.archive.org/work/msl5b6eco5a33ou2fvqx276fwi/access/wayback/https://journal.unnes.ac.id/sju/index.php/icmse/article/download/13407/7392/