Development of module of medicinal plants for the subject of organic chemistry in natural materials to stimulate metacognitive skills of students Tadris IPA IAIN Bengkulu

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Abstract. This research aims to develop a module of medicinal plants for the subject of organic chemistry in natural materials to stimulate the metacognitive skills of students Tadris IPA IAIN Bengkulu. The research method refers to the steps of Research and Development. The research is Began by analyzing the needs of the subject of organic chemistry in natural and plant materials that are often used by Bengkulu people as medicines to be used as learning resources in the form of modules. The trial of the module was limited to 16 students of the fourth semester in the IAIN Bengkulu, Natural Sciences Study Program. The results showed that the metacognitive skills of students using the medicinal herbs module varied greatly. Student metacognitive skills are mostly good (50%), very good (6%), satisfactory (6%), and less (38%). The ability of students in the planning aspect has developed well while the aspects of monitoring, evaluating, and revising have not developed well (enough). This local potential medicinal plant module is able to stimulate the metacognitive abilities of the fourth semester of students, Tadris natural sciences Study Program, IAIN Bengkulu viewed from the classical values.

1. Introduction

Education is a conscious and deliberate effort to create a learning process so that learners become active in developing the potential for them to have self-control, personality, intelligence, and the skills required. Higher education aims to create graduates with qualifications able to apply its expertise in the field of science to solve the problems. The orientation of higher education focuses on knowledge and skills to be able to adapt to changing situations. Development of life skills of students is done through the curriculum developed on the courses in accordance with the scientific field. The study program has a number of subjects that serve to develop knowledge and skills of students so that the quality of teaching on the course have an influence on the achievement of competencies as a graduate strata.

The learning process is expected to become a vehicle for students to learn about themselves and the environment, as well as prospects for further development in applying it in our daily lives. Learning in higher education has an important role in conveying knowledge to students that need the media that contains the information and ideas that are able to facilitate the learning of students, the learning resources [1]. Source of learning is not only obtained from lecturer and book or text book in theoretical, but can also be obtained from the surrounding environment. The existence of about a potential that can be used to support the activities of learners in the learning process [2]. One subject in college can apply
local potential as a source of learning is the organic chemistry of natural materials. The use of local potential in learning can be packaged in a module based on the research results.

On the subject of organic chemistry of natural materials contained submateri herbs competence standards of this subject, one of them is students are able to understand some examples of natural materials useful compounds and are found in families of plants so that the local potential in the form of medicinal plants in certain regions can be applied as a source of learning in these subjects. Higher education institutions that have developed the curriculum with natural materials such as organic chemistry is State Islamic Institute (IAIN) Bengkulu, Department of Education and Social Sciences, Department of Tadris IPA. Results of interviews with lecturers in mind that the subject organic chemistry of natural materials Fixed in the second semester. Organic chemistry in natural materials is one of the optional subjects taken by students of Tadris IPA, IAIN Bengkulu.

Results of a preliminary analysis shows that the use of teaching materials developed from the study of local potential has never been done on the subject natural materials in organic chemistry Tadris Studies Program IPA, IAIN Bengkulu. One of the local potential in the form of herbs from the village of Lubuk Jukung, South Linggau II which can be used as research for a learning resource is simbagh utak plant (Hydnophytum moseleyanum Becc). The results of the initial phytochemical test plant with Hydnophytum genus contains flavonoids, tannins, saponins, terpenoids and phenolic [3]. Based on the existing chemical compounds Hydnophytum genus has its benefits and potential for treating various diseases. In order that all steps taken and the results obtained in this study can be informed of the necessity of the existence of a container to pour the information, one of them in the form of modules as well as a learning resource to be delivered in particular through the learning process. Teaching materials has a high adaptability to the development of science and technology and material therein in accordance with the competence or sub competence is a module [4]. The module is a printed instructional material in the form of sheets of paper containing material, a summary and guide the implementation of learning tasks that must be done by learners who refers to the basic competencies that must be achieved [5]. The module has the characteristics that distinguish with other instructional materials. Flexibility-making material in a module is one of the advantages of the module [6].

Competency to be developed by their research results module plants simbagh utak (Hydnophytum moseleyanum Becc) are the metacognitive skills of students. Modules based research have a significant impact on learners' metacognition skills [7]. The learning activities that take advantage of the surrounding environment enables more meaningful learning. Module-based learning that integrated with local potential significant effect on learning outcomes [8]. Metacognitive skills need to be developed to maximize the learning process. Metacognitive thinking refers to the high level to plan, approach and monitor the learning process becomes successful learning for students [9]. Includes metacognitive awareness, monitoring and setting other person's thinking for himself [10]. Metacognitive skills development of students is facilitated through a learning process. Based on the explanations that have been described, the development of teaching materials based module plant products simbagh utak (Hydnophytum moseleyanum Becc) may be one solution to provide a variety of teaching materials and develop metacognitive skills of students of Tadris IPA, IAIN Bengkulu. Metacognitive skills development of students is facilitated through a learning process. Based on the explanations that have been described, the development of teaching materials based module plant products simbagh utak (Hydnophytum moseleyanum Becc) may be one solution to provide a variety of teaching materials and develop metacognitive skills of students of Tadris IPA, IAIN Bengkulu. Metacognitive skills development of students is facilitated through a learning process. Based on the explanations that have been described, the development of teaching materials based module plant products simbagh utak (Hydnophytum moseleyanum Becc) may be one solution to provide a variety of teaching materials and develop metacognitive skills of students of Tadris IPA, IAIN Bengkulu.

