JPPIPA 9(Special Issue) (2023)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Development of Ethnoscience-Based Science Education Module Using a Case Based Learning Model

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Received: October 12, 2023
Revised: November 29, 2023
Accepted: December 25, 2023
Published: December 31, 2023

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DOI: 10.29303/jppipa.v9iSpecialIssue.6123

Abstract: This research is a research and development (R&D) study using the 4- D model. The research aims to produce valid a integrated ethnoscience science education module using a case based learning model. The data sources consisted of three expert validators who used validity instruments with four indicators (structure, organization of material, language, and appearance). The research data were analyzed using a quantitative descriptive method. Test the validity of the learning tool using score validation analysis. The results of the validity test show that the average score validation for structure module is 3.89 with a very valid category, for the material's organization it is 3.66 with a very valid category, for the language it is 3.67 with a very valid category, and for the appearance it is 3.73 with a very valid category. With a very valid category, the overall average mark validity is 3.74.

Keywords: Case Based Learning; Ethnoscience Modules; Science Education

Introduction

In the era of the Industrial Revolution 4.0, education is experiencing a major upheaval with a tremendous acceleration of knowledge increase. This rapid increase in knowledge is supported by the utilization of digital media and technology. The changes made are not only in the way of teaching, but more essential is the change in perspective on the concept of education itself. Therefore, the government continues to make various innovations to improve the quality and quality of education, one of which is by improving the curriculum. The Merdeka Curriculum has the essence of independent learning, which helps students and teachers be more creative and innovative, more free to think, and take part in learning more enjoyably (Daga, 2021). The MBKM curriculum that is currently implemented changes the learning pattern from teacher centered to student centered, where student activeness is prioritized in their learning activities. Students are trained to be able to discover and learn concepts independently, and connect the concepts they learn with their daily lives (Kemendikbud, 2022).

Based on the results of observations that have been made at the PGSD Study Program, FKIP, Mataram University, it is known that the ethnoscience- integrated science education module is not yet available. In addition, science literacy skills in the learning process do not appear to be clearly developed, and have not emphasized the meaning of science in culture in society so that students have difficulty in linking learning materials with the culture of the local community. The use of modules is actually a systematic guide that students must do in finding and learning a material concept in the learning process.

Modules are teaching materials in the form of sheets, containing material, summaries, tasks given to students. Modules need to be designed in such a way as to increase learning activities and student

How to Cite:
Wardani, K.S.K., Astria, F.P., & Nurwahidah, N. (2023). Development of Ethnoscience-Based Science Education Module Using a Case Based Learning Model. *Jurnal Penelitian Pendidikan IPA*, *9*(SpecialIssue), 473–478. https://doi.org/10.29303/jppipa.v9iSpecialIssue.6123

thinking creativity. Module presentation can be innovated with ethnoscience content using local cultural aspects in learning. Ethnoscience learning aims to introduce students to facts that have developed in the community, then associated with scientific science materials and knowledge. In learning, an innovative learning model is needed that is student-centered by involving the active role of students and can provide opportunities to build knowledge. The right learning model to be combined with the module is a model that is able to activate students through scientific inquiry activities (Prastowo, 2015 ; Rahayu & Sudarmin, 2015).

The case-based learning model is a constructivist-oriented learning model with active student participation so that students can form their own knowledge. In case based learning, students are given a realistic problem scenario, a case, which can be studied in real terms by examining how the case is solved or interactively trying to solve the case (Çimen, 2021). With the cases presented in case- based learning, students are given the opportunity to practice their science skills. Cases are closely related to problems, so students can improve their science literacy skills. In addition, a case certainly contains many things, can relate several concepts at once, so that students can practice their skills related to connections (Sato & Rogers, 2010; Kazempour, 2014).

