RESEARCH ARTICLE

Feasibility of submaterial module for reproductive system disorders based on inventory of medical plants

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Abstract: Modules are teaching materials designed to be studied by students independently or with minimal guidance from educators because they are equipped with their learning instructions. This study aims to determine the feasibility of teaching materials for reproductive system disorders submaterial modules from the inventory of medicinal plants that facilitate and relieve menstrual pain in Tumiang Village, Samalantan District, Bengkayang Regency. The research method was used research and development (R&D) Borg and Gall model, including potential problems, data collection, product design, design validation, and product revision. The validation of the teaching materials was done by five validators using validation sheets. The aspects assessed in the validation sheet consist of content, language, presentation, and graphics. The validation data were analyzed using the Content Validity Ratio (CVR) and the Content Validity Index (CVI). The results of the validation of the module's instructional materials yielded a CVR value of 1.00 for each criterion with a valid category and a CVI value of 1.00 with a valid category. Based on these results, it can be concluded that the module on reproductive system disorders from the results of the inventory of medicinal plants that facilitate and relieve menstrual pain is suitable for use as teaching material.

Keywords: module, reproductive system, teaching materials

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Introduction

Learning is a process of interaction that takes place in a learning environment between educators, students, and learning resources (Ubabuddin, 2019; Wardana & Djamaluddin, 2019). Learning resources encompass all sources, including data, individuals, materials, tools, techniques, and settings that educators and learners can utilize, either separately or in combination, to facilitate learners in achieving learning objectives or specific competencies. They enhance the effectiveness, efficiency, and comfort of the learning process (Manurung, 2020; Samsinar; 2020; Mahbub et al., 2022). The learning process of students can be supported by the presence of instructional materials (Rosada et al., 2019; Magdalena et al., 2020; Susilawati et al., 2020). Teaching materials are all forms of materials used to assist educators in carrying out teaching and learning activities in the classroom (Suprihatin & Manik, 2020; Ritonga et al., 2022; Manurung et al., 2023). These materials can be in the form of written or unwritten materials (Magdalena et al., 2020; Nuryasana & Desiningrum, 2020; Manurung et al., 2023). One of the printed or written materials that can be used in learning is a module (Prastowo, 2018; Panjaitan et al., 2019; Rosada et al., 2019; Susanti, 2019; Irmayanti & Suryani, 2020; Widyaningrum & Wahyuni, 2020; Difinubun et al., 2022).
Modules can help schools realize quality learning (Sari et al., 2019). Modules are teaching materials that can be used as learning resources and are created sequentially using language that is easily understood by students according to their age and level of knowledge so that students can learn independently with minimal teaching (Hamid et al., 2017). According to Setyandaru et al. (2017), a module is an instructional

material that can be studied anywhere and anytime without the need for specific equipment. Additionally, learners can self-assess their mastery level of the content covered in each module unit (Puspitasari, 2019). Modules can also be used as a substitute for student handbooks provided by the school because they are self-contained and stand-alone so they do not depend on teaching materials or other learning media (Daryanto, 2013). Therefore, modules can be utilized by learners for independent study, with or without the guidance of educators (Wulandari et al., 2022).

Based on previous research, states that module teaching materials that achieve high validity are suitable for use in learning (Sintamiati et al., 2021). Other research states that modules can increase students' motivation (Agusti et al., 2019; Candratasari et al., 2021; Khoirudin et al., 2022) and improve students' learning outcomes (Agusti et al., 2019; Wiratama & Margunayasa, 2021). Other research also indicates that modules are effective for students during the learning process and can be used independently by students (Netofa & Japa, 2022).

Many students find it difficult to understand biological concepts because they can not see them directly (Raida, 2018). Reproductive system material is one of the biological material concepts that requires a high level of conceptual understanding and is also closely related to students' daily lives (Ramadhani et al., 2016; Ardiyanti & Utami, 2017; Pratama, 2021). The submitter of reproductive system disorders in the independent curriculum syllabus is part of the reproductive system material in phase F. Learning outcomes are learning competencies that must be achieved by students in each phase Riswakhyuningsih (2022). The learning outcomes in the reproductive system material are that students have the ability to analyze the relationship between the structure of the reproductive organs in the reproductive organ system and their functions, as well as disorders that occur in the reproductive organ system.

