



The feasibility of herbarium based local wisdom on plant structure and development subject



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ABSTRACT

The development of herbarium based on local wisdom as a learning media for the subject of plant structure and development, especially traditional food, is still very rare. This is very unfortunate because local wisdom contains pedagogical values that play an important role in improving the quality of learning. This study aims to determine the feasibility of the herbarium developed according to the validation results of the instructional media expert and herbarium expert. The development model used is ADDIE and the stages carried out in this research are up to the development stage. The results showed that the herbarium based on local wisdom developed was suitable as a learning media for the subject of plant structure and development, with an average score of the validation results of the two validators was 81,25. Both validators suggest using plant specimens that display complete organs, consisting of roots, stems, leaves, flowers, fruits, and seeds in making herbariums.

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INTRODUCTION

Indonesia ranks fourth of the 25 global biodiversity hotspots (Rintelen, Arida, & Häuser, 2017). Local communities in each region utilize and conserve biological resources to meet their daily needs, thus producing local wisdom that is different from other regions. Local wisdom turns out to have pedagogical values that play an important role in the field of education (Widodo, Priyanti, & Salimi, 2016). The development of learning models and learning tools based on local wisdom has begun to be developed in Indonesia. However, the cost of the development is intended for the school level (Jufrida, Basuki, & Rahma, 2018) and students' character (Tresnawati, 2018). Based on the results of observations made by researchers on various scientific journal articles, the development of a learning component based on local wisdom that is intended for higher education

and oriented towards understanding concepts is still very rare. Various forms of local wisdom exist in the life of Indonesian people and one that is very easy to find is traditional food.

Traditional food is a part of local wisdom that can become the identity of a certain community. There are various categories of traditional food when viewed from its popularity, one of which is a popular traditional food. This traditional food is still loved by many people, many sellers, and buyers, and has become an icon of an area (Harmayani, Santoso, & Murdijati, 2017). Lodeh Kikil is an example of popular traditional food from the Jombang Regency. This traditional food has become an icon of culinary tourism in the Jombang Regency and has never been studied as a learning resource or learning media, especially in biology learning.

The raw materials used in the making of Lodeh Kikil are mostly plants. Plants used in making Lodeh Kikil include: *Allium sativum*, *Allium cepa*, *Cymbopogon citratus*, *Syzygium polyanthum*, *Curcuma longa*, *Kaempferia galanga*, *Alpinia galanga*, *Zingiber officinale*, *Citrus hystrix*, *Capsicum frutescens*, *Cocos nucifera*, etc. This is a potential that can be used as a basis for developing learning media to study plant structure and development. The form of learning media being developed is a herbarium. The herbarium that had been developed before was the Pteridophyte herbarium. Previous developments received a positive response from students as users (Minah, Ami, & Meishanti, 2018), but it has not been related to local wisdom. In this study, the herbarium was developed based on local wisdom so that it is more contextual.

The herbarium is a plant preserved in dry form that is accompanied by identity and attached to a paper. Herbarium as a learning media is known to support learning activities, help understand the material (Dikrullah, Rapi, & Jamilah, 2018), and increase learning effectiveness (Handayani, Napitupulu, & Hadap, 2016). The types of plant specimens used for the development of the herbarium in this study are the plants used as raw materials for making Lodeh Kikil. This is done because the types of plants used in Lodeh Kikil include monocot and dicot plants, so it is relevant to be used as examples in studying plant structure and development, especially Angiosperms. Besides, the selection of this type of plant is a form of integration of local wisdom of traditional food into learning media. The integration is expected to introduce the young generation, especially students, to local wisdom in their area so that they can play an active role in efforts to preserve local wisdom. A good learning media must be assessed for its feasibility. The purpose of this study was to determine the feasibility of the herbarium being developed. Feasibility is determined from the assessment of the instructional media expert and herbarium expert.

