

# Development of Research Methodology Module based on High Order Thinking Skill (HOTS)

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