An example of disorders in the reproductive system is amenorrhea and dysmenorrhea. Amenorrhea is a menstrual disorder characterized by the absence of menstruation during reproductive age (Khan et al., 2020; Mishra et al., 2021; Sinaga, 2021). On the other hand, dysmenorrhea refers to cyclic uterine pain occurring before or during menstruation (Juliana et al., 2019; Afrioza & Srimulyati, 2022; Mizuta, et al., 2023; Serrahima & Martinez, 2023). The module created in this study provides information on medicinal plants that facilitate and relieve menstrual pain in Tumiang Village, Samalantan District, Bengkayang Regency. The people of Tumiang Village still use their tradition of using the plants around them as medicine. To find out the diversity of medicinal plants and how they are used, an inventory process is carried out. Teaching materials in the form of this module will certainly be useful for students because it contains types of medicinal plants that are effective in facilitating and relieving menstrual pain as well as parts of medicinal plants used and how to process them so that students are expected to increase their concern for the health of their reproductive system organs.

Based on this background, this study was conducted to determine the feasibility of a module on reproductive system disorders based on the results of an inventory of medicinal plants that facilitate and relieve menstrual pain.

Method

This was Research and Development (R&D) with Borg and Gall model, which consists of 5 stages (Sugiyono, 2019). The stages of this research include the potential and problem stage, which is related to the analysis of learning problems that occur in the classroom and the benefits of educational materials as a support for the learning process. The information gathering stage is based on the results of an inventory of facilitate and relieve menstrual plants in Tumiang Village, Samalantan District, Bengkayang Regency, West Kalimantan Province. The stage of designing the product according to the module components. Design validation stage, module evaluation by five validators. Design revision stage based on suggestions from validators.

The preparation of the module teaching materials goes through several stages, namely, finding information related to plants that facilitate and relieve menstrual pain. From the information obtained, then design the content of the module with a general description of plants that facilitate and relieve menstrual pain, plant parts used, and how to process plants, as well as sub-material on reproductive system disorders. Then, the characteristics and needs of the students are identified, the materials and learning objectives are aligned with the learning objectives flow of the independent curriculum, the module title is determined, the components included in the module are assembled, and the text, images, colors, and margins are edited. The next stage is the design validation to determine the feasibility of this module as a teaching material. The validation sheet evaluated in the module testing is the feasibility aspect of content, language, presentation, and graphics. The feasibility of the module was evaluated by five validators. The last stage is data analysis based on the validators' assessment and validity calculation referring to Lawshe (1975) and validation criteria referring to Departemen Pendidikan Nasional (2008).

This study follows a Research and Development (R&D) framework, structured into five distinct stages (Sugiyono, 2019). (1) Initially, the research identified key issues related to classroom learning challenges

and explored the potential benefits of instructional materials in supporting the educational process, alongside leveraging local community wisdom in the use of medicinal plants. (2) Subsequently, information was gathered through an inventory conducted in Tumiang Village, Samalantan District, Bengkayang Regency, West Kalimantan Province, involving interviews with 11 informants to catalog plants known for their ability to relieve menstrual pain. (3) The development phase focused on crafting a module that encompassed general descriptions of these plants, specific parts used, methods of plant preparation, and subtopics covering reproductive system disorders. This stage also involved adapting the module's content and learning objectives to align with the curriculum framework, determining its title, compiling its components, and refining its visual and textual elements. (4) The design validation stage aimed to assess the module's suitability as an instructional resource. Validation sheets evaluated during module testing included aspects of content relevance, language clarity, presentation style, and graphical quality. The module's suitability was assessed by five validators, consisting of two academics from the Department of Mathematics and Science Education at Tanjungpura University and three biology teachers from eleventh-grade classrooms. (5) Based on feedback received, the final stage involved revising the module design to incorporate recommendations and ensure its effectiveness as a pedagogical tool.

The validation data is analyzed using Content Validity Ratio (CVR) to determine the suitability of criteria for items based on expert or validator assessments, and Content Validity Index (CVI) to illustrate overall content validity. Validity calculations follow Lawshe (1975), and validation criteria adhere to the guidelines of the Departemen Pendidikan Nasional (2008). The formula for calculating CVR (1).

$$CVR = \frac{ne - \frac{N}{2}}{\frac{N}{2}} \quad (1)$$

Description:

- CVR = Content Validity Ratio
- ne = The number of validators who agree on the validity of instructional materials (considered to agree if the criteria score is 3 to 4; if the score is less than 3, it is considered to disagree)
- N = Total number of validators

After obtaining the CVR values for each criterion, the next step is to calculate the CVI score. The formula for calculating CVI (2).

$$CVI = \frac{\Sigma CVR}{\Sigma n} \quad (2)$$

Description:

