# DEVELOPMENT OF A TAXONOMIC MODULE FOR HIGHER PLANTS THROUGH EXPLORATION AND CHARACTERIZATION OF THE SAPOTACEAE FAMILY IN THE PUMPKIN FRUIT GARDEN OF DELI SERDANG DISTRICT

**Farida Alas*[1], Yusri Fefiani[2], Edi Azwar Nasution[3]**
**[1] FKIP, Program Studi Pendidikan Biologi**
**Universitas Islam Sumatera Utara[2]**
faridaalas471@gmail.com*

**Keywords:**
**Module, Taxonomy, Exploration, Sapotaceae**.

**Abstract**

This research aims to develop higher plant taxonomy module through exploration and characterization of the Sapotaceae family found in Lubuk Pakam Fruit Park area, Deli Serdang Regency. This research was conducted in May-July. This research was motivated by several problems, including the lack of information regarding the higher plant taxonomy of the Sapotaceae family. There are a lot of literatures that discuss the Sapotaceae family, but does not discuss taxonomy, only diversity. Biology students lack of understanding regarding plant taxonomy material due to the use of foreign terms and the lack of usage of concrete images, especially regarding the Sapotaceae family. It is not possible for the Sapotaceae family to be used as practical material because it is expensive and difficult to obtain because of limited books to support learning material on the higher plant taxonomy in the Sapotaceae family in the Biology library. In this case, the researcher connected several of these problems and then compiled them into a learning resource in the form of a module "Characteristics of the Sapotaceae Family in Lubuk Pakam Fruit Park, Deli Serdang Regency". This research is included in the type of research and development (R&D). This research was divided into two stages. The research method for the first stage is the research was done by using descriptive qualitative research with observation and documentation techniques which aims to identify the characteristics of the Sapotaceae family in Lubuk Pakam Fruit Park, Deli Serdang Regency. The second stage research method is development by using ADDIE development model which consists of five stages, namely the analysis, design, development, implementation and evaluation stages.).

## INTRODUCTION

Education is the most important thing to make the nation's life intelligent. Education will give birth to a superior and qualified generation to support the future. Without education, a country will be left behind by other countries. So, the country's progress can be driven by quality and a good education system. Good education is education that is able to give rise to students' curiosity, not just providing teaching without students understanding that knowledge. Therefore, a good education system is needed to achieve quality learning. Various efforts have been made by the government to improve the quality of education in Indonesia, such as developing the curriculum from conventional learning to more interactive learning and utilizing technology as a medium to support learning. The change of curriculum from KTSP to Curriculum 2013 is proof of the government's efforts to improve the quality of education in Indonesia. Implementation of the 2013 curriculum which includes strengthening spiritual attitudes, social attitudes, knowledge and skills in the learning process (Hamsu, 2017: 103). According to Republic of Indonesia Law No. 20 of 2003 concerning the National Education System, learning is an interaction process that involves learning components, namely students, teachers/lecturers, and learning resources in a learning environment so that goals can be achieved in accordance with the goals that have been set.

Learning activities are characterized by educational interactions, meaning that the interactions that occur are aware of the goal, are methodologically rooted, proceed systematically through the stages of design, implementation and evaluation. Learning occurs through stages characterized by certain characteristics, namely involving students' mental processes in the learning process and building a dialogical atmosphere so that a question and answer process occurs which is aimed at building students' knowledge through their own construction (Muh, 2021: 74).

According to the Minister of Education, Culture, Research and Technology of the Republic of Indonesia No.56 (2022:68) educators have the flexibility to create, select and modify available teaching modules according to the context, characteristics and needs of students.

In teaching and learning activities, the modules used are not in accordance with student needs. The modules used tend to be monotonous and lack innovation. When learning Taxonomy, students still do not fully understand the material because the material covers a lot

International
JOURNAL OF SCIENCE AND EDUCATION
Website: https://journals.pspmas.org/index.php/ijose/index

and there are many scientific names.

Allah SWT. Says in surah Az-Zumar: 21

اَلَمْ تَرَ اَنَّ اللّٰهَ اَنْزَلَ مِنَ السَّمَآءِ مَآءً فَسَلَكَهٗ يَنَابِيْعَ فِى الْاَرْضِ ثُمَّ يُخْرِجُ بِهٖ زَرْعًا مُّخْتَلِفًا اَلْوَانُهٗ ثُمَّ يَهِيْجُ فَتَرٰىهُ مُصْفَرًّا ثُمَّ

يَجْعَلُهٗ حُطَامًا ۗاِنَّ فِيْ ذٰلِكَ لَذِكْرٰى لِاُولِى الْاَلْبَابِ ۝ ٢١

Meaning: "Have you not noticed that Allah sends down water from the sky, then he arranges it into sources of water on the earth, then He causes plants of various colors to grow with it, then it becomes dry, then you see it turn yellow, then it becomes destroyed. pattering. Indeed, in that there really is a lesson for people who have understanding.

The interpretation of the verse above explains the evidence of God's oneness through illustrations of His various creations, starting from His power to send rain, create springs, grow plants to the processes they go through until they are destroyed. The heavy rain that falls on the earth grows many kinds of plants and grass, some of which hold water, then Allah gives humans the ability to use it, so they can drink with that water, irrigate fields and plant plants. That is the parable of who understands religion and is useful for what Allah has conveyed until he knows and is able to teach it (Quraish. 2007:221).

Higher plant taxonomy is one of the materials taught in Biology courses. It is known that during the learning of higher plant taxonomy material, learning resources are used using presentation methods in front of the class and discussions or questions and answers, so that students have difficulty getting to know various types of higher plants. The teaching materials used tend to be textbooks borrowed from libraries and scientific papers from the internet. In addition to the limited teaching materials used, students also feel bored with the look of textbooks that look boring and the lack of pictures and explanations of the material. Students need visual printed teaching materials that can help in learning by utilizing the surrounding environment which has a collection of high-level plants that can be interesting. interest in learning in higher plant taxonomy courses.

Higher plants (Phanerogamae) are a group of plants that have seeds and reproduce sexually. The seeds in this plant originate from the ovule which is analogous to the macrosporangium (Gembong, 2009). In it, macrospores are produced which will develop into macroprothalium. Seed plants are plants that have seed organs as a means of sexual reproduction, while tree-like plants (arbo) are plants that have the characteristics of woody stems, large and varying heights. Tree trunks are woody because they contain a lot of lignin so the trunk becomes hard and brownish in color. Other characteristics of the tree include a trunk diameter of ≥ 20 cm and it will start to branch after its growth height exceeds 1 meter.