2. Methods
This research is the Research and Development (R & D). In this study, the stages of research and development (R & D) was adapted from the stage (R & D) by Borg and Gall (1989). Research carried
out by four steps, namely research and information collecting, planning, develop preliminary form of the product, and preliminary field testing. The study was conducted on 16 students of fourth semester, Tadris Studies Program IPA, IAIN Bengkulu. Assessment tools to measure student metacognitive skills in the form of discussion student essay amounted to 12 grains contained in the module simbagh utak (*Hydnophytum moseleyanum Becc*) with 4 indicators metacognitive skills, namely planning, monitoring, evaluating, and revising.

3. Results and discussion

3.1. Design module

The products developed are teaching materials module simbagh utak medicinal plants. The module teaching material component consists of 4 parts: the first part, the introduction, the core part, and the concluding section. Description of the contents of the component framework module simbagh utak medicinal plants in each section can be seen in Figure 1.

![Module Plant Medicine Simbagh Utak](image)

**Figure 1.** Design module plant medicine Simbagh Utak.

Figure 1 shows the design module medicinal plants Simbagh Utak. The early part of the module consists of a front page (cover), the identity module, preface, table of contents, list of tables, and the list of images as well as the introduction to the module explains the module, the user module, competence and concept maps. The core part consists of learning activities and learning activities 1 to 3. At the core, there are 3 learning activities consist of competencies that must be mastered, learning objectives, materials, and student discussion. Aspects of planning metacognitive skills granted after learning objectives for each
learning activities in the form of stimulus learning strategies. Aspects of monitoring, evaluating, and revising awarded after learning activities carried out in the form of a question.

In any learning activities have different material that is learning one of the characteristics of simbagh utak, simbagh utak spreading and simbagh utak secondary metabolites, revision 2 utilization of simbagh utak and learning activities 3 on simbagh utak extract manufacture. Preparation of starting materials module of the materials that are easy to some difficult then the module material initially on general knowledge about simbagh utak which further discusses the application of simbagh utak. At the end the discussion there any learning activity, in which every learning activity consists of 4 questions for discussion to stimulate metacognitive skills. The concluding part consists of the evaluation, a glossary, and bibliography.

3.2. Characteristics module
Based on the results of exposure module design development of medicinal plants simbagh utak is applied to the subject of organic chemistry of natural materials-oriented provisioning metacognitive skills have characteristic features such as in Table 1.

| No. | Character Modules  | Information                                                                 |
|-----|--------------------|-----------------------------------------------------------------------------|
| 1.  | Mission Module     | Developing the research on medicinal plants sourced from the potential of    |
|     |                    | the natural environment in the subject of organic chemistry natural material |
|     |                    | to stimulate metacognitive skills                                           |
| 2.  | Competence Module  | 1. Shows the caring attitude towards medicinal plants                        |
|     |                    | 2. Shows scientific ethics when conducting the learning process of medicinal|
|     |                    | plants                                                                      |
|     |                    | 3. Describes the characteristics and habitats of medicinal plants           |
|     |                    | 4. Identifying the secondary metabolites of medicinal plants                |
|     |                    | 5. Applying the concept of utilization of secondary metabolites of medicinal|
|     |                    | plants                                                                      |
|     |                    | 6. Applying the concept of utilization of the results of medicinal plants   |
|     |                    | 7. Applying metacognitive skills (planning, monitoring, evaluating,        |
|     |                    | revising) of the learning activities of medicinal plants                   |
| 3.  | Basic theory       | Simbagh utak medicinal plants module based on constructivism learning theory |
| 4.  | Basic activity     | Simbagh utak medicinal plant module has a basic form of learning activity.  |
|     |                    | Each learning process has a different learning objectives. At the           |
|     |                    | beginning of the learning activities are stimulus metacognitive skills in   |
|     |                    | aspects of planning, and at each end of the learning activities are stimulus|
|     |                    | metacognitive skills on aspects of evaluating, monitoring, and revising.    |
| 5.  | source material     | Source materials derived from plant research data simbagh utak (Hydnophyta |
|     |                    | moseleyanum Becc)                                                          |
| 6.  | Characteristic     | Metacognitive skills measured using the instrument in the form of a matter  |
|     | Assessment         | of discussion. Total about 12 grains that have four aspects, namely        |
|     |                    | metacognitive skills planning, monitoring, evaluating and revising         |

3.3. Preliminary field testing module
At this stage trials in small-scale module (formative test) at 16 students of fourth semester, Tadris Studies Program IPA, IAIN Bengkulu because once validated the feasibility of modules categorized as very feasible 98.20%. Activities carried out to look at the effectiveness of the learning module tooling
simbagh medicinal plants against metacognitive skills. Aspects of metacognitive skills assessment include (1) Planning, (2) monitoring, (3) evaluating, and (4) revising. Overall student metacognitive skills gained from the average ratings student discussion. The percentage of fourth semester student metacognitive skills, Tadris Studies Program IPA, IAIN Bengkulu after using the module development results can be seen in Figure 2.