- n = Total number of items across all aspects

Results and Discussion

This study aims to assess the feasibility of module-based instructional materials. Modules offer advantages over other instructional materials because they present content in a systematic sequence, packaged into a cohesive unit independent of other teaching aids or media. They include assessment questions that allow learners to evaluate their learning abilities. Modules also use language that is easy to understand and suitable for the learners' developmental stage. Additionally, modules can be utilized by learners for independent study, reducing dependency on external sources. This is a research and development study focused on a submaterial for reproductive system disorders. The submaterial contains the results of research on the inventory of medicinal plants that facilitate and relieve menstrual pain in Tumiang Village, Samalantan District. The module includes a cover, preface, table of contents, concept map, introduction (learning outcomes, description, time, instructions for using the module, and final objectives), material description, biological information, summary, student worksheet, formative test, evaluation, feedback, glossary, bibliography, and answer key. After the teaching material for the module is completed and printed, it undergoes a validation process to determine its feasibility and suitability for use in the learning process (Wati & Dewi, 2018; Panjaitan et al., 2022; Sintamiati et al., 2021). The validation results for the module's suitability as teaching material for reproductive system disorders are presented in Table 1.

Table 1. Assessment of teaching materials for reproductive system disorders sub material by validator based on the inventory of medicinal plants that facilitate and relieve menstrual pain.

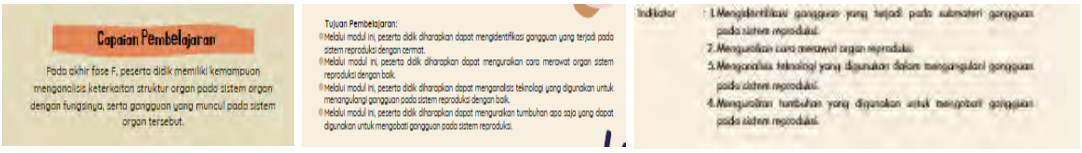
Aspect	Criteria	Validator Sequence Number-					CVR	Description
		1	2	3	4	5		
Content	1. Adherence to the learning outcomes, indicators, and learning objectives.	4	4	4	3	3	1,00	Valid
	2. Adherence to the needs of the learners.	4	4	4	4	3	1,00	Valid
	3. Adherence to the needs of teaching materials.	4	3	4	3	3	1,00	Valid
	4. Benefits to add insight and knowledge.	3	3	4	3	3	1,00	Valid
Language	5. The information is easily understood due to the use of clear and concise language.	4	4	4	3	4	1,00	Valid
Presentation	6. Systematic presentation of module components.	4	4	4	4	3	1,00	Valid
	7. Completeness of information.	3	4	4	3	4	1,00	Valid
Graphic	8. Font usage (type and size).	4	4	4	3	4	1,00	Valid
	9. Layout.	4	4	4	4	3	1,00	Valid
	10. Illustrations and pictures.	4	3	4	3	3	1,00	Valid
	11. Attractiveness of the module cover design.	4	4	4	3	3	1,00	Valid
	CVI = 1,00							Valid

Description: CVR (Content Validity Ratio)
CVI (Content Validity Index)

The analysis yielded a validation value of 1.00 with a valid category, based on four aspects and eleven criteria. The average CVI (Content Validity Index) score for all criteria was 1.00, indicating that they are worth using.

Content appropriateness aspect

The feasibility aspect of the module's content is evaluated based on four criteria, each of which received a score of 1.00 in a valid category. The first criterion assesses the alignment of the material with the learning outcomes, indicators, and objectives of the module, which received a CVR score of 1.00 in a valid category (Figure 1). According to Riswakhyuningsih (2022), when preparing learning plans, it is important to consider understanding learning outcomes, formulating learning objectives, compiling a flow of learning objectives, and designing learning. The analysis of learning outcomes can be translated into achievement indicators and learning objectives (Difinubun et al., 2022).



a) b) c)

Figure 1. a) learning outcomes, b) learning objectives, and c) learning indicators in the module.

The second criterion is the suitability of the teaching materials to the needs of students who obtain a CVR value of 1.00 with a valid category. The validation results indicate that the developed module meets the needs of students by making learning activities more interesting, providing opportunities for independent learning, and facilitating the mastery of each competency. According to Susanti (2019), good teaching materials should be tailored to meet the needs and characteristics of students. This ensures that the interaction between educators and students achieves the previously set learning objectives.

The third criterion is suitability to the needs of teaching materials which obtained a CVR value of 1.00 with a valid category. The validation results show that the developed module has adjusted the needs of

teaching materials, namely the material is presented sequentially, contains evaluation questions to measure learning outcomes, and is up to date. In line with the opinion of Ritonga et al., (2022) which states that coherently arranged material can facilitate students in the learning process to achieve learning success. Evaluation questions in teaching materials function to determine the extent of mastery of learning outcomes that have been achieved by students (Daryanto, 2013). The requirements given by Direktorat Jenderal Pendidikan Tinggi (2014) are that 80% of literature references must have a level of novelty in the last 10 years so that the teaching materials developed are up to date.

