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Development of an Ethnoscience-Based Teaching Module on Incung Kerinci Batik as a Learning Resource for Biology of Plant Material (Plantae)

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Abstract: Ethnoscience can be used and integrated into various learning models, one of which is the 21st century learning model in the form of a Project based learning (PjBL) learning model with an ethnoscience approach. This research was conducted in Kerinci Regency and Sungai Banyak City, precisely at SMA Negeri 1 Sungai Banyak and the Kerinci Incung batik studio, this study aims to produce ethnoscience-based teaching modules that can improve students' understanding of plants through a local cultural approach. The research method used is the ADDIE development model, the results of the material expert validation were 98.60% and the results of the media expert validation were 96.30% with a very valid category and feasible to be applied. Continued with product trials using random sampling data collection techniques and involving classes XA and % with practical and very practical categories. Practicality tests were also conducted on six biology teachers in class X obtained with percentages, namely: 75%; 100%; 91.25%; 93.75%; 89.16%; and 95.41% with an average category of very practical.

Keywords: Development; Ethnoscience; Teaching modules; Kerinci Incung Batik; Plants

Introduction

21st century learning is learning that emphasizes critical thinking skills, creative thinking and the ability to solve problems in learning activities. 21st century learning has various learning models, such as Problem based learning (PBL) and Project based learning (PjBL) learning models. These learning models can be integrated into various learning resources such as ethnoscience-based teaching modules, media and various other interesting learning resources. Ethnoscience can be used and integrated into various learning models, one of which is the 21st century learning model in the form of the Project based learning (PjBL) learning model with an ethnoscience approach (Ardianti & Raida, 2022). So that it can provide effective learning. The Project based learning (PjBL) learning model is a 21st century learning model that is creative, innovative and contextual which can provide opportunities for students to design and create assignments in the form of projects about the material being studied (Darling-Hammond et al., 2020).

In addition, the Project Based Learning (PjBl) learning model focuses more on students' understanding of concepts and problem solving in learning activities and students create an assignment or project and the final result is a project worked on by students based on study groups (Rehman et al., 2023). According to Dewi et al. (2021), students' science and biology learning outcomes can be improved through an ethnoscience-based approach because it is easier to understand. According to Anam et al. (2022); Susanto et al. (2022) local wisdom must continue to be preserved by society and the younger generation today so that it does not become extinct. Purnamawati et al. (2022), stated that in order for local wisdom to be preserved, it must be carried out wholeheartedly, such as being internalized, practiced, taught and introduced to the next generation so that it can form behavioral patterns between humans and with the universe. Original scientific knowledge in the form of local wisdom is very important and needs to

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be studied and socialized because local wisdom can provide a positive contribution to students and teachers (Hikmawati et al., 2021). Hossain (2024); Oktavianti & Ratnasari (2018), emphasized that traditions and cultures in society can be used as learning resources based on local knowledge in the learning process.

The science learning process in schools is not linked and combined with indigenous science that has local wisdom values, resulting in knowledge about science not developing and scientific science is still universally recognized as true (Chakravartty, 2023; Mieg, 2022; Rikizaputra et al., 2022). According to Febrian et al. (2024); Parmin & Fibriana (2019); Suastra et al. (2021), this happens because teachers are weak in linking, reconstructing and transforming indigenous science knowledge into scientific science so that meaningful learning is difficult to realize. Learning in schools is more guided by learning achievements and learning objectives contained in the independent curriculum and teachers use teaching modules as an addition to the learning resources used (Tomi et al., 2018). Some problems found in today's era, especially in the field of education, only focus on scientific concepts that are studied without being accompanied by the concept of local wisdom (Fischer et al., 2023; Sivakumar et al., 2023; Treve, 2021).

The values of local wisdom have been marginalized and are starting to fade in society. Most people do not recognize local wisdom and cultural values because of the influence of very sophisticated and very rapid technological developments so that local wisdom values are no longer considered by both society and in the world of education such as in schools in Kerinci Regency and Sungai Penuh City, causing local wisdom to be unknown in society. The results of observations at SMA Negeri 1 Sungai Penuh City, which has begun to implement the independent curriculum in its implementation, require additional learning resources that can support existing learning resources, such as teaching modules in biology learning. Additional teaching modules are indeed needed in the implementation of the independent curriculum, where learning resources are quite limited and most students have to find their own learning resources on the internet and subject teachers allow students to access various learning resources via the internet, in order to be able to add to previously existing learning resources.

Therefore, in SMA Negeri 1 Kota Sungai Penuh, teachers and students are not only focused on one learning resource but many learning resources are used, such as textbooks, teaching modules, LKS, LKPD and learning resources from the internet that can be accessed by teachers and students. The above problems can be overcome through the application of ethnoscience which can encourage teachers and education practitioners to teach science based on the culture and local wisdom possessed by the community. So that students can understand and recognize local wisdom and apply the knowledge learned in school to be applied in everyday life. Through the development of ethnoscience-based teaching modules in the form of Kerinci incung batik in this study, further development will be carried out regarding the development of ethnoscience-based teaching modules as a learning resource.

By using teaching modules, it is hoped that the material studied will be focused on what is being studied because in the teaching module only one specific material is studied, namely plants and plant classification, both Monocotyledoneae plants and Dicotyledoneae plants. Based on the background description, it is necessary to conduct research on "Development of ethnoscience-based teaching modules on Kerinci incung batik as a learning resource for plant biology (Plantae)".

Method

The research and development model used is the ADDIE model. The ADDIE model stands for Analyze, Design, Development, Implementation, and Evaluation. This model can be used for product development such as learning strategies, models, learning methods, teaching materials, and media. The reason researchers chose this development model is because this model is very simple but the process is systematic in designing learning materials that can be applied to face-to-face learning in class or online learning. The ADDIE development procedure consists of five stages as shown in the image below, namely: Analysis, Design, Development, Implementation, and Evaluation. The ADDIE development research design as seen in Figure 1.