Figure 2 shows the percentage of students metacognitive skills in classical are very good 6%, good 50%, satisfactory 6%, and less 38%. The percentage of assisted learning module shows the results of a research-based development can stimulate metacognitive skills even though there are 38% of students are metacognitive skills are lacking. Metacognitive skills measured indicators are planning, monitoring, evaluating and revising can be seen in Table 2.

Table 2. Metacognitive data skills students indicators.

| No. | indicators Metacognitive | Score | Category  |
|-----|--------------------------|-------|-----------|
| 1   | Planning                 | 81    | High      |
| 2   | Monitoring               | 73    | Quite high|
| 3   | Evaluating               | 71    | Quite high|
| 4   | Revising                 | 72    | Quite high|

Table 2 shows that the indicators of metacognitive skills planning obtain an average value of 81 (high), monitoring with a value of 73 (quite high), evaluating the value of 71 (quite high), revising the value of 72 (quite high). Indicators of planning to get the average value of 81 (high) because the metacognitive aspects of planning average, getting a score of 4 in both categories. Students have been able to make plans to learn about medicinal plants secondary metabolites simbagh utak which consists of anything they want to know from the secondary metabolites of medicinal plants simbagh utak. Students had to explain how what they need to do to prove that secondary metabolites based on resources or existing literature. Students on the planning indicators can already mention the things he wants to know and determine a plan to achieve what you want to be known. Students are considered to have been able to analyze because, according to Bloom analysis stage is when one is able to describe material into components clearer, parts of information into several parts and find a causal link.

Indicators monitoring the value of 73 (quite high) because the metacognitive monitoring aspects on average, getting a score of 3 in the category quite high. Students do not make information of secondary metabolites as priority information for simbagh utak plant can be used for medicinal materials if contain secondary metabolites such as flavonoids, tannins, saponins, terpenoids and phenolic. Students directly
mention the efficacy of the plant so that the simbagh utak student in monitoring indicators have not been able to determine the priority information and interpret new information in their own words and have not been able to prepare and submit information back. That's because the ability to synthesize the students are still undeveloped. Monitoring get into cognitive synthesize due to inter information there should be a reciprocal relationship.

Indicators evaluating the value of 71 (quite high) because the average evaluating aspects of getting a score of 3 in the category enough. Students do not connect the functions of each secondary metabolite with its efficacy for a particular disease so that the indicators evaluating students are able to interpret the data into information but have not been able to connect the interconnection between information and infer information. Students had not yet reached his or her ability to assess the benefits and towards the goal of a new knowledge.

Revising indicator with a value of 72 (quite high) for revising aspects on average, getting a score of 3 in the category quite high. Students already provide a solution in case of exploitation simbagh utak with conservation but action should be taken in such conservation has not been described. In revising the indicators students are able to determine the problem and the solution but still lack of information in terms of linking the problem and the solution. Revising get into the cognitive evaluation of its capability means that a student has not reached to create an action, decision and policy on an issue or case.

The value of monitoring, evaluating, and revising the students are still in the stage enough, this is because the module simbagh utak medicinal plants still have a disadvantage in terms of facilitating the metacognitive skills of students in aspects of monitoring, evaluating, and revising. The ability of students also has not reached the stage of synthesizing and evaluation. According to Piaget's theory of cognitive development in early adulthood is a formal way of thinking already operational between 11/12 age - 18 years. Key feature of the development at this stage is the child is capable of abstract thinking and logical to use the mindset of possibilities, a larger quantity of knowledge as well as more systematic and skilled. Students are still lacking in terms of synthesizing and evaluating as expected so far in the learning process has not been given the provision of basic and exercises thinking like deductive reasoning, inductive, scientific, critically, reason, rational, creative, explorative, decision making, and problem solving. The problem-solving based learning method can improve the basic skills and thinking skills a person [11]. Simbagh utak medicinal plant module components empower metacognitive skills of students in learning so as to provide the opportunity for students to carry out exploration and evaluation in developing metacognitive skills. The development of metacognitive skills can use the strategy of self-reflection. Metacognitive skills also have an important role in supporting the development of students' thinking and process skills [12].

4. Conclusion
Development of medicinal plants simbagh utak modules based on these results include beginning, a core and a cover, and there are materials to stimulate student discussion metacognitive skills. Characteristics of the module includes the mission module, the module competence, basic theory, basic activities, source material, and a character assessment. Feasibility level modules categorized as very feasible 98.20% to be used as teaching materials on the subject of organic chemistry of natural materials. Module-based simbagh utak plant can stimulate metacognitive skills of students of fourth semester, Tadris Studies Program IPA, IAIN Bengkulu seen from a classical value.

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