The fourth criterion is the benefit of adding insight and knowledge, which obtained a CVR value of 1.00 in a valid category. The validation results for this criterion received suggestions from the validator to improve plant images by using images that clearly show plant parts (Figure 2). The developed module provides valuable insights and knowledge. It contains information about sub materials related to human reproductive system disorders such as amenorrhea and dysmenorrhea, as well as information about medicinal plants used by the community in Tumiang Village to facilitate and relieve menstrual pain. Amenorrhea is a disorder characterized by the absence of menstruation in women of reproductive age, while dysmenorrhea is a condition of cyclic uterine pain that occurs before or during menstruation, often causing significant discomfort for many women. According to Sari et al., (2019), providing information on community knowledge of medicinal plants and their usage through module teaching materials can be beneficial for students. This can increase their familiarity with plants and raise awareness about environmental sustainability.

a) Before Revision b) After revision

Figure 2. Improvement of the image section of the teaching materials.

Language appropriateness aspect

The language feasibility aspect of the module received a score of 1.00 in one criterion and was placed in a valid category. The validation results indicate that the language used in the developed module is clear, unambiguous, and easy to understand (Figure 3). As noted by Panjaitan et al., (2019), it is important for the language used in the module to be easy to understand, engaging, and free from double meanings. According to Daryanto (2013), modules should use simple grammar and avoid scientific sentences to ensure easy comprehension by students.

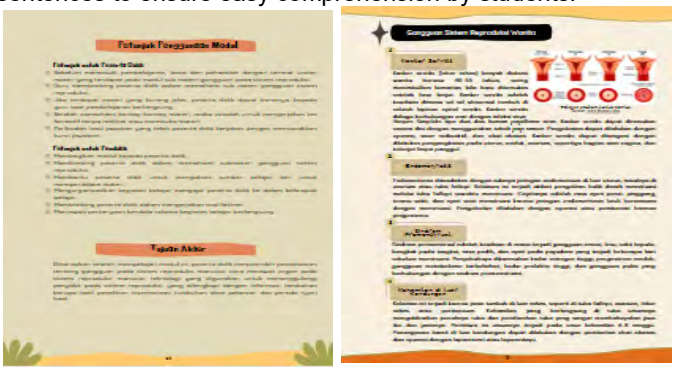


Figure 3. Language presentation in the module.

Presentation feasibility aspect

The presentation feasibility aspect of the module is evaluated based on two criteria, both of which must receive a value of 1.00 in the valid category. The first criterion requires the presentation of systematic module components that obtain a CVR value of 1.00 in the valid category. The validation results indicate that the module developed in this research is systematically packaged. It includes a cover, foreword, table of contents, concept map, introduction (learning outcomes, description, time, instructions for using the module, final goal), material description, biological information, summary, student worksheets, formative tests, evaluation, feedback, glossary, bibliography, and answer key (Figure 4). According to Prastowo (2018); and Manurung et al., (2023), a module is a systematically arranged teaching material

that enables students to learn independently with minimal assistance or guidance from educators.

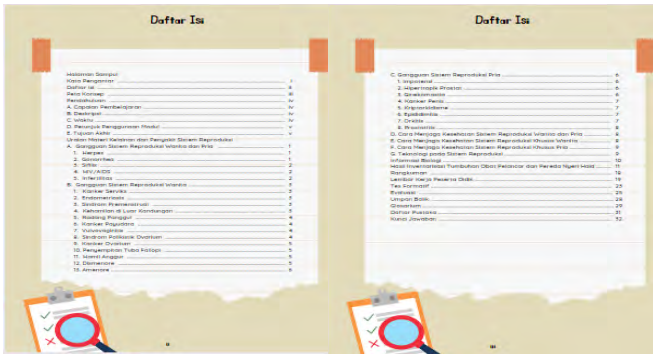


Figure 4. Table of contents for the sub-material module on reproductive system disorders.

The second criterion for validity is the completeness of information, which receives a CVR value of 1.00 in the valid category. The validation results indicate that the module developed in this research includes comprehensive information on reproductive system disorders in humans, maintaining reproductive system health, technology for treating reproductive system disorders, and the use of plants to facilitate and relieve menstrual pain by the people of Tumiang Village (Figure 5). According to Prastowo's (2018) opinion, presenting complete information in the module can assist students in achieving their predetermined learning objectives.

Figure 5. Material in the module.