The subjects of the trial in this study were students of class X of SMAN 1 Sungai Penuh in the odd semester of the 2023/2024 academic year (class XA - XL). The subjects were divided into two classes consisting of superior and non-superior classes, namely, class XA which consisted of 36 people and was a superior class and class XC which consisted of 36 people and was a regular/non-superior class, the research sample was taken by random sampling. Totaling 8 students for small group tests and 18 students for large group tests. By creating a lottery number containing the name of each class and carrying out a randomization process with the lottery number so that two class names were obtained which were used as trial subjects, namely classes XA and XC. To conduct a product trial in the form of a teaching module, product implementation was carried out in classes XA and XC which used learning with a teaching

module based on Kerinci batik incung ethnoscience as a source of learning biology for plant material (Plantae) and using the Project based learning (PjBL) learning model.

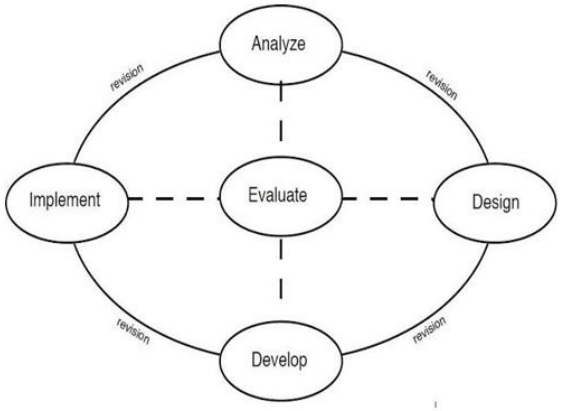

Figure 1. ADDIE Development Model

Data collection techniques are techniques or methods used by researchers to collect data related to the problems of the research they are taking, some data collection techniques in this study are observation, interviews, tests, and documentation. While the instruments in this development research are questionnaires, observation sheets, interview sheets and pretest and posttest question sheets. The data analysis techniques used are qualitative descriptive analysis and quantitative descriptive analysis. Qualitative descriptive analysis is a data processing technique by grouping several pieces of information in the form of input, criticism, and suggestions for improvement that are appropriate in the questionnaire and quantitative descriptive analysis is used to analyze data on the validity, practicality, and effectiveness of the teaching module. Analysis of the validity test results using the Likert Scale and the validity level formula, while the analysis of the practicality test results using the Likert Scale and the practicality level formula and the Gain Normality test (N-Gain Test) using the formula used to calculate the gain normality according to Munawati et al. (2022), this test is used to determine the effectiveness of the treatment given by the teacher to students.

Result and Discussion

Analysis Stage (Analyze)

The analysis stage aims to see the picture of field conditions related to the learning process on the Spermatophyta plant material for class X students at SMA Negeri 1 Sungai Penuh. The process carried out is learning resource analysis, curriculum analysis, and needs analysis. Based on the results of the learning resource analysis, information was obtained that: biology learning at SMA Negeri 1 Sungai Penuh uses an independent curriculum; the learning process uses teaching modules designed by biology subject teachers along with LKPD, printed books and LKS and teachers do not require students to use only one learning resource and students are free to access and use additional learning resources on the internet; Teachers and students are not only focused on one learning resource but also use many additional learning resources from outside printed books, teaching modules and LKS.

The teaching module used by biology subject teachers only focuses on scientific studies in it and does not introduce local wisdom owned by the local community so that students are unable to recognize local wisdom in the area, with the development of ethnoscience-based teaching modules about Incung Kerinci batik as a learning resource on Spermatophyta plant material can help students in recognizing and understanding biology in a unique way, namely through the Incung Kerinci batik motif in the form of Spermatophyta plant motifs. The student needs analysis questionnaire showed that many students had difficulty in learning biology and had difficulty understanding Spermatophyta plant material and most students did not recognize plants around the school, because teachers only provided material with lecture methods in class and continued with giving practice questions to students (Liu et al., 2023; Loughlin & Lindberg-Sand, 2023).

In addition, In'am et al. (2022); Mahmudah et al. (2022) teachers use self-designed teaching modules and use various additional learning resources, but the learning resources used only focus on Spermatophyta plant material or scientific science, without being combined with ethnoscience elements in the form of Incung Kerinci batik around the school environment and if this can be combined, then it can be a new breakthrough or something new for teachers in explaining Spermatophyta plant material to students in class, so that students can easily understand plants through the intermediary of the Incung Kerinci batik motif which uses many plant motifs in it and is combined with the Incung Kerinci script. Based on the results of the curriculum analysis, there are learning outcomes (CP) for Senior High School Biology Class X: At the end of phase E, students have the ability to respond to global issues and play an active role in providing problem solving.

These abilities include observing, questioning and predicting, planning and conducting research, processing and analyzing data and information, evaluating and reflecting, and communicating in the form of simple projects or visual simulations using available technology applications related to alternative energy, global warming, environmental pollution, nanotechnology, biotechnology, chemistry in everyday life, utilization of waste and natural materials,

pandemics due to viral infections. All of these efforts are directed at achieving the Sustainable Development Goals (SDGs). Through process skills, scientific attitudes and Pancasila student profiles are also built. Students plan the process of making products in the form of Incung Kerinci batik using plant motifs and produce products to apply the basic concepts of Biology material about Spermatophyta plants and their types.