The Phanerogamae plant is said to be a higher level plant because it is a true cormus plant. Cormus plants are a group of plants that can be differentiated based on three main body parts, namely roots, stems and leaves. The types of plants that grow and develop in Indonesia have approximately 40,000 types of plants consisting of woody plants, fungi, ferns, naked seed plants (gymnosperms), orchids, plants that produce carbohydrates, produce proteins and fats, produce fruit, vegetables, bamboo, rattan, and various medicinal plants (Abrori, 2016). Therefore, Indonesia's abundant biological wealth needs to be utilized as fully as possible to meet food needs, especially fruit. It is recorded that there are at least 4 genera from 4 tribes of native Indonesian fruit which have quite high economic value and also have high biodiversity (Winarno, 2000) in (Angio, 2019). Indonesian tropical fruits are annual or perennial. However,

How to cite: Author. (2024). Title, Times New Roman, Bold, 20 pts, max 14 words. *International Journal of Science and Education, 1*(1). https://doi.org/10.25217/0020247417100
**E-ISSN:** 9999-9999
**Published by:** Foundation of the Center for Human Development and Environmental Studies

annual fruits are more dominant. In general, annual fruiting depends on climatic conditions. Usually the harvest falls in the rainy season after a long dry season. Meanwhile, in the dry season, annual fruit plants rarely bear heavy fruit. This causes a big fruit harvest, small or secondary fruit harvest and famine (Sunarjono, 2010).

Before characterizing the taxonomy of higher plants in the Sapotaceae family, exploration is carried out. Exploration is field exploration with the aim of gaining more knowledge (Sulistiyo, 2014). The field exploration carried out to develop the higher plant taxonomy module was in the Lubuk Pakam Fruit Park, Deli Serdang Regency, there is an agro-tourism attraction which is 34 km from the city of Medan. It has an area of 4 hectares containing various fruit trees, medicinal plants and nuts, precisely in the regent's office complex. This area contains a kind of garden for various fruit plants, children's playground, photo spots. Operating in 2015, this fruit garden is never empty, especially during the holiday season and year-end holidays. This park functions as an educational park on how to live a healthy life by preserving natural resources so that you get to know various kinds of plants for health. This fruit garden is the only one in North Sumatra that has various collections of tropical fruit with a horticultural garden design. Horticulture is a modern technique for cultivating plants that are collected. (baione.id, 2023). From the results of environmental observations, namely there is an Educational Tourism Park, it was found that the high-level plant *of the Sapotaceae* family is *Pouteria. Pouteria* Some well-known types are Pouteria campheciana, *P. sapota, P. duclitan and P. obovata*. *P. obovata* has an oval leaf shape with alternate leaf sitting between 15-25 cm in size. The fruit is oval (Slik, yearless), while *P. campechiana* has leaves that are oval. The fruit is classified as a berry with a persistent sepal and spindle-shaped to oval and yellow (blogspot.com), as well as other tall plants that have the potential to be used as a learning resource in the Tall Plant Taxonomy material One of the efforts that can be made to improve the quality of learning is to develop a teaching material that utilizes the potential of the surrounding environment, Because the material is difficult for students to understand if it is not visualized, then students do not know the concrete form of all types of plants studied.

Based on an interview with Mr. Yanto on June 7, 2024, who is one of the administrators of the Lubuk Pakam Fruit Park, there has been no data collection about the plants in the orchard, and no one has yet taken advantage of the potential of the orchard as a source of learning and only as a place for recreation. The potential of plants in the Lubuk Pakam fruit garden has a variety of high-level plants and can be used as a source of learning about the taxonomy of tall plants which are compiled into teaching materials based on plant identification results (Observation at the Lubuk Pakam Fruit Garden, June 7, 2024).

Teaching materials are positioned as tools or means to achieve competency standards and basic competencies as well as as to optimize services to students (Yaumi, 2017:273-274). One of the printed teaching materials that can be developed to help students' difficulties in learning is the module teaching materials. Modules are learning materials that are prepared and presented in writing and in such a way that readers are expected to be able to absorb the material presented by themselves. A module is a package of learning materials that can be learned by students with minimal assistance from teachers (tutors), which includes a clear plan of goals to be achieved, the provision of learning materials, the materials needed, and tools for assessors in measuring the success of students in completing learning materials (Yunus and Heldy, 2015:170). The module's teaching materials were chosen because they have advantages compared to other teaching materials, namely with the module, students can learn independently without the presence of a teacher, students can learn according to their respective abilities/abilities to understand the material, and the language used in the module is simple so that students can easily understand the concepts of what is taught (Triyono, 2021:42).

Based on the presentation of the above problem, the researcher is interested in conducting research on the Development of Tall Plant Taxonomy Module Through Exploration and Characterization of the Sapotaceae Family in Lubuk Pakam Fruit Park, Deli Serdang Regency. With the existence of these teaching materials, it is hoped that it can provide innovation in the

International JOURNAL OF SCIENCE AND EDUCATION
Website: https://journals.pspmas.org/index.php/ijose/index

learning process.

## METHODS

A. Location and time of research

1. Research Location

The research was conducted in the Lubuk Pakam fruit garden, Jalan Karya Jasa Perbarakan, Pagar Merbau District, Deli Serdang Regency, North Sumatra Postal Code 20151. This research was carried out in the area because the area is an educational tourist attraction to get to know various kinds of plants.

2. Research Time

Table 1 List of Activities

This research was conducted from May to July 2024.

| Activities | May/Sunday | | | | | June / Sunday | | | | | July /Sunday | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Field Survey | | ■ | | | | | | | | | | | | | |
| Seminar preparation | | | ■ | | | | | | | | | | | | |
| Implementation of proposal seminars | | | | ■ | | | | | | | | | | | |
| Revision proposal | | | | | ■ | | | | | | | | | | |
| Research license letter | | | | | | ■ | | | | | | | | | |
| Research Implementation | | | | | | | ■ | | | | | | | | |
| Preparation of reports | | | | | | | | ■ | ■ | | | | | | |
| Thesis trial | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ |

B. Research and Development Model

This research was carried out through two stages. The first stage is an exploratory research that aims to identify the diversity of plants of the *Sapotaceae* family in the Lubuk Pakam Fruit Park Tourism Area, which is used to develop the results of exploration and characterization of plants *of the Sapotaceae* family in the Lubuk Pakam Fruit Park, Deli Serdang Regency, North Sumatra. Here are the two stages of the research:

Phase 1 Research The research method used is the cruise method. The exploration method is carried out by exploring or exploring along every corner of the Lubuk Pakam Fruit Park Location, Deli Serdang Regency.

Phase II research (Research and Development) The research and development model in this study is the ADDIE development model which will produce a module product based on plant identification results in the Lubuk Pakam Fruit Park Study Park, Deli Serdang Regency. The ADDIE development process consists of analyze, design, develop, implement, and evaluate.

This model was chosen because the ADDIE model is often used to develop a systematic approach to instructional development, i.e. a systematic process used to develop education and training programs consistently and reliably.