Graphic feasibility aspect

The module's graphic feasibility is evaluated based on four criteria, each receiving a score of 1.00 in the valid category. The first criterion is the use of fonts (type and size) that obtain a CVR value of 1.00 in the valid category. The validation results indicate that the developed module uses varied and appropriate fonts, making it easy to read (Figure 6). This aligns with Wulandari's (2022) opinion that the use of varied fonts in modules can increase students' interest in learning. Renat et al., (2017) argued that using letter variations in the module can attract students' attention. Additionally, Panjaitan and Tenriawaru (2022) found that using the appropriate type and size of letters can improve readability for readers.

Figure 6. Module font type and size usage.

The second criterion is the layout display, which receives a CVR value of 1.00 in the valid category. The validation results indicate that the module developed in this research already has a good layout. As Fahrurrozi and Mohzana (2020) stated, a good layout can create a special attraction for students' interest in learning. The third criterion is the attractiveness of the illustrations and images, which also obtain a CVR value of 1.00 in the valid category. The validation results indicate that the module developed in this research includes appropriate illustrations and images for the presented material (Figure 7). As noted by Manurung et al., (2023), the use of illustrations enhances the appeal of teaching materials. Furthermore, according to Wati and Dewi (2018), Panjaitan et al., (2019), Jeong and So (2020), Winarto et al., (2020), and Zikra et al., (2023), appropriate images can clarify the lesson content and make it easier for students to understand and achieve learning objectives.

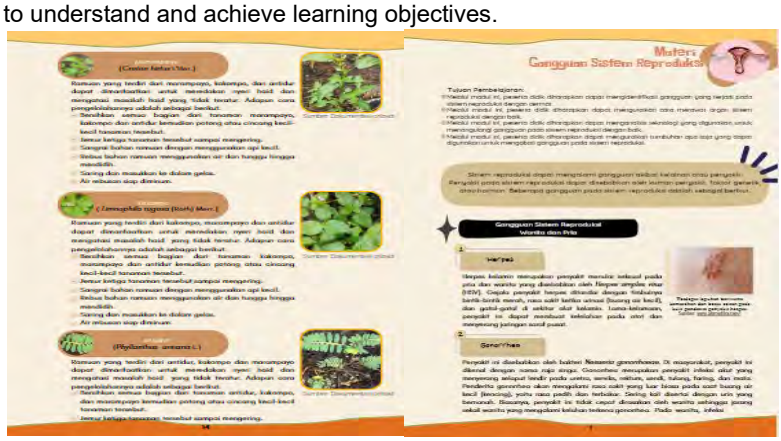


Figure 7. The use of illustrations and images in the module.

The fourth criterion, which pertains to the attractiveness of the module cover design, received a CVR value of 1.00 in the valid category. The validation results indicate that the module cover developed in this research has good color suitability and displays clear and attractive images (Figure 8). According to Irmayanti and Suryani (2020), Magdalena et al., (2020), and Muswita et al., (2020), an attractive module cover is achieved through a harmonious combination of colors and images, which can increase students' interest in learning. Additionally, Panjaitan et al., (2021) emphasized the importance of educators paying attention to students' interests during interactions.

a) Front cover b) Back cover

Figure 8. Module cover view.

Conclusion

This module is based on an inventory of medicinal plants that relieve menstrual pain. The instructional module was validated by five validators across four aspects. The first aspect, content, consisting of four criteria, consist of alignment with learning outcomes, indicators, and objectives; relevance to learner needs; suitability as instructional material; and benefit for enhancing insight and knowledge obtained a CVR score of 1.00. The second aspect, language use, focusing on communicative language for easy comprehension, also received a CVR score of 1.00. The third aspect, presentation, encompassing three criteria like sequence of presentation, motivation provided, and completeness of information, also attained a CVR score of 1.00. The fourth aspect, graphic design, consisting of four criteria like, use of fonts (type and size), layout, use of illustrations and images, and attractiveness of module cover design, those achieved a CVR score of 1.00. Based on these results, a CVI score was 1.00 points each validated criterion. This score categorizes the module as valid and suitable for use as instructional material. However, there has been no specific research addressing disorders of the reproductive system complemented by the results of an inventory of medicinal plants used for menstrual pain relief and regulation. Therefore, this module on reproductive system disorders based on the inventory of medicinal plants for menstrual pain relief is highly recommended for educational purposes.

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Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Author Contributions

R. G. Panjaitan., Khoirunnisa, and **T. Titin:** methodology and analysis; **R. G. Panjaitan** and **K. Khoirunnisa:** writing original draft preparation, **R. G. Panjaitan, K. Khoirunnisa, Titin,** and **Z. Jia:** review and editing.

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