ATP (Learning objective flow) Indaryanti et al. (2023): Through learning activities with the application of the PjBL learning model, students are able to collaborate to apply the basics of Spermatophyta plants and their types by implementing the making of Incung Kerinci batik using plant motifs by working together, thinking critically and creatively; Students can find out the definition and characteristics of Spermatophyta plants (seed plants); Students can mention examples of Spermatophyta plants found in the surrounding environment; Students can mention the differences and examples of Gymnospermae and Angiospermae plants. In the Angiospermae plant section, there are Monocotyledoneae and Dicotyledoneae plants; Through group work, students are able to make products in the form of Incung Kerinci batik with plant motifs carefully; By using various literature, students are able to make reports on the making of Incung Kerinci batik with plant motifs in detail; Students are able to report the results of the making of Incung Kerinci batik products with plant motifs in detail; Main concept: Spermatophyta plants and their types.

Based on the results of the needs analysis, the steps taken at this stage are to conduct direct observations in the field. In the initial observation conducted in class X of SMA Negeri 1 Sungai Penuh, it showed that many students had difficulty understanding the material taught by the teacher. Students of class X of SMA Negeri 1 Sungai Penuh have problems during Biology learning activities in the form of difficulty in understanding the Biology material of Spermatophyta plants, because there are many scientific languages in it and require scientific understanding, and its application is only through observation and introduction to plants around SMA Negeri 1 Sungai Penuh, so that students become bored because the practicum is only introduced to plants around the school and makes students' thinking limited.

In addition to these various problems, this makes students' thinking only focus on scientific science without being accompanied by elements of cultural introduction in it and makes students less enthusiastic in learning, besides that student always say that Biology learning is difficult to understand and analyze because of the many scientific languages in it and too many discussions in it. The Spermatophyta plant material taught is still guided by the teaching materials used by subject teachers in the form of teaching modules and accompanied by LKPD and combined with other teaching materials from the internet. The teaching modules used now only focus on scientific science which results in students only focusing on scientific science material without involving cultural elements in it. In addition, the learning syntax used by teachers is still conventional by explaining the material with the lecture method in class and most students have paid attention but there are still students who do not understand the material presented by the teacher.

In addition to these problems, the learning resources used by students are still limited, because many students do not get textbooks and have to borrow from the library in turns, and of course this makes students rarely read biology material because the learning resources used are limited and the opportunity to repeat lessons is difficult due to the limitations of the learning resources used. With these problems, researchers want to develop an ethnoscience-based teaching module about Incung Kerinci batik as a learning resource for Spermatophyta plant material that will be used by students in the learning process. The ethnoscience-based teaching module on Incung Kerinci batik as a source of learning material on Spermatophyta plants has the advantage of being able to provide new insights to students about the culture owned by the community, can introduce culture, preserve culture and students can understand scientific science easily through local wisdom owned by the local community. So that with this it can improve students' understanding in studying Biology, because for example it can be applied in real life, namely through the Incung Kerinci batik motif which is poured into the Spermatophyta plant motif and this is able to make students able to relate Biology lessons to everyday life.

Design Stage

The design in the ethnoscience-based teaching module about Incung Kerinci batik on the Spermatophyta plant material uses the Canva application, and is continued in the creation with a word format consisting of several components of the teaching module, namely: Design of the cover or cover of the teaching module, Title page, foreword, table of contents, list of figures and list of tables and brief descriptions, general module information (Identity, initial competency, Pancasila student profile, facilities and infrastructure, student targets and objectives, learning approach models and methods) and learning outcomes (CP and ATP, meaningful understanding, trigger questions, learning activities and learning tools), Learning activities for the teaching module, Content framework, Instructions for using the teaching module, Ethnoscience-based teaching module materials, Practice questions I and practice questions II for the

ethnoscience-based teaching module, Final evaluation questions in the teaching module, Answer key and assessment guidelines, Glossary containing a list of difficult words, Bibliography, Biographies of the author and validator team. The following in Figures 2 are a comparison of the cover design of the teaching module before and after revision.

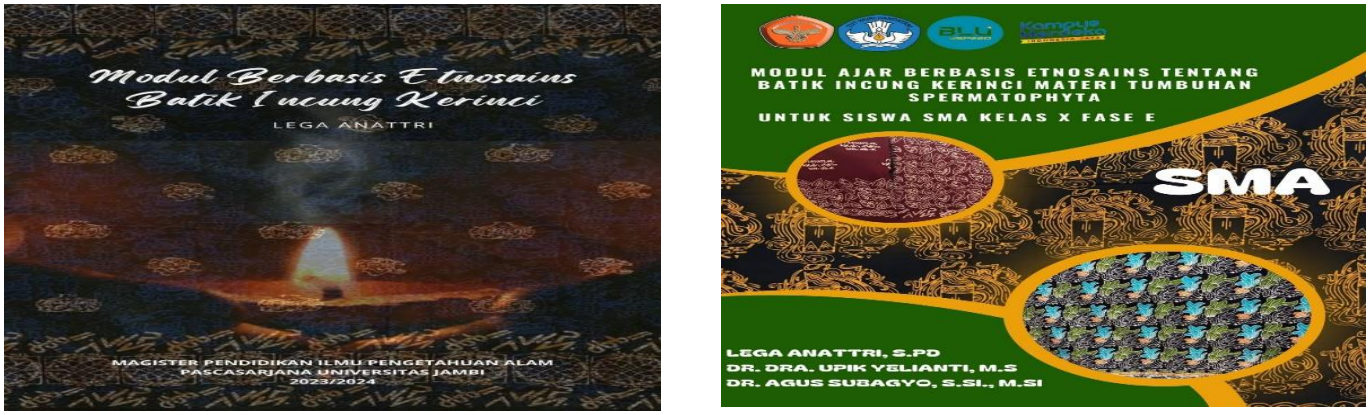

Figure 2. Display of Cover module: (a) before revision and (b) after revision

Development Stage

Validation Stage

Validation of the ethnoscience-based teaching module on Kerinci incung batik with Spermatophyta plant material was carried out 2 times with revisions in the form of material validation and media validation. The results of the validation of the ethnoscience-based teaching module on Kerinci incung batik with Spermatophyta plant material are shown in Table 1.