RESEARCH METHODS

Research Design

This research is developmental research that refers to the ADDIE model (Branch, 2009). The ADDIE model consists of five stages, but in this study, only three stages were used namely analysis, design, and development. The fourth and fifth stages, namely implementation and evaluation, will be carried out in further research. The analysis phase was carried out to determine the need for local wisdom-based herbarium development as a learning media for studying plant structure and development material. The results from the analysis phase are used to determine the appropriate herbarium design. The determination of the herbarium design included in this design stage includes technical and substantive specifications of the herbarium being developed. The next stage is the third stage, namely the development of the herbarium. At this stage of development, the herbarium is made and assessed for its feasibility by the validators.

Population and Samples

The validator used in this study were two people. One person is a learning media expert who has expertise in developing biology learning media. The other is a herbarium specialist with expertise in an herbarium. The educational qualification for the two validators is a master's degree.



Instruments

There are several types of instruments used in this study according to the stages in the ADDIE model. The instruments used at the analysis stage were a needs analysis questionnaire and an interview guide. This questionnaire and interview guide were used to collect data on the importance of herbarium development from the lecturer who taught the plant development structure subject and students. At the development stage, during the herbarium validation process, the learning media expert validation sheet and the herbarium expert validation sheet were used.

Procedures

This research procedure follows the steps in the ADDIE model. The first stage is a needs analysis, which is conducted to determine the factors that support the development of this local wisdom-based herbarium. The second stage is the preparation of the herbarium design according to the results of the needs analysis. The herbarium design compiled includes both technical and substantive aspects. Technical aspects are, for example, types of plants and material concepts, will be displayed. The third stage is the development of the herbarium, which is done at this stage is the manufacture of the herbarium according to the design and expert validation to determine its feasibility.

Data Analysis

The data obtained were then analyzed descriptively (Ananta, Syamswisna, & Ariyanti, 2018). The data obtained from the results of the needs analysis questionnaire and interviews are arranged in tabular form to facilitate the identification and description of things that are needed in herbarium development for the plant structure and development subject. Data from expert validation in the form of a mean score is calculated by dividing the total score obtained by the maximum total score. The mean obtained is then interpreted according to the category in [Tabel I](#).

Table I. The category of validator assessment

No	Mean	Category	Explanation
1	76-100	Very feasible	Usable
2	56-75	Feasible	Usable but requires a little revision
3	40-55	Less feasible	Not usable
4	50-39	Not feasible	Not usable

(Rezeqi & Handayani, 2018)

RESULTS

The results of the needs analysis stage ([Table 2](#)) show that the herbarium based on local wisdom, especially Jombang traditional food, has never been developed or used as a learning media for the subject of plant structure and development. The lecturer and students responded positively to the herbarium development plan based on local wisdom as a learning media for the plant structure and development subject. The lecturer stated that a herbarium is needed to provide a real picture of plant structure without spending a lot of time so that the time can be used for other more needed practicum activities.

Based on [Figure 1](#) shows an example of a developed herbarium. The data obtained from this study were the value of the herbarium validation results by an instructional media expert ([Table 3](#)) and the herbarium validation results by a herbarium expert ([Table 4](#)).

Table 2. The results of the needs analysis stage

Opinions of the lecturer who is the subject of plant structure and development	Opinions of students who take the course plant structure and development
The lecturer has never used traditional food as a learning media or linked it to the course material for plant structure and development.	Students rarely get to know the traditional food of the Jombang Regency.
The lecturer has never developed learning media based on local wisdom, including traditional food.	Students feel motivated to study plant structure through the herbarium.
The lecturer is very interested in learning media based on traditional food of the Jombang Regency for the material plant structure and development.	Students are interested if there is an herbarium that is developed based on the traditional food of the Jombang Regency.
The lecturer wants the development of learning media in the form of a herbarium based on local wisdom, for example, the traditional food of the Jombang Regency.	