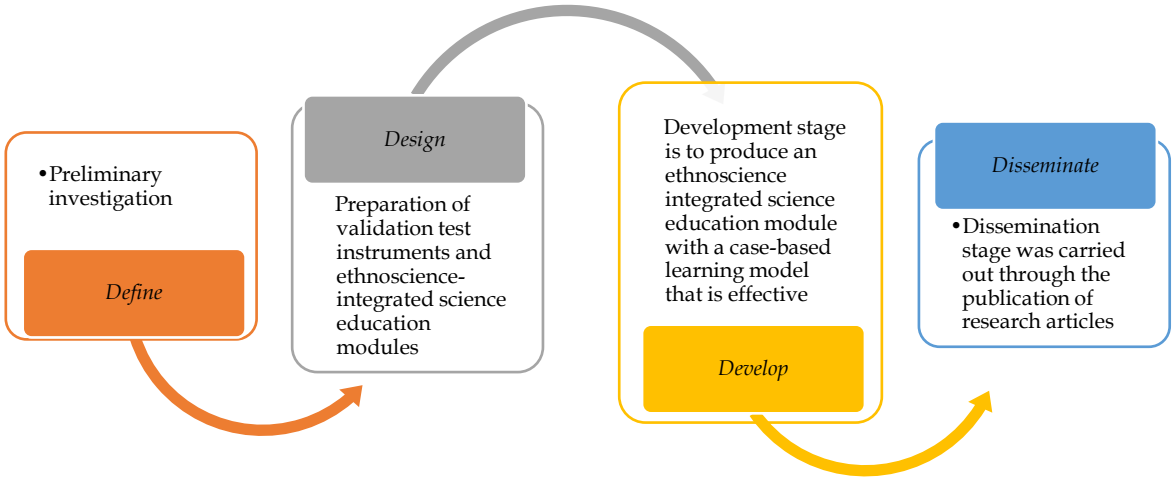
The characteristics of case-based learning are as follows: In Case is an educational instrument that appears in the form of a narrative. Narratives bring real-life situations into the classroom. The class and teacher work on these real-life problems collectively. Study Questions a list of study questions presented at the end of each case. Study questions promote understanding because they encourage students to apply what they know in analyzing data and proposing solutions. Small group work students discuss their responses to the study questions in small study groups. Students have the opportunity to discuss cases and questions with each other prior to whole class discussion. Group discussion is requires students' active involvement in the learning activity. Follow-up activities can be done individually or in groups through textbooks, articles from newspapers and magazines, tables, data graphs, research reports, videos and written information and other visuals can be the source (Sato & Knaus, 2023).

Ethnoscience learning aims to provide students with an understanding of facts that have developed in society, then linked to scientific knowledge. Knowing about ethnoscience in their environment will help students understand the lesson because they can see and feel the original science contained in the community (Haspen, et al., 2021 ; Hikmawati, et al., 2021). The process of developing a community's indigenous scientific knowledge and then studying it in scientific science is known as the ethnoscience approach (Khoiri & Sunarno, 2018: Hermanto, 2021). According to the definition of science, which is the study of matter, people, and the interactions between people and other materials, science is the study of natural phenomena that arise in human life (Sudarmin, 2015 ; Suastra, et.al., 2017). In order to ensure that science education, in particular, benefits from the application of the ethnoscience approach, which is essential for sustaining and preserving local culture, and to boost student engagement in the classroom (Sumarni, 2018 ; Wardani, 2021).

Knowledge that is specific to a community is known as ethnoscience (Imansari et al., 2018 ; Nuralita, 2020). Students' learning environments can be made more engaging by implementing ethnoscience-based learning (Widyaningrum, 2018; Zidny & Eilks, 2022). Students using ethnoscience-based learning can also connect course materials to their surroundings. Ethnoscience-based education can force instructors and students to apply their native cultures. Local culture is applied by educators and students (Wahyu, 2017). Based on the explanation above, it is necessary to conduct aresearch entitled "Development of Ethnoscience-Based Science Education Module Using a Case Based Learning Model".