Table 1. Validity test of material stage I

Assessment aspects	Description	Assessment Score	Notes
Relevance of the biology teaching module on spermatophyte plant material with the independent curriculum	Suitability of spermatophyte plant material with learning outcomes	4	Appropriate
	Suitability of spermatophyte plant material with learning objectives	4	Appropriate
	Suitability of spermatophyte plant material with learning objective flow	4	Appropriate
	Completeness of spermatophyte plant material	4	Appropriate
	Depth of spermatophyte plant material	4	Quite appropriate
	Accuracy of concepts and definitions	3	Appropriate
	Accuracy of actual images, diagrams and illustrations	4	Appropriate
	Application of material	4	Appropriate
	Encourage to seek more information	4	Quite appropriate
	Suitability of material with scientific developments	3	Appropriate
	Actual images, diagrams and illustrations	4	Appropriate
	Up-to-date literature	4	Appropriate
Aspects of presentation feasibility	Consistency of presentation system in learning activities	4	Appropriate
	Coherence in presentation	4	Appropriate
	Practice questions at the end of each learning activity	4	Appropriate
	Answer key to practice questions	3	Quite appropriate
	Introduction	4	Appropriate
	Glossary	4	Appropriate
	Bibliography	4	Appropriate
	Summary	3	Appropriate
	Student involvement	4	Quite appropriate
	Introduction	4	Appropriate
	Contents	4	Appropriate
	Closing	4	Appropriate

Assessment aspects	Description	Assessment Score	Notes
Language feasibility aspects	Sentence effectiveness	3	Appropriate
	Standard terms	4	Appropriate
	Consistency in the use of language rules	4	Quite appropriate
	Consistency in the use of terms	4	Appropriate
	Consistency in the use of symbols or icons	4	Appropriate
Total assessment score			111
Maximum score			145
Percentage of product quality (%)			111: 145 x 100
Category			= 76.55%
General conclusion			Good enough

Based on Table 1 of the results of the validation of the material stage I, the product developed is still not feasible to be tested and still requires some improvements because the percentage of product quality is 76.5% with a fairly good category, but the validator provides suggestions and comments to be improved again and produce a good product that is feasible to be tested. Improvements were made for the validation stage II which can be seen in the Table 2.

Table 2. Validity test of stage II material

Assessment aspects	Description	Assessment Score	Notes
Relevance of the biology teaching module on spermatophyte plant material with the independent curriculum	Suitability of spermatophyte plant material with learning outcomes	5	Very appropriate
	Suitability of spermatophyte plant material with learning objectives	5	Very appropriate
	Suitability of spermatophyte plant material with the flow of learning objectives	5	Very appropriate
	Completeness of spermatophyte plant material	5	Very appropriate
	Depth of spermatophyte plant material	5	Very appropriate
	Accuracy of concepts and definitions	5	Very appropriate
	Accuracy of actual images, diagrams and illustrations	5	Very appropriate
	Application of material	5	Very appropriate
	Encourage to seek more information	5	Very appropriate
	Suitability of material with scientific developments	5	Very appropriate
	Actual images, diagrams and illustrations	5	Very appropriate
	Up-to-date literature	5	Very appropriate
Aspects of presentation feasibility	Consistency of presentation system in learning activities	5	Very appropriate
	Coherence in presentation	4	Very appropriate
	Practice questions at the end of each learning activity	5	Very appropriate
	Answer key to practice questions	5	Very appropriate
	Introduction	5	Very appropriate
	Glossary	5	Very appropriate
	Bibliography	5	Very appropriate
	Summary	5	Very appropriate
	Student involvement	5	Very appropriate
	Introduction	5	Very appropriate
	Content	5	Very appropriate
	Closing	5	Very appropriate
Language feasibility aspects	Sentence effectiveness	5	Very appropriate
	Standard terms	5	Very appropriate
	Provision of language rules	5	Very appropriate
	Consistency in the use of terms	4	Very appropriate
	Consistency in the use of symbols or icons	5	Very appropriate
Total assessment score			143
Maximum score			145
Percentage of product quality (%)			143: 145 x 100
Category			= 98.62%
General conclusion			Good

Based on Table 2, the results of the second stage of material validation obtained a product quality percentage of 98.60% with a good category. Thus, it can be concluded that the product is suitable for use in the field without any revision.