**Figure 1.** Developed herbarium**Table 3.** The results of the validation of the instructional media expert

No.	Indicator	Score	Category
1	Appearance	95	Very feasible
2	Durability	85	Very feasible
3	Ease of use	85	Very feasible
4	Compatibility with teaching material	85	Very feasible
Mean		87,5	Very feasible

Table 4. The results of the validation of the herbarium expert

No.	Indicator	Score	Category
1	Specimen quality	80	Very feasible
2	Completeness of plant organs	70	Feasible
3	Identification sheet	75	Feasible
4	Presentation	75	Feasible
Mean		75	Feasible

DISCUSSION

The needs analysis shows that lecturers and students need a herbarium as a learning media for the subject of plant structure and development. The lecturer especially needs a herbarium to accompany practicum activities to shorten learning time. The previous research states that herbarium can make it easier for students to observe and identify plants (Syamsiah, Nurhayati, & Hiola, 2020). A good herbarium should feature well-preserved plant structures, to provide a representative model over a long period (Takano et al., 2019). Therefore, the researchers compiled the herbarium design according to the criteria and carried out a good herbarium-making procedure. Plant specimens that will be preserved are intact and morphologically good specimens. The specimens were then cleaned and dried. The complementary components of the herbarium that are also compiled are a description of the morphology, habitat, role, and classification of the plant.

The herbarium based on local wisdom developed in this study uses plant specimens which are the raw material for making Lodeh Kikil. The results of the validation of the instructional media expert showed that this herbarium was very feasible and could be used as a learning media because it obtained an average score was 87.5. Instructional media to be used in the classroom must first be validated by an expert to obtain eligibility. The herbarium is one of the learning media so it needs to be validated to be suitable for use in learning activities (Windayati, Afifah, & Karno, 2017). The assessment indicators used include appearance, durability, ease of use, and compatibility with the teaching material. The herbarium display obtained the highest score compared to the other indicators. The three other indicators received the same score, namely 85. Herbarium experts considered that this herbarium was feasible and could be used but needed a little revision. The revision referred to is related to the completeness of the plant organs displayed in the specimen. Some herbarium specimens do not display complete organs. This was considered by the validator as a deficiency and needed to be corrected.

Good learning media are those that can convey subject matter to learners (Resviya, 2018). The local wisdom-based herbarium developed in this study is a good learning media in terms of expert assessment of learning media. The concept of teaching material conveyed through this herbarium, namely the plant structure and development, is also feasible, although it cannot be said to be perfect. The herbarium developed is a contextual learning media because it integrates local wisdom around the learners, namely traditional food (Lodeh Kikil). Traditional food is not only a means of fulfilling community nutrition but also contains pedagogical values that can be implemented in learning activities (Tyas, 2017; Pathuddin & Raehana, 2019). Contextual learning media or learning activities will provide more meaning to learners so that they can increase learning motivation and understanding of concepts (Ramdani, 2018). The attractiveness and response of users, in this case, students, are still unknown because research related to this has not been carried out.

The herbarium has long been used as a means of plant identification among botanists because it can show the morphological characters of plants that can be related to the environment in which they live. Today's developments in science and technology have even made herbariums a source for DNA analysis of plant species that have become extinct (Lang, Willems, Bossdorf, & Scheepens, 2018). A good herbarium is a herbarium that displays plant specimens with complete plant organs and in good condition (not damaged or moldy). The completeness of the organs needs to be considered so that the herbarium users can study the structure and development of organs from one plant specimen as a whole. The good condition of the specimen will provide an understanding of the correct concept of the structure and development of the plant organ (Girmansyah, Santika, Rugayah, & Rahajoe, 2018). This makes the herbarium a biology learning media that needs to be used and provided in educational institutions.

CONCLUSION

The herbarium based on local wisdom developed through this research is very suitable to be used as a learning media to study plant structure and development because it gets a score was 81,25 from the two validators. Besides, the types of plants used as specimens in the developed herbarium are quite relevant because they present examples of monocot and dicot plants. The development of herbarium based on local wisdom needs to be continuously carried out as an effort to preserve Indonesia's cultural and natural wealth.

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