Method

This research uses research and development methods or better known as Research and Development (R&D) which is a research method to produce a certain product and then test its effectiveness (Sugiyono, 2013). In this development research, a teaching material product will be produced, namely a science education module integrated with ethnoscience with a case-based learning model. The research and development design used in this research is the 4D model (Thiagarajan, 1974). which consists of from define, design, develop and disseminate stages.



Figur 1. Research Flow

Define

This initial stage aims to find out and define the needs in the learning process and collect information related to the Module to be developed. To obtain this information, instruments such as observation sheets, interview sheets, and curriculum studies are used. At this stage, data on material coverage according to the curriculum is obtained, namely sound and the sense of hearing, measurement, heat, and biotechnology.

Design

Information obtained at the define stage related to the development of ethnoscience modules is then collected and used as a reference to design ethnoscience modules with a case-based learning model. The things done in this stage include: Preparation of validation test instruments: The validation test instrument is an instrument used to measure the validity of the ethnoscience integrated science education module developed. The validation instrument developed in this study was a module validation sheet. After validation by two validators with doctoral qualifications, a relevant module validation sheet was used for the validity test. Than, Preparation of ethnoscience-integrated science education modules: In the early stages of development, this Ethnoscience-integrated Science Education module was developed as a supporting teaching material. Elementary Science Education subject which includes the activities of the Sasak people on Lombok Island. This ethnoscience integrated Science Education Module contains 2 CPMK which consists of 4 Sub-CPMK. Each Sub- CLO contains: introduction, material description, summary, student activity sheet, formative test, and bibliography.

Develop

The main objective in the development stage is to produce an ethnoscience integrated science education module with a case-based learning model that is effective and feasible for dissemination. The instruments used to test the validation and practicality of the modules that have been developed are validation questionnaires and student responses to modules.

Disseminate

After stages development completed, then proceed to the final stage, namely dissemination or disseminate the module. In this study, the dissemination stage was carried out through the publication of research articles.

There are several suggestions that need to be followed up as revision material. The suggestions given by the validators for improving the module in the module validation activity are presented as follows.

Before Revision After Revision

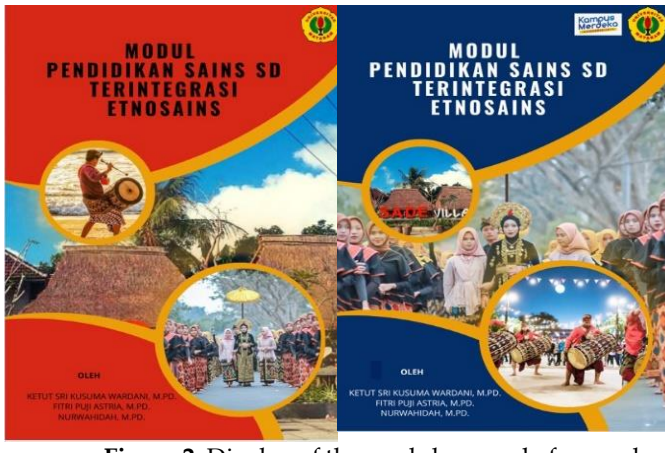


Figure 2. Display of the module cover before and after revision

The cover of the Module added the symbol of the independent campus and some pictures were arranged to be more symmetrical and attractive. In addition, the appearance of the introduction in Chapter III related to heat is adjusted with the introduction in other chapters so that the display format is uniform as shown in Figure 2.

Before Revision


PENDAHULUAN

Gambar 3.1 Kegiatan Menenun Tenun Sesek
(Sumber: https://bit.ly/menenun

Tenun sesek merupakan salah satu warisan kebudayaan suku Sasak yang masih dilestarikan hingga saat ini. Tenun *sesek* merupakan kain tenun ikat yang memiliki motif khas dan berwarna-warni. Tampilan tenun *sesek* yang menarik membuatnya banyak diminati. Pembuatan tenun *sesek* menggunakan bahan-bahan alami dan dilakukan secara tradisional. Rangkaian tahapan pembuatan tenun *sesek* melibatkan serangkaian aktivitas dan fenomena ilmiah. Keterkaitan konsep sains dalam fenomena ilmiah pembuatan tenun *sesek* akan diuraikan dalam Modul ini.