Table 3. Media validity test stage I

Assessment aspects	Description	Assessment Score	Notes
Relevance of the spermatophyte plant biology teaching module to the independent curriculum	Compliance with the achievement of biology learning on spermatophyte plant material	4	Appropriate
	Compliance with the objectives of biology learning on spermatophyte plant material	4	Appropriate
	Compliance with the flow of biology learning objectives on spermatophyte plant material	4	Appropriate
Module layout	The appearance of layout elements on the front, back and spine covers is harmonious and consistent	4	Appropriate
	The color of the module title contrasts with the background color	4	Appropriate
	The composition and size, layout (title, author and logo illustration) are proportional, balanced and in tune with the layout of the contents (according to the pattern)	4	Appropriate
	The color of the layout elements is harmonious and clarifies the function	4	Appropriate
	Describes the contents	4	Sufficiently appropriate
	The color of the object is in accordance with reality	4	Appropriate
	The placement of layout elements is consistent based on the pattern	3	Appropriate
	The spacing between text and illustrations is appropriate	4	Sufficiently appropriate
	The placement of the title of the learning activity, the subtitle of the learning activity, and the page/folio number does not interfere with understanding	4	Appropriate
Aspects of presentation feasibility	The placement of illustrations and captions does not interfere with understanding	3	Appropriate
	The placement of the title, subtitle, illustration, and caption does not interfere with understanding	4	Appropriate
Linguistics	The font size of the module title more dominant and proportional compared to the size of the author's name	4	Sufficiently appropriate
	16. Not using too many letter combinations	4	Appropriate
	Clear separation between paragraphs	3	Appropriate
	Overall presentation of illustrations is harmonious	4	Appropriate
	Creative and dynamic	4	Appropriate
The content typography is easy to read and understand	Not using too many fonts, and excessive letter variations	4	Sufficiently appropriate
	Width, spacing between lines in normal text layout	4	Appropriate
	Normal spacing between letters	4	Appropriate
Total assessment score			85
Maximum score			110
Percentage of product quality (%)			85: 110 x 100=77.27%
Category			Good
General conclusion			Revision is required

Based on Table 3 of the results of the first stage of media validation, the product developed is still not feasible to be tested and still requires some improvements because the percentage of product quality is 77.20% with a fairly good category, but the validator provides suggestions and comments to be improved again and produces a good product that is feasible to be tested. Improvements were made for the second stage of validation which can be seen in Table 4.

Table 4. Media validity test stage II

Assessment aspects	Description	Assessment Score	Notes
Relevance of the spermatophyte plant biology teaching module to the independent curriculum	Compliance with the achievement of biology learning on spermatophyte plant material	5	Very appropriate
	Compliance with the objectives of biology learning on spermatophyte plant material	5	Very appropriate
	Compliance with the flow of biology learning objectives on spermatophyte plant material	5	Very appropriate
Module layout	The appearance of layout elements on the front, back and spine covers is harmonious and consistent	5	Very appropriate
	The color of the module title contrasts with the background color	5	Very appropriate
	The composition and size, layout (title, author and logo illustration) are proportional, balanced and in tune with the layout of the contents (according to the pattern)	4	Suitable
	The color of the layout elements is harmonious and clarifies the function	4	Suitable
	Describes the contents	4	Suitable
	The color of the object is in accordance with reality	5	Very appropriate
	The placement of layout elements is consistent based on the pattern	5	Very appropriate
	The spacing between text and illustrations is appropriate	5	Very appropriate
	The placement of the title of the learning activity, the subtitle of the learning activity, and the page/folio number does not interfere with understanding	5	Very appropriate
Aspects of presentation feasibility	The placement of illustrations and captions does not interfere with understanding	5	Very appropriate
	The placement of the title, subtitle, illustration, and caption does not interfere with understanding	5	Very appropriate
Linguistics	The font size of the module title more dominant and proportional compared to the size of the author's name	4	Very appropriate
	Not using too many letter combinations	5	Very appropriate
	Clear separation between paragraphs	5	Very appropriate
	Overall presentation of illustrations is harmonious	5	Very appropriate
	Creative and dynamic	5	Very appropriate
The content typography is easy to read and understand	Not using too many fonts, and excessive letter variations	5	Very appropriate
	Width, spacing between lines in normal text layout	5	Very appropriate
	Normal spacing between letters	5	Very appropriate
Total assessment score			106
Maximum score			110
Percentage of product quality (%)			106: 110 x 100 = 96.36%
Category			Very good
General conclusion			The product can be tested

Based on table 4, the results of the second stage of media validation obtained a percentage of product quality of 96.30% with a very good category. Thus, it can be concluded that the product is suitable for use in the field without any revision. The purpose of validating the ethnoscience-based teaching module on Incung Kerinci batik as a source of learning biology on Spermatophyta plant material is to obtain assessments and input in the form of comments or suggestions from validators who are experts in their fields. The first validation was carried out by a material expert. The material expert validator was carried out by a biology lecturer, Mrs. Prof. Dr. Revis Asra, S.Si., M, Si as a material validator. The material expert validator assessed various aspects of the

assessments that had been given previously, in the form of aspects of the relevance of the biology teaching module on Spermatophyta plant material with the independent curriculum, aspects of presentation feasibility and aspects of language feasibility. Based on table 1, the results of the stage I material validity test were 76.50% with a fairly good category and further improvements were needed to the product.

In table 2, the results of the stage II material validity test were 98.60% with good and very valid categories and did not need to be revised. The results of the material expert validation questionnaire stated that the ethnoscience-based teaching module on batik incung kerinci as a source of learning biology on Spermatophyta plant material was declared suitable for use in the field without any revision, thus it can be concluded that the teaching material in the form of a teaching module is suitable for use and is suitable for application in the learning process. After validation with material experts, the validation stage was continued by media experts. The media expert validator was a chemistry lecturer, Mrs. Dr. Dra. Zurweni, M, Si. The media expert validator assessed various aspects of the assessment that had been given previously, in the form of aspects of the relevance of the Spermatophyta plant biology teaching module to the independent curriculum, module layout, language and typography of the contents that are easy to read and understand.

Based on the results of the media expert validation listed in table 3, the media validity test stage I was obtained at 77.20% with a fairly good category and the validator provided suggestions and comments for further improvements to the developed product. In table 4, the results of the media validity test stage II were 96.3% with a very good and very valid category and without revision, the results of the media expert validation questionnaire stated that the ethnoscience-based teaching module product about batik incung kerinci plant material for biology SMA Phase E has been declared theoretically and procedurally feasible. So that the product can be continued to the trial stage. With the conclusion that it is feasible to use in the field without any revision, thus the teaching module is feasible to use and feasible to be applied in the learning process. After the product assessment in the form of material and media validation, the validator provides recommendations in the form of comments, suggestions or input on the product that has been made to make it even better, and if the product is final and has been declared feasible to use, then it is continued to the next stage in the form of a product trial stage at SMA Negeri 1 Sungai Penuh, especially in classes XA and XC.

Practicality Stage

Students' practicality stage

Students' practicality in the Ethnoscience-based teaching module on Kerinci incung batik on Spermatophyta plant material, practicality by students with small group tests (Small group) was carried out by filling out an assessment questionnaire consisting of 13 statement items tested on 8 students, the results of which are obtained in Table 5.

Table 5. Results of the small group test practicality questionnaire

Aspects	Value (%)	Criteria
Ease of use	77.34	Practical
Efficiency of use	90.62	Practical
Attractiveness	71.87	Practical
Easy to interpret	84.37	Practical
Has Equivalence	75	Practical
Average (%)	79.84	Practical

The results of students' practicality in the ethnoscience-based teaching module on Kerinci Incung batik with Spermatophyta plant material, as seen in table 5, the practicality responses of students in the small group test obtained an average score of 79.84 with a practical category. Students' practicality in the ethnoscience-based teaching module on Kerinci Incung batik with Spermatophyta plant material with a large group test (field test) was carried out by students by filling out an assessment questionnaire on the module consisting of 13 statement items tested on 18 students, the results of which are obtained in Table 6.

Table 6. Results of the large group test practicality questionnaire

Aspects	Value (%)	Criteria
Ease of use	85.06	Practical
Efficiency of use	86.11	Practical
Attractiveness	86.80	Practical
Easy to interpret	83.34	Practical
Has Equivalence	85.64	Practical
Average (%)	85.39	Very Practical

The results of students' practicality on the ethnoscience-based teaching module on Kerinci Incung batik on Spermatophyta plant material, as seen in table 6, the practicality responses of students in the large group test (field test) obtained an average score of 85.39 with a very practical category. It can be seen and concluded that the results of the students' practicality test on the ethnoscience-based teaching module on Kerinci Incung batik as a source of learning biology on Spermatophyta plant material as shown in tables 5 and 6 above that the students' practicality test on the small group test obtained an average score of 79.84 with

practical criteria and the large group test obtained an average score of 85.39 with very practical criteria.

This is known based on students' assessments on the practicality questionnaire and the average student gave an assessment according to the assessment score from 1 to 4 with various aspects of statements such as ease of use, efficiency of teaching materials, easy to interpret and have equivalence, from these statements students can assess the teaching module applied by researchers in class. Overall, the ethnoscience-based teaching module on Incung Kerinci batik as a source of learning biology for Spermatophyta plant material is said to be practical because it has met the aspects and indicators of its practicality. This is supported by Rahmadani's opinion that a product is said to be practical can be seen from its ease of use, the time required for implementation, the attractiveness of the product to student interests and easy to interpret by subject teachers and other teachers (Markula & Aksela, 2022; Sari et al., 2022).

Practicality stage by teachers

After the product has been validated and improved according to the suggestions and input of expert validators. Furthermore, the product is given to Biology subject teachers at school to be given suggestions, input and responses regarding the product being developed. The product was given to six Biology subject teachers of Class X SMA Negeri 1 Sungai Penuh. The biology teacher's response to the product was carried out by filling out an assessment questionnaire consisting of 13 statement items and the results can be seen in Table 7.

Table 7. Results of the teacher's practicality questionnaire

Biology Teacher	Value (%)	Criteria
Teacher 1	75	Practical
Teacher 2	100	Very Practical
Teacher 3	91.25	Very Practical
Teacher 4	93.75	Very Practical
Teacher 5	89.16	Very Practical
Teacher 6	95.41	Very Practical

The finished product is validated and improved according to the suggestions and input from the expert material validator and media expert. After that, the product is given to the biology teacher at the school to provide comments or suggestions on the product being developed. In the practicality aspect consisting of 13 statement items and obtaining the results of the biology teacher's practicality test on the ethnoscience-based teaching module on Incung Kerinci batik on the Spermatophyta plant material as seen in table 7 above, obtained from six biology teachers of class X of SMA Negeri 1 Sungai Penuh with various percentages of 75%; 100%; 91.25%; 93.75%; 89.16%; and 95.41% stated practical and very practical criteria. The practicality of the teaching module can be seen from the ease of use in the form of teaching modules that can facilitate learning, teaching modules can be presented and can be understood clearly, using easy-to-understand language and using easy-to-read letters, efficiency of teaching materials in the form of using teaching modules according to the time available, the appeal in the form of teaching modules has an attractive appearance towards interests and students enjoy using ethnoscience-based teaching modules about Incung Kerinci batik, easy to interpret in the form of teaching modules can make students more active in learning, teaching modules have syntax that is easy to understand and has equivalence in the form of teaching modules having equivalence with teaching materials used by students, teaching modules have a presentation of material that is relevant to learning achievements and teaching modules can be used as one variation of teaching materials in learning biology material on Spermatophyta plants.

In terms of ease of use, ethnoscience-based teaching modules on Incung Kerinci batik on Spermatophyta plant material that are developed can help and facilitate teachers in providing correct explanations of the concepts being studied. According to Hair et al. (2019); Rajapathirana & Hui (2018) the practicality of a product that is developed can be seen from the results of the assessment of its use. If the assessment is quite practical, it means that the product developed can be used under normal conditions and applied by practitioners, in this case teachers and students. Aryani et al. (2022); Kintu et al. (2017; Mardianti et al. (2020), also said that the practicality of learning devices has been achieved if teachers are able to use learning devices and most students give a positive response. Based on the practicality value of the ethnoscience-based teaching module on Incung Kerinci batik on Spermatophyta plant material that has been developed as a whole, it can be concluded that the teaching module developed is easy for teachers to use in the learning process, especially on Spermatophyta plant material. The practicality of a teaching material is one of the factors in selecting good and suitable teaching materials for use in the learning process (Wisudariani & Wiraningsih, 2023). Thus, if the level of practicality provided by the teacher is very high, then the developed module can be used in the learning process so that the learning process is more interesting and meaningful.

Implementation Stage

At this stage, the researcher implemented an ethnoscience-based teaching module on Incung Kerinci batik with Spermatophyta plant material in class XA and class XC of SMA Negeri 1 Sungai Penuh by conducting

learning activities using the teaching module created by the researcher. After implementing the teaching module, the researcher asked students to fill out a student response questionnaire on the teaching module that had been implemented by the researcher (Guo et al., 2020). In addition to asking for responses from students, the researcher also asked for the biology teacher's response to the teaching module which is contained in Tables 8 and 9.

Table 8. Teacher response questionnaire results

Teacher Response	Mark (%)	Criteria
Teacher 1	75	Good
Teacher 2	100	Very Good
Teacher 3	91.25	Very Good
Teacher 4	93.75	Very Good
Teacher 5	89.16	Very Good
Teacher 6	95.41	Very Good
Average	92.16	
Category	Very Good	

The results of teacher responses to the ethnoscience-based teaching module on Incung Kerinci batik on the Spermatophyta plant material contained in table 8 above were obtained from six Biology teachers of class X of SMA Negeri 1 Sungai Penuh with various percentages of 76.84%; 100%; 98.94%; 92.63%; 86.31%; and 97.89% with good and very good categories, and with an average overall score of 92.16% with a very good category.

Table 9. Results of student response questionnaire

Class	Mark (%)	Criteria
XA	83.67	Very Good
XC	85.68	Very Good

The results of student responses to the ethnoscience-based teaching module on Incung Kerinci batik on the Spermatophyta plant material are obtained in table 9 above from class XA and XC of SMA Negeri 1 Sungai Penuh with an average response of class XA students of 83.67% and a response of class XC students of 85.68% with a very good category. At the implementation stage of the use of teaching materials in the form of an ethnoscience-based teaching module on Incung Kerinci batik which was carried out in class XA and XC of SMA Negeri 1 Sungai Penuh totaling 72 students. Based on the results of the teacher response questionnaire data obtained from six biology teachers of class X at SMA Negeri 1 Sungai Penuh, an average value of 92.16 was obtained with a very good category without revision. While the results of the analysis of the response questionnaire from 72 students in class XA and XC obtained an average value from class XA of 83.67 and an average value of class XC of 85.68 with a very good category and can be used without revision. This score is obtained from 15 statements with a score of 1 to 5.

Based on the results of the teacher's response which is at an average score of 92.16 which is stated as very good while the student's response is at an average score of 83.67 and 85.68 which is stated as very good, so it can be concluded that the ethnoscience-based teaching module on Incung Kerinci batik on Spermatophyta plant material is practical to use in the learning process. The results of the research and development carried out are in line with the research and development of the module by Fadillah et al. (2022); Rukmana et al. (2024), which shows that the results of the developed module are feasible or practical to use in class X biology learning, with the acquisition of student responses to the learning module with an average percentage of strong and strong categories of 84.23% and teacher responses of 88.7% so it can be concluded that the student and teacher responses are positive so that the biology learning module based on a scientific approach meets the criteria for practicality (Asfar et al., 2023; Ibrahim et al., 2023);.

Evaluation Stage (Evaluation)

At this stage, the researcher conducted an evaluation in the form of an evaluation at the beginning (pretest) and at the end (posttest) of learning materials I and II of the ethnoscience-based teaching module on Incung Kerinci batik on Spermatophyta plant material in class XA and class XC of SMA Negeri 1 Sungai Penuh and continued with the N-Gain test on the pretest and posttest results to see the effectiveness of using the teaching module by the researcher implementing the teaching module during learning activities in the classroom (Nurhafidhah et al., 2024), after implementing the teaching module, the researcher gave practice questions I, practice questions II and evaluation questions to students to be worked on by students with the aim of measuring the extent to which students understand the material explained by the teacher using the teaching module. This evaluation stage was carried out twice at the beginning (pretest) and at the end (posttest) of learning with the aim of seeing the comparison before the teaching module was implemented and after the teaching module was implemented and continued with the N-Gain test on the pretest and posttest values of classes XA and XC.

Table 10. Pretest and posttest results for classes XA and XC

Class	Average pretest results	Average posttest results
XA	31.94	84.61
XC	38.33	85.25

The results of the pretest and posttest of students on the ethnoscience-based teaching module on Incung Kerinci batik on the Spermatophyta plant material obtained from table 10 above are Class XA and XC of SMA Negeri 1 Sungai Penuh with an average pretest and posttest of class XA students pretest 31.94 and posttest 84.61, while the pretest and posttest of class XC students pretest 38.33 and posttest 85.25 with the categories of less and very good.

Table 11. Results of the N-Gain test for classes XA and XC

Class	Average N-Gain score	Average result of N-Gain score percent
XA	0.76	76
XC	0.74	74

After testing the pretest and posttest results, an N-Gain test was conducted to determine the effectiveness of the treatment given by the teacher to students and the results obtained in table 11 above were the N-Gain Score of Class XA with an Average of 0.76 and the N-Gain Score of class XC with an Average of 0.74 with a high category. Furthermore, it was seen through the interpretation of the effectiveness of the N-Gain percentage of class XA with an Average of 76% and class XC with an Average of 74% with an effective and fairly effective category. After the implementation stage of the use of teaching materials in the form of ethnoscience-based teaching modules on Incung Kerinci batik which was carried out in classes XA and XC of SMA Negeri 1 Sungai Penuh totaling 72 students, the next step was the evaluation stage of the data obtained through the analysis of the pretest and posttest given to students in classes XA and XC which showed an increase in the posttest scores for each class. The implementation of the ethnoscience-based teaching module on Incung Kerinci batik was carried out from February 19, 2024 to February 27, 2024 by implementing the teaching module for two meetings in class and continued with simple observation and practicum activities in the form of making Incung Kerinci batik at the Incung Kerinci batik studio. When implementing the teaching module in class, the researcher gave pretest questions at the beginning of learning with a total of 20 pretest questions about Incung Kerinci batik and Spermatophyta plants in classes XA and XC. While the posttest questions were given by the researcher after completing 2 meetings in class with a total of 30 posttest questions about Incung Kerinci batik and Spermatophyta plants.

The results of the pretest and posttest scores at the implementation stage of the ethnoscience-based teaching module on Incung Kerinci batik can be seen in table 10 above with an average pretest score in Class XA of 31.94 and an average posttest score of 84.61. Meanwhile, the average pretest score in class XC was 38.33 and the average posttest score was 85.25. It can be concluded that before the implementation of the ethnoscience-based teaching module on Incung Kerinci batik, the students' pretest scores decreased, while after the implementation of the ethnoscience-based teaching module on Incung Kerinci batik, the students' posttest scores increased. After obtaining the pretest and posttest scores of class XA and XC students, the researcher then conducted a test on the pretest and posttest results by conducting an N-Gain test to determine the effectiveness of the treatment given by the teacher to students in the class by obtaining an N-Gain Score from Class XA with an average of 0.76 and an N-Gain Score for class XC with an average of 0.74 with a high category.

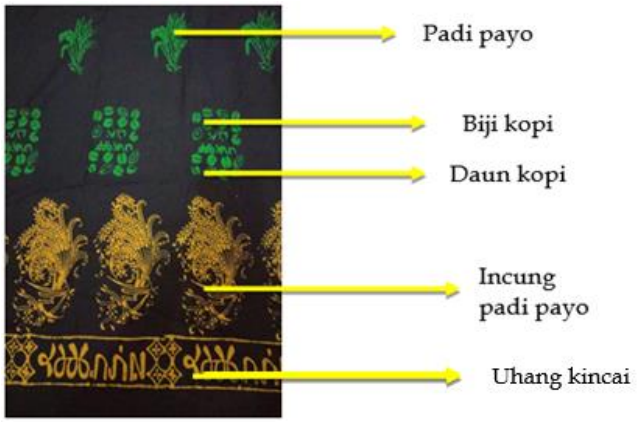

Figure 3. Padi Payo and Kopi Kerinci batik motifs

After knowing the N-Gain Score in classes XA and XC, the researcher continued by looking at the score through the interpretation of the effectiveness of the N-Gain percentage of class XA with an average of 76% and class XC with an average of 74% with an effective and fairly effective category. It can be concluded that the treatment given by the teacher to students in the class is indeed very high and the treatment is effectively applied by the teacher to his students. The treatment given by the teacher to students through treatment in class XC without using ethnoscience-based teaching modules about Incung Kerinci batik and Class XA is given treatment with ethnoscience-based teaching modules about Incung Kerinci batik. After carrying out all the stages in this study, the researcher then made other product results, namely Incung Kerinci batik which was designed by the researcher himself and collaborated with the owner of the Incung Kerinci batik studio and the researcher was interested in making motifs on batik cloth in the form of monocotyledoneae and dicotyledoneae plant motifs that are in the teaching module that the researcher has previously applied in class and examples are rice and coffee made by the

researcher in one batik cloth and combined with the Incung Kerinci script writing found in Figure 3.

The resulting product is a Padi payo motif with the Incung script "Padi payo" and combined with a Kerinci coffee motif in the form of the Incung script "Kopi Kerinci", coffee beans and coffee leaves are made into one Kerinci coffee motif, in addition, at the very bottom is accompanied by the Incung script that says "Uhang Kincai" basically in Incung Kerinci batik only one plant motif is used and combined with the Incung script, However, in the product results of this module, the researcher makes the rice and coffee plant motifs in one batik, so that they can be seen directly and simultaneously in one batik and can be combined with the Incung Kerinci script.

Conclusion

Based on the results of the development that has been carried out, it can be concluded that the development of an ethnoscience-based teaching module on Kerinci incung batik as a source of learning biology on plant material (plantae) that has been developed has validity with a very valid category and is suitable for use, this is based on the assessment of expert validators of material and media, and the teaching module has practicality with a very practical category based on the assessment of teachers and students at SMA Negeri 1 Sungai Penuh City, with the implementation of the ethnoscience-based teaching module on Kerinci incung batik, it is hoped that it can bring a positive contribution as a good learning source and can help improve students' understanding of learning and can help improve students' learning outcomes while studying biology.

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Author Contributions

In writing this scientific paper, L. A., U. Y., A. S., the author contributed to conducting research at the Incung Kerinci school and batik studio to obtain various research data that was carried out and continued with processing the research data, and the researcher took research documentation in the field before publishing the scientific paper.

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Conflicts of interests

The research interest in this study is that the researcher wants to introduce the local wisdom possessed by the Kerinci and Sungai Penuh City communities, that they have very unique and very interesting local wisdom that can be used as a source of learning Biology in plant material in the form of plant motifs on Incung Kerinci batik and various other interests, namely, the researcher wants to publish his scientific work so that it can be read by others and can be used as a reference for other researchers.

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