How to cite: Author. (2024). Title, Times New Roman, Bold, 20 pts, max 14 words. *International Journal of Science and Education*, *1*(1). https://doi.org/10.25217/0020247417100
**E-ISSN:** 9999-9999
**Published by:** Foundation of the Center for Human Development and Environmental Studies

C**.** Population and Sample

The population in this study is the sapotaceae family in the Lubuk Pakam Fruit Park Area, Deli Serdang Regency. The samples taken in this study are species from the *Sapotaseae Family* in the Lubuk Pakam fruit garden area, Jalan Karya Jasa Perbarakan, Pagar Merbau District, Deli Serdang Regency, North Sumatra.

A. Research and Development Procedures

The research and development procedures on the ADDIE model are as follows.

1. Analyze (Tahap Analisis)

At this stage, the aim is to find gaps or learning problems in the Higher Growth Taxonomy. Researchers carry out several activities to obtain data as a source of research.

a. (Validate the Performance Gap) Determination of Learning Problems

The determination of learning problems is carried out by seeking information about the basic problems faced in learning the taxonomy of tall plants, which are needed in development. The analysis was carried out by interviews with teachers/lecturers of tall plant taxonomy and the distribution of questionnaires to Biology students regarding the difficulties and shortcomings in the learning process and the use of the teaching modules used.

b. (Determine Intructional Goals) Determination of Learning Objectives

At this stage, learning objectives are determined. The formulation of learning objectives is carried out based on the analysis of basic competencies (KD) and core competencies (KI) based on the 2013 curriculum.

c. (Analyze Learner) Student Analysis

At this stage, the identification of students' character related to their abilities regarding experience, knowledge, and attitudes is carried out. The stage was carried out by distributing student analysis questionnaires. Student analysis was carried out to find out the obstacles and shortcomings in the learning process, learning methods, in the form of modules used in the taxonomy material of tall plants *of the Sapotaceae family.*

2. Design (Tahap Desain)

The design stage aims to design teaching materials in accordance with the results of the formulation of learning objectives at the analysis stage. The steps taken at this stage select the module format. Product design uses Microsoft word to structure module components and canva app to design module displays.

3. Development (Tahap Pengembangan)

At this stage, the researcher develops teaching materials in the form of modules that have been designed at the design stage. In addition, the researcher prepared an instrument that will be used to assess the results of the module teaching materials that have been developed. Then determine the expert or expert of the developed teaching materials and 1 user validator (Biology teacher/lecturer). The results of the validation score from the expert team are then used as material to improve the teaching materials of the developed modules

4. Implementation (Tahap Implementasi)

At this stage, it is the trial stage of module teaching materials on target users/students of Biology after the validation stage of the Exploration and Characterization of *the Sapotaceae* Family module in the Lubuk Pakam Fruit Park Educational Tourism Area in the Tall Plant Taxonomy Course. The stages carried out are:

a. Preparing Educators

The purpose of this stage is to prepare educators who function as facilitators in learning. This stage is carried out by the researcher explaining what chapters will be studied, the tools needed in learning, and introducing the teaching materials of the modules that will be implemented to students.

b. Preparing Students

Preparing students/students, namely providing briefings to students before the implementation of the implementation includes the characterization material of the Sapotaceae

faimili to be studied, the tools needed in the form of stationery and worksheets to fill in the evaluation questions at the end of the material in the module. Students are informed about the teaching materials that will be used in the form of modules, namely independent teaching materials that allow students to learn independently (independent), and allow students to conduct self-assessments with evaluation questions equipped with answer keys and discussions so that the honesty and enthusiasm of students are needed in the learning process. This implementation stage is carried out by sample trials. According to Sugiyono (2010:118), samples are part of the number and characteristics possessed by the population, so samples are considered an important source of data to support research. In the study that became the research sample, 30 UISU biology students were conducted on Wednesday, July 3, 2024

5. Evaluation (Tahap Evaluasi)

The evaluation stage is the last stage in the ADDIE development model. At this stage, it is carried out to improve the product and follow up from the implementation stage. At this stage, a formative evaluation of module teaching materials products was carried out based on the results of exploration and characterization *of the Sapotaceae* family in the Lubuk Pakam Fruit Park Educational Tourism area. Formative evaluation is carried out to revise the data at each stage used to improve the product. The results of the evaluation in this study can be used as a basis to assess the quality of module teaching materials based on the results of exploration and characterization *of the Sapotaceae* family in the Lubuk Fruit Park Educational Tourism area on Tall Plant Taxonomy Material.

B. Product Trial

Product trials are carried out to obtain data that is used as a reference for determining the level of validity and practicality of the products to be produced. Product trials are carried out by expert validators, Biology teachers/lecturers and students/students. The instruments used are validation instruments, Biology teachers/lecturers, and student response questionnaires. This activity aims to obtain assessments, comments and suggestions from validators, so that the level of validity and practicality of the product can be known.

C. Test Design

The module products that are prepared are then validated by Biology teachers/lecturers as user validators to find out the level of product validity. In the product trial, validators will be given a validation analysis questionnaire which will later show the quality of the product. After being validated and revised according to the validator's assessment, then the product developed is tested to students/students to find out the practicality of the product produced in the research.

1. Data Type

The types of data used in this study are:

a. Quantitative data

Quantitative data in the form of the results of the validator questionnaire assessment by biology teachers/lecturers. This data is also the result of student response data to the product developed.

b. Qualitative data

Qualitative data in this study are in the form of comments, criticisms, and suggestions from validator questionnaires on the module teaching materials products developed

D. Data Collection Instruments

1. Interview Guidelines

The interviews conducted in this study are unstructured interviews. The questions asked are open-ended so that respondents are free to answer questions. Interviews in this study were

conducted with Biology teachers/lecturers with the aim of finding out the shortcomings and constraints of teaching materials used in Biology learning.

2. Questionnaire Sheet

The questionnaire used in this study is a type of digital and structured questionnaire, namely a questionnaire that provides several possible answers. The questionnaire was used to obtain comments, criticisms, and suggestions from biology teachers/lecturers as user validators as well as students/student responses. The questionnaire in this study was prepared using a likert scale with 4 answer options, namely strongly agree, agree, disagree and strongly disagree with the number of questions in the validation questionnaire, the number of questions is 20 items. The scoring system is by giving a checklist mark to the answer to the answer that will be chosen by the respondent.

E. Data Analysis Techniques

1. Validity Data Analysis

Product validity analysis can be obtained from data analysis taken from the results of validation and practicality trials processed based on their respective trignites.

a. Module validity data analysis

The data collected is the result of validation of plant taxonomy modules by experts or experts processed using descriptive statistical analysis. Validity data analysis is carried out with the following steps:

1) The analysis begins with scoring for each item. The validity data of this module is in the form of a Likert scale with conditions such as Table

***Table 2 Category and Item Score Likert Scale Module Validity***

| Category Score | Category Score |
|---|---|
| 4 | Strongly Agree (SS) |
| 3 | Agree(s) |
| 2 | Disagree (TS) |
| 1 | Strongly disagree (STS) |

2). All items that are scored, then tabulated and found the percentage using the following formula.

$$\text{Module Validity Values} = \frac{\text{Item Score Earned}}{\text{Maximum Score}} \times 100\%$$

3). Based on the validity value obtained, validity criteria are determined, with the conditions as in the Table

***Table 3 Module Validity Category***

| Score | Category |
|---|---|
| 0%-19,99% | Strongly disagree (STS) |
| 20%-39,99% | Disagree (TS) |
| 40%-59,99% | Agree(s) |
| 60-%-100% | Strongly Agree (SS) |

2. Module practicality data analysis

The practicality data of the plant taxonomy module was obtained from the results of small-scale testing in a fruit garden in Lubuk Pakam. Practicality data was obtained from the module practicality test sheets by students and teachers. Practicality data analysis is carried out with several steps as follows.

1) The questionnaire is prepared in the form of a Likert scale with the provisions of Table 4

***Table 4 Likert Scale Categories and Item Scores***

International JOURNAL OF SCIENCE AND EDUCATION
Website: https://journals.pspmas.org/index.php/ijose/index

Module Practicality

| Secretary | Category |
|---|---|
| 1 | Strongly disagree (STS) |
| 2 | Disagree (TS) |
| 3 | Agree(s) |
| 4 | Strongly Agree (SS |

The data analysis technique used in this second phase of research is quantitative analysis. Quantitative data is obtained from the assessment items provided by the validator in accordance with those listed in the module assessment instrument. Alternative criteria for answer options in the questionnaire are:

Excellent : 4

Good : 3

Enough : 2

The data obtained from the questionnaire is then searched for the percentage with the formula:

$$\frac{\text{Total Score}}{\text{Highest Score}} \text{ X } 100\%$$

The results of the validity that have been known as the percentage are then checked with the following score interpretation criteria:

| | |
|---|---|
| 76.0% - 100% | Worth using without revision |
| Figure: 60.0% - 75.9% | Worth using with little revision |
| Figures 26.0% - 50.9% | Less usable revisions |
| 0% - 25.9% | Not feasible to use for total revision learning |

## RESULTS AND DISCUSSION

1. Research Results

1. Phase I Research Results

Results of Exploration and Characterization of Sapotaceae Family in Lubuk Pakam Fruit Park, Deli Serdang Regency

The taxonomy research on tall plants of the Sapotaceae family was carried out in two stages, namely, the Lubuk Pakam Fruit Park area, Deli Serdang Regency and the UISU Biology Laboratory.

From the research that has been carried out in the Lubuk Pakam fruit garden area, 6 genera and 6 species of plants from the *Sapotaceae* family were obtained. Species of *the Sapotaceae* family are presented in the following table:

How to cite: Author. (2024). Title, Times New Roman, Bold, 20 pts, max 14 words. *International Journal of Science and Education, 1*(1). https://doi.org/10.25217/0020247417100
**E-ISSN:** 9999-9999
**Published by:** Foundation of the Center for Human Development and Environmental Studies

***Table 5 Genus, Plant Species of Sapotaceae Family found in the Lubuk Pakam Fruit Park Area***

| It | Family | Genus | Species |
|---|---|---|---|
| 1. | *Sapotaceae* | *Manikara* | *Manikar Japota L* |
| 2. | *Sapotaceae* | *Mimuaqos* | *Mimuaqos Elengi* |
| 3. | *Sapotaceae* | *Pouteria* | *Pouteria Campachiana* |
| 4. | *Sapotaceae* | *Manikara* | *Nicola Kauki* |
| 5. | *Sapotaceae* | *Chrysophllum* | *Chrysophllum caimito* |
| 6. | *Sapotaceae* | *Polytechnic* | *Polteria caimito* |

**Table 6 Root morphology of the Sapotaceae family**

| It | Species Name | Root Morphology |
|---|---|---|
| | | Root system |
| 1 | *Manikar Japota L* | Ride |
| 2 | *Mimuaqos Elengi* | Ride |
| 3 | *Pouteria Campachiana* | Ride |
| 4 | *Nicola Kauki* | Ride |
| 5 | *Chrysophllum caimito* | Ride |
| 6 | *Polteria caimito* | Ride |

***Table 7 Stem morphology of the Sapotaceae family***

| **It** | **Species Name** | **Stem Morphology** | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Kind** | **Shape** | **Surface** | **Growth direction Trunk** | **Tall** | **Diameter** |
| 1 | *Manikara zapota L* | Woody | Round | Rough | Upright Straight | 30m | 60 cm |
| 2 | *Mimuaqos Elengi* | Woody | Round | Rough | Upright Straight | 25 m | 100 cm |
| 3 | *Pouteria Campachiana* | Woody | Round | Rough | Upright Straight | 20 m | 60cm |
| 4 | *Manikara Kauki* | Woody | Round | Rough | Upright Straight | 25 m | 50 cm |
| 5 | *Chrysophllum caimito* | Woody | Round | Rough | Upright Straight | 20m | 60cm |
| 6 | *Polteria caimito* | Woody | Round | Rough | Perpendicular | 15m | 60cm |

**Table 8 Leaf morphology Family Sapotaceae**

| **It** | **Kind** | **Leaf morphology** | | | | |
|---|---|---|---|---|---|---|
| | | **Leaf shape** | **Leaf tips** | **Leaf base** | **Leaf edges** | **Meat leaf** |

International JOURNAL OF SCIENCE AND EDUCATION
Website: https://journals.pspmas.org/index.php/ijose/index

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | *Manikara zapota L* | Ovate | Blunt | Tapered | Flat | Thin and stiff |
| 2 | *Mimuaqos Elengi* | Ovate | Tapered | Tapered | Corrugated | Thin and stiff |
| 3 | *Pouteria Campachiana* | Ovate | Tapered | Pointed | Flat | Thin and stiff |
| 4 | *Manikara Kauki* | Ovate | Blunt Widened | Blunt Widened | Flat | Thin and stiff |
| 5 | *Chrysophllum caimito* | Ovate | Tapered | Pointed | Flat | Thick and stiff |
| 6 | *Polteria caimito* | Ovate | Blunt | Tapered | Corrugated | Thin and stiff |

**Table 9 Leaf morphology of the Moraceae family**

| It | Kind | Leaf morphology | | | |
|---|---|---|---|---|---|
| | | Leaf straining | Leaf Color | Leaf type | Leaf length |
| 1 | *Manikara zapota L* | Protrude | Green Shiny | Single leaf | 10 cm |
| 2 | *Mimuaqos Elengi* | Protrude | Glossy green | Single leaf | 9-16 cm |
| 3 | *Pouteria Campachiana* | Protrude | Glossy Green | Single leaf | 15cm |
| 4 | *Manikara Kauki* | Protrude | Faded Green | Single leaf | 5-12cm |
| 5 | *Chrysophllum caimito* | Protrude | Top: Glossy Green Bottom: Yellow navel | Single leaf | 7 cm |
| 6 | *Polteria caimito* | Protrude | Glossy Green | Single leaf | 15 cm |

***Table 10 Flower morphology of the Sapotaceae family***

| It | Kind | Color | Location | Type | Shape | Long |
|---|---|---|---|---|---|---|
| 1 | *Manikara zapota L* | White | In the axils of the leaves | Limitless | Bell | 1-2 mm |

How to cite: Author. (2024). Title, Times New Roman, Bold, 20 pts, max 14 words. *International Journal of Science and Education, 1*(1). https://doi.org/10.25217/0020247417100
**E-ISSN:** 9999-9999
**Published by:** Foundation of the Center for Human Development and Environmental Studies

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | *Mimuaqos Elengi* | Purplish and brownish | In the axils of the leaves | Limitless | Star | 1-2 mm |
| 3 | *Pouteria Campachiana* | Whiteish green | In the axils of the leaves | Limitless | Cylindrical | 2.5 mm |
| 4 | *Manikara Kauki* | Whiteness | In the axils of the leaves | Limitless | Oval buds | 1-2 mm |
| 5 | *Chrysophllum caimito* | Whiteish green | In the axils of the leaves | Limitless | Cylindrical | 1-2 mm |
| 6 | *eria caimito* | Whitish green | On the stem | Limitless | Round | 1-2 mm |

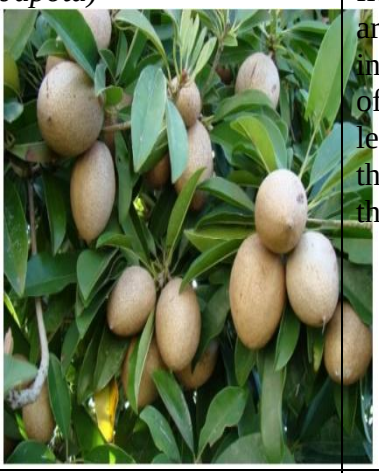
***Table 11 Fruit morphology of the Moraceae family***

| **It** | **Kind** | **Fruit morphology** | |
|---|---|---|---|
| | | **Fruit type** | **Diameter** |
| 1 | *Manikara zapota L* | Buni fruits with thick flesh can be eaten | 8 cm |
| 2 | *Mimuaqos Elengi* | Buni fruits with thin flesh can be eaten | 1.7- 1.9 cm |
| 3 | *Pouteria Campachiana* | Fleshy pseudo-compound fruit is edible | 7 cm |
| 4 | *Manikara Kauki* | The thin-fleshed buni fruit is edible | 1-2 cm |
| 5 | *Chrysophllum caimito* | Juicy buni fruit with thick flesh inedible | 5-10 cm |
| 6 | *Polteria caimito* | Thick-fleshed buni fruit edible fruit | 8 cm |

***Table 12 Special characteristics of the Sapotaciae family***

| Less | Picture | Flower | Leaf | Seed | Fruit |
|---|---|---|---|---|---|

International
JOURNAL OF SCIENCE AND EDUCATION
Website: https://journals.pspmas.org/index.php/ijose/index

| | | | | | |
|---|---|---|---|---|---|
| 1. | *Sawo Manila (Manikar Japota)*  | Single flowers are located in the axils of the leaves at the tips of the twigs | Slightly hairy single | Tango seeds have a hard skin and storage resistance is quite long | The thin skin of the pulp contains a lot of fruit juice and the characteristi c taste and aroma of savoy |
| 2. | Cape tree (*Mimuaqos elengi)*  | Small size has five to six petals Star-shaped And Fragrant | Elliptical in shape, has leaf bones so clearly shiny green color | Seeds Ape blackish-brown | The skin and pulp are thin, the fruit cannot be consumed |
| 3. | Butter tan (*Pouteria campachiana*)  | The petals of the five flowers are white and smell good | Leaves are gathered at the ends of twigs that somewhat resemble spoons | The size of a large seed resembles a piece of human kidney | Tastes like sweet potatoes with thick flesh and deep yellow color |
| 4. | Sawo Kecik (*Manikara Kauki)* | The flower is in the axils | The lower surface of the leaves | Flat shape and dark brown in | Eggplant-like shape is long, oval |

How to cite: Author. (2024). Title, Times New Roman, Bold, 20 pts, max 14 words. *International Journal of Science and Education, 1*(1). https://doi.org/10.25217/0020247417100
**E-ISSN:** 9999-9999
**Published by:** Foundation of the Center for Human Development and Environmental Studies

| | | | | | |
|---|---|---|---|---|---|
| |  | of the leaves of the rounded buds | is whitish and smooth | color | and pistiled |
| 5. | Sawo durian (*Chrysophyllum caimito)*  | Large bell-shaped flowers are yellowish in color and have a distinctive aroma | Single leaves are golden brown in color, the leaves resemble durian leaves in general | Seeds like pea chips that amount to 7 seeds in the fruit | The skin of the fruit is shiny with a purplish brown color |
| 6. | Savoy (*Pouteria caminto)*  | Flowers clump on the twigs in groups | Alternatel y arranged and wavy leaf edges | Hard, lightning-black seeds | Transparent and juicy soft fruit textiles |

The first question was "Do you know about the Taxonomy of Tall Plants?", the answer to the question was 93.3% answered yes and 6.7% answered no, so it can be concluded that most of the UISU Biology students know about the Taxonomy of Tall Plants. And the statement "The learning module makes me happy to learn the material Taxonomy of Tall Plants", the answer to the question was 93.3% answered yes and 6.7% answered no, so it can be concluded that most UISU Biology students agree. The second question is "Have you ever observed the taxonomy of tall plants in plants directly?", the answer to the question was 93.3% answered yes and 6.7% answered no, so it can be concluded that most UISU Biology students have observed the taxonomy of tall plants directly." And the statement is "The Module Display is interesting to study until completion", the answer to the statement is 93.3% answered yes and 6.7% answered no, so it can be concluded that most UISU Biology students agree that the Module Display is interesting to study until completion.

The third question is "If so, what kind of plants did you observe?" the answer to the question was that 50% of students answered guava plants and 50% answered mangoes, rambuta, duku, and alvokado. so it was concluded that most of the UISU biology students observed the surrounding plants." And the statement "The pictures contained in the module motivate me to

International
JOURNAL OF SCIENCE AND EDUCATION
Website: https://journals.pspmas.org/index.php/ijose/index

study something?" the material of the answer to the statement was 93.3% answered yes and 6.7% answered no, so it can be concluded that most UISU Biology students agree that the pictures contained in the module make me motivated to study a material.

The fourth question is "Have you ever observed the taxonomy of tall plants of the Sapotaceae family on plants directly?", the answer to the question was 50% answered yes and 50% answered no, so it can be concluded that most of UISU Biology students have observed the taxonomy of tall plants of the Sapotaceae family on plants directly. And the statement "Using the learning module will not be boring", the answer to the question was 50% answered yes and 50% answered no, so it can be concluded that most UISU Biology students agree.

The fifth question is "Do you know exploration techniques?", the answer to the question was 93.3% answered yes and 6.7% answered no, so it can be concluded that most UISU Biology students know exploration techniques. And the statement "The information explained in the module makes me gain new knowledge", the answer to the question was 50% answered yes and 50% answered no, so it can be concluded that most UISU Biology students agree.

The sixth question was "Do you know the technique of characterizing plants?", the answer to the question was 93.3% answered yes and 6.7% answered no, so it can be concluded that most of the UISU Biology students know the technique of characterizing plants. And the statement is "The learning module is easy to use", the answer to the question is 50% yes and 50% no, so it can be concluded that most UISU Biology students agree.

The seventh question was "do you observe the characteristics of plants of the sapotaceae family", the answer to the question was 73.3% answered yes and 26.7% answered no, so it can be concluded that most UISU Biology students can observe the characteristics of plants of the sapotaceae family. And the statement, namely "The evaluation question sheet in the teaching module helps to explore the material", the answer to the question was 93.3% answered yes and 6.7% answered no, so it can be concluded that most UISU Biology students agree.

The eighth question was "apart from modules, scientific papers and powerpoints can you learn the taxonomy material of tall plants", the answer to the question was 93.3% answered yes and 6.7% answered no, so it can be concluded that most of the UISU Biology students can study the taxonomy material of tall plants. And the statement is "making handwriting for students as an independent teaching material", the answer to the question was 50% answered yes and 50% answered no, so it can be concluded that most UISU Biology students agree.

The ninth question is "does your lecturer use media that can help you in studying tall plant taxonomy material", the answer to the question was 93.3% answered yes and 6.7% answered no, so it can be concluded that most UISU Biology students use media that can help in studying tall plant taxonomy material. And the statement "modules help me learn to be directed and organized", the answer to the question was 50% yes and 50% no, so it can be concluded that most UISU Biology students agree.

The tenth question is "do you think there is a need to use modules as learning materials for tall plant taxonomy materials", the answer to the question was 93.3% answered yes and 6.7% answered no, so it can be concluded that most UISU Biology students need to use modules as learning materials for tall plant taxonomy materials. And the statement is "can understand the terms used in the module through the glycerium", the answer to the question was 93.3% answered yes and 6.7% answered no, so it can be concluded that most UISU Biology students agree.

Based on the results of the questionnaire analysis of learning media needs in the form of a high plant takaonomi module *Sapotaceae* For UISU Biology students, it can be concluded that

How to cite: Author. (2024). Title, Times New Roman, Bold, 20 pts, max 14 words. *International Journal of Science and Education*, *1*(1). https://doi.org/10.25217/0020247417100
**E-ISSN:** 9999-9999
**Published by:** Foundation of the Center for Human Development and Environmental Studies

UISU Biology students have understood the characteristics of plants and have made direct observations of plants. Many students agreed with the creation of the Sapotaceae family characteristic module as a learning companion, the results of the dissemination of a questionnaire of student interest in learning with the module obtained an average percentage of 89.3%.

The following are the results of the respondents' test on the feasibility of module learning resources

| **Less** | **Name** | **Shoes** | **Score Percentage** |
|---|---|---|---|
| 1. | Wasihatul Afrah | 98 | 81,66% |
| 2. | Lutfia and others | 80 | 66,66% |
| 3. | Della Amanda Putri | 80 | 66,66% |
| 4. | Dhiyah Azhari Pangathousands | 98 | 81,66% |
| 5. | Asrina Hasibuan | 80 | 66,66% |
| 6. | Amanda Bako | 98 | 81,66% |
| 7. | Suranta Uli br Ginting | 80 | 66,66% |
| 8. | Khofifah Intan Empress | 98 | 81,66% |
| 9. | Riska Rahma Putri | 80 | 66,66% |
| 10. | Veronika | 80 | 66,66% |
| 11. | Yusi Salabila | 80 | 66,66% |
| 12. | Memory Khairani | 80 | 66,66% |
| 13. | Indah Meliana | 80 | 66,66% |
| 14. | Ekbal Awaluddin | 80 | 66,66% |
| 15. | Zikir Amen | 98 | 81,66% |
| 16. | Dini Rafika | 98 | 81,66% |
| 17. | Yusra Laila | 80 | 66,66% |
| 18. | Johan Ph Pardosi | 80 | 66,66% |
| 19. | Hafifah Anggraini | 98 | 81,66% |
| 20. | Rizka Khoirunnis | 80 | 66,66% |
| 21 | Moses | 98 | 81,66% |
| 22 | Riza sibuea | 80 | 66,66% |
| 23. | Renia Ramadan | 80 | 66,66% |
| 24. | Dilla anggraini | 98 | 81,66% |
| 25. | Puput Amelia | 98 | 81,66% |
| 26. | Ayla Saraggi | 80 | 66,66% |
| 27. | Mariana Ritonga | 80 | 66,66% |
| 28. | Goodbye | 80 | 66,66% |
| 29. | I'm looking for salvina | 80 | 66,66% |
| 30 | Dinda | 80 | 66,66% |
| | **Sum** | 2.580 | 2149,80% |
| | **Average** | 86 | 71,66% |

a.) Lecturer in Tall Plant Taxonomy Course

The assessment by the lecturer of the tall plant taxonomy course aims to determine the feasibility of this module as a companion learning resource. The assessed aspects can be seen as follows:

| **It** | **Assessment Items** | **Shoes** |
|---|---|---|
| 1. | The module has an attractive appearance | 3 |
| 2. | Fill in modules according to indicators | 3 |
| 3. | The order of components in the module is clear and systematic | 2 |
| 4. | The headings in the modules correspond to the purpose | 3 |

International JOURNAL OF SCIENCE AND EDUCATION
Website: https://journals.pspmas.org/index.php/ijose/index

| | | |
|---|---|---|
| 5. | Plant Taxonomy Module Suitable for Biology Students | 3 |
| 6. | Images and illustrations of module books are sourced from valid and according to the material | 2 |
| 7. | Module factual data accuracy | 2 |
| 8. | The material in the module discusses the characteristics of the Sapotaceae family | 4 |
| 9. | Suitability of material in the development of science | 3 |
| 10. | suitability of the explanation of the taxonomic of tall plants | 4 |
| 11. | Format tests in modules can improve biology students' understanding | 3 |
| 12. | Customization of summaries in the content of the module | 4 |
| 13. | The suitability of the answer key with the formative test provided in the module | 3 |
| 14. | Module objectives in accordance with the content of the module | 3 |
| 15. | The text or writing on the module is easy to read | 2 |
| | **NUMBER OF SCORES** | **44** |
| | | |

$$\frac{\text{Total score}}{\text{Highest Score}} \times 100\% \qquad \frac{44}{60} \times 100\% = 73.33\%$$

It is known from the feasibility of this module that the percentage of the results of the questionnaire distribution above is 73.33% with the category of Suitable for use with a slight revision.

a) Assessment of media experts validates the completeness of the module content

| It | Assessment items | Shoes |
|---|---|---|
| 1 | What About Module Covers | 4 |
| 2 | Module Table of Contents | 3 |
| 3 | Module Summary | 4 |
| 4 | Module Glossary | 4 |
| 5 | module book size conformity with IOS standard, A4 size | 3 |
| 6 | Module books do not use more than three font types in a proportional module book | 3 |
| 7 | Module book titles are displayed more prominently than the background color | 4 |
| 8 | The composition of layout elements (titles, illustrations, logos) is balanced and has a pattern that is in accordance with the layout of the content of the module book | 4 |
| 9 | Cover layout (image and text layout) in the Proportional Module Book | 3 |
| 10 | The letters used do not reduce the level of readability and clarity of the information conveyed | 3 |
| 11 | proportional margin to module size | 3 |

How to cite: Author. (2024). Title, Times New Roman, Bold, 20 pts, max 14 words. *International Journal of Science and Education*, *1*(1). https://doi.org/10.25217/0020247417100
**E-ISSN:** 9999-9999
**Published by:** Foundation of the Center for Human Development and Environmental Studies

| | | |
|---|---|---|
| 12 | Consistent Sliding Patterns and Subtitle Colors | 3 |
| 13 | The rules for presenting images have been in accordance with the material | 3 |
| 14 | The images contained in the module are clear and consistent | 4 |
| 15 | The combination of colors in the module book is appropriate | 3 |

$$\frac{\text{Total score}}{\text{Highest Score}} \text{ X } 100\% \qquad \frac{51}{60} \text{ X } 100\% = 85.00\%$$

It is known from the assessment of media experts to validate the completeness of the content of the module obtained, the percentage of the results of the distribution of the questionnaire above is 85.00% with the category of suitable for use without revision.

Module Validation Results by Validators

| **No.** | **Name** | **Information** | **Presented** |
|---|---|---|---|
| 1. | Drs. Yusri Fefiani, M.Si | Lecturer | 73,33% |
| 2. | Pandu Prabowo, S.Pd., M.Pd. | Media Members | 85,00% |

**B. Discussion**

From the results of the research on the development of tall plant modules *of the Sapotaceae* Family in the Lubuk Pakam Fruit Park area, Deli Serdang Regency, 6 Genus and 6 Species were found. To find the results of the type of characterization exploration in the research in the Lubuk Pakam Fruit Park, Deli Serdang Regency, a qualitative description method is needed, the tools used are stationery, questionnaires, cameras, meters, calipers, bow rulers, knives and pH-meters.

The characterization identification method with the preparation of the description was carried out by observation method at the research site. The purpose of using this method is to collect data directly at the research location, both in the form of plant description data and environmental description. The method of sampling plants uses purposive sampling. The purpose of using this method is to determine plant samples that are in accordance with the criteria of sample plants needed in the study.

The preparation of supporting data uses the interview method. The purpose of using the interview method is to explore and obtain the secondary data needed in this study. The observation variables were in the form of a description of the research location (altitude of the place, average temperature of the environment, air humidity, and type of land use for rukam plants) and plant descriptions based on the descriptor of tropical fruit crops (IPGRI 1980).

Of the 6 characters observed, the most character differences were found in the qualitative characters of plants, such as the characters of tree roots, trunks, leaves, flowers, fruits, and seeds. Meanwhile, Trimanto (2012) stated that characterization is preliminary data to complete information on the diversity of a plant.

From the results of this study, it can be known that the Development of the Taxonomy Module of Tall Plants of the Family *Sapotaceae* with the ADDIE method (Analysis, Disegn, Development, Implementation, Evaluation) obtained the results of the dissemination of the questionnaire online through google forms to UISU biology students with the results of the dissemination of the questionnaire for the analysis of teaching material needs in the form of a tall plant taxonomy learning module obtained an average result of 89.3% with the category of Strongly agreeing. Biology students strongly agree in learning to use teaching modules in order to help students in teaching and learning activities, and the results of the dissemination of student response questionnaires to the feasibility of learning resources in the form of modules were obtained on average 71.66% with a category of suitable for use with slight revisions.

And the results of the dissemination of the questionnaire with lecturers in the tall plant taxonomy course at the Islamic University of North Sumatra with the results of the module feasibility test in learning obtained results with an average of 73.33% with the category of

suitable for use with a slight revision in the module. And from the distribution of questionnaires to media experts, it can be concluded that the taxonomy teaching module of the *Sapotaceae family* is suitable for use without revision.

## CONCLUSION

Based on the discussion that has been carried out by the researcher, it can be The following conclusions are drawn:

1. The results of the identification of the taxonomy of tall plants of the *Sapotaceae* family are plants that can live ecologically in tropical climates, this plant has taproots, the Sapotaceae family generally contains white latex/sap on each branch of the *Sapotaceae* family, the main stem growth type grows straight upwards indefinitely and has many branches of one branch of the Sapotaceae family. Leaf shape, single leaf of the *Sapotaceae* family consists of an oval shape, long rounded with wavy edges scattered at the end of the stem, rarely facing generally there is no stipula/passenger leaf. The fruit shape of the sapotaceae family has 2 types of 1st shapes. Like belinjo, the size of the fruit is the same size as the seeds, generally rarely consumed by the public and the 2nd form. Round, oval, approximately 5-7 cm in diameter, generally this savoy can be consumed with a sweet taste containing a lot of water in the thick flesh, generally the characteristic of savoy fruit has a receptacle at the base of the fruit, the outer skin of the fruit is protected by thin black skin which is easy to clean when the fruit is plucked will appear smooth and clean, ripe fruit will emit a distinctive savoy smell. Savoy seeds are generally brownish-black with a thick seed skin that can be stored for a long time. The sapodilla fruit that cannot be consumed by the tree is used as an oxygen producer because it can absorb various kinds of pollution and make the air a scavenger, flood prevention, and road protector/blower.
2. The results of the validity of the Sapotaceae tall plant taxonomy module book produced in this study have module specifications packaged in the form of *Hardfile*. The module is A4 *size lanscape*, the module is printed using Art paper. The material in this module includes the taxonomy of tall plants, the characteristics of Sapotaceae plants and the pictures in the module are presented using actual photos. The typeface used is no more than three types of fonts with the font size in the title being larger than the description of the material. The results of the development of learning resources in the form of the Sapotaceae Family module were declared suitable to be used as learning resources by students.
3. The results of the response test of student interest in learning using modules through the dissemination of questionnaires in the form of questionnaires The questionnaire method used is the online questionnaire method. Online questionnaires are created using the google form feature. Furthermore, the questionnaire was distributed by utilizing social media by distributing the link address from the google form that had been made by students at FKIP Islamic University of North Sumatra with the target of biology education students with a total of 30 respondents for the online questionnaire. The results of student interest in learning with modules obtained an average percentage of 89.3%. And the feasibility results of the module used according to the lecturer in charge of the tall plant taxonomy course obtained a result of 73.33% with the category of Suitable for use with a slight revision.

### B. Suggestions

Based on the objectives and benefits of the research described in the previous chapter, the researcher provides suggestions to several parties,

How to cite: Author. (2024). Title, Times New Roman, Bold, 20 pts, max 14 words. *International Journal of Science and Education*, *1*(1). https://doi.org/10.25217/0020247417100
**E-ISSN:** 9999-9999
**Published by:** Foundation of the Center for Human Development and Environmental Studies

Among others:

1. For students, learning resources in the form of this module can be used as an additional reference in learning Tall Plant Taxonomy material. In addition, it can also be used as an additional collection of books in the Biology library.
2. For educators, learning resources in the form of this module can be used as an additional reference in teaching Tall Plant Taxonomy material

4. For researchers, learning resources in the form of this module can be used for further research. It is recommended to be able to improve this research so that it can produce better products

## REFERENCES


Abrori, M., 2016. *Diversity of Underplants in the Gadungan Mangosteen Nature Reserve, Puncu District, Kediri Regency.* Research Report. Malang: Department of Biology, Faculty of Science and Technology, Maulana Malik Ibrahim State Islamic University.

Atriyanto and Sulistiyo.2014. *The Effect of Expository Learning Strategies on Student Learning Outcomes in the Training Subject to Improve Compact Casette Recorder Class XI TAV at SMA Negeri 2 Surabaya*. Journal of Electrical Engineering Education. Vol 03 No 02.

B, Suryosubroto. 1983. *Teaching System with Modules,* Jakarta: Bina Aksara.

Coal, Hamdan Husein, 2020. *Interactive Learning Media*. Semarang: Fataawa Publishin.

Branch, Maribe Robert, 2009. *Intructional Design: The ADDIE Aproach*. USA: University of Georgia.

Cambell, Neil A, Jane B. Reece, and Lawrence G. Mitchell, 2008. Biology volume 2 5th edition. Wasmen Manalu. Jakarta: Erlangga Publishers.

Fahrurrozi and Mohzana, 2020. *Development of Learning Tools: Theoretical and Practical Review*. Lombok: Hamzanwadi University Press

Hanafy, Muh. Sain, (2014) *"The Concept of Learning and Learning,"* Lentera Pendidikan : Journal of Tarbiyah and Teacher Training 17, no. 1: 74, accessed on November 15, 2021, https://doi.org/10.24252/lp.2014v17n1a5

Kurniawan, Citra, and Dedi Kuswandi, 2021. *Development of E-Module as Digital Literacy Media in 21st Century Learning*. Lamongan: Academia Publication.

Panggabean, Nurul Huda and Amir Danis, 2020. *Design for the Development of Science-Based Teaching Materials.* Medan: Yayasan Kita Menulis.

Permendikbudristek, (2022). *Guidelines for the Implementation of the Curriculum in the Context of Curriculum Recovery*.

Quraish, Shihab Muhammad (2007). *Tafsir Al-Misbah*. Jakarta: Lantern of the Heart.

Rayanto, Yudi Hari and Sugianti, 2020. *Research on the Development of ADDIE and R2R2 Models*: Theory and Practice. Pasuruan: Academic & Research Institute.

Salim and Haidir, 2019. Educational Research: Motede, Approach, and Types. Jakarta: Kencana.

Sari, Murni Sapta, 2019. "Taxonomy Learning Through a Contextual Approach as an Effort to Increase Student Interest in Taxonomy." Proceedings of the National Seminar on Science and Science Education VII UKSW, n.d

Sari, Visca Riana, 2012. "Morphological Variations of Kepel Plant (Stelechocarpus Burahol Hook. F and Thomson) which grow at different heights." Thesis, 2012. http://repository.unair.ac.id/25681/1/SARI, VISCA R.pdf.

Setiyadi, Muhammad Wahyu, Ismail, and Hamsu Abdul Gani, (2017) *"Development of Biology Learning Module Based on a Scientific Approach to Improve Student Learning Outcomes," Journal of Educational Science and Technology* (EST) Vol. 3, No. 2: 103, accessed on November 6, 2021, https://ojs.unm.ac.id/JEST/article/view/3468

Sudjana. 2007. Teaching Media. Bandung: Sinar Baru Algasindo.

Sugiono, 2018. *Quantitative, Qualitative, and R&D Research Methods.* Bandung: Alfabeta.

Sunarjono, H. 2007. *Gardening 21 types of fruit plants.* Independent Spreader. Jakarta.

International
JOURNAL OF SCIENCE AND EDUCATION
Website: https://journals.pspmas.org/index.php/ijose/index

Tjitrosoepomo, Gembong. 2009. *Taxonomy of Plants. Yogyakarta:* Gadjah Mada University Press.

Triono, Slamet, 2021. Dynamics of A-Module Arrangement. Indramayu: C.V. Adanu Abimatha

Wahyuni, Dwi Kusuma, Wiwied Eka Sari, Joko Ridho Witono, and Hery Purnobasuki, . Toga Indonesia. Surabaya: Airlangga University Press

Winarno, Surakhmad. 2000. *Scientific Psychology*, Bandung: Tarsirto www.baione.id first indexed by Google in March 2023

Yaumi, M. 2017. *Learning Design Principles*: Adapted to the 2013 Curriculum. Jakarta: Kencana.

2015 *Curriculum-Based Learning Planning* 2013. Yogyakarta: Deepublish.



How to cite: Author. (2024). Title, Times New Roman, Bold, 20 pts, max 14 words. *International Journal of Science and Education, 1*(1). https://doi.org/10.25217/0020247417100
**E-ISSN:** 9999-9999
**Published by:** Foundation of the Center for Human Development and Environmental Studies