Modul Bab 3 ini akan membantu Anda untuk mempelajari lebih lanjut tentang konsep kalor dan perpindahannya. Adapun rincian materi yang Anda akan dipelajari yaitu:

A. Konsep kalor
B. Konsep perpindahan kalor
C. Konsep konduksi
D. Konsep reduksi
E. Konsep konveksi

After Revision


PENDAHULUAN

Tenun sesek merupakan salah satu warisan kebudayaan suku Sasak yang masih dilestarikan hingga saat ini. Tenun sesek merupakan kain tenun ikat yang memiliki motif khas dan berwarna-warni. Tampilan tenun sesek yang menarik membuatnya banyak diminati. Pembuatan tenun sesek menggunakan bahan-bahan alami dan dilakukan secara tradisional.

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Rangkaian tahapan pembuatan tenun sesek melibatkan serangkaian aktivitas dan fenomena ilmiah. Keterkaitan konsep sains dalam fenomena ilmiah pembuatan tenun sesek akan diuraikan dalam Modul ini.

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D. Konsep reduksi
E. Konsep konveksi

Figure 3. Introduction before and after revision

Another addition from the validator is to add an image reference "Weaving Sesek Khas Sasak" by creating a bit.ly reference according to the naming of the reference source used and correcting the numbering of images according to the guidelines. Module validation was carried out using a validity test sheet instrument consisting of: module structure, material writing organization, language, and appearance. The average validation score for module structure is 3.89 with a very valid category, material writing organization is 3.66 with a very valid category, language is 3.67 with a very valid category, and appearance is 3.73 with a very valid category. The total average validity value is 3.74 with a very valid category. Thus the module that has been developed is suitable for use in classroom learning, but before use the module must be revised based on validator input.

There are several factors that cause the developed module to be of high value with a very valid category and feasible to use, as follows. The module components were developed based on the indicators set out in the module validity test instrument. The module has met the content validity. This is because the module was developed based on the CPMK and Sub-CPMK that have been determined in the curriculum. This is adjusted through the curriculum analysis conducted. The module has met the construct validity. This is because the module is structured based on the link between one material and another and also the link between the material and its application in everyday life. Lecturers and practitioners who become validators do understand what students need in learning. So that when presented with an integrated ethnoscience module with a case- based learning model, the validators felt that this module was an example of a module that could help in classroom learning. Ethnoscience as an artifact can be integrated in the form of developing teaching materials (Arifah & Zainuddin, 2022; Puspaningrum, 2022) in the form of textbooks to improve students' science process skills, modules for process skills (Ni'mah, 2022), critical thinking skill (Risdianto, et al., 2020) and science literacy (Puspaningtyas, 2018 ; Sulistri, et al., 2020 ; Yuliana, et.al., 2021).

Conclusion

The results of the validity test show that the average score validation for structure module is 3.89 with a very valid category, for the material's organization it is 3.66 with a very valid category, for the language it is 3.67 with a very valid category, and for the appearance it is 3.73 with a very valid category. With a very valid category, the overall average mark validity is 3.74. At this stage, product finalization is carried out based on suggestions and input from the validator. The next stage is disseminating research results in the form of article publicationt.

Acknowledgments
This work was supported by the Mataram University under grant Number: 1910/UN18.L1/PP/2023. We would like to thank for continuing support and feedback from colleagues in the faculties of education.

Author Contributions
The authors provide equal contributions to this work.

Funding
This research received no external funding.

Conflicts of Interest
The authors declare no conflict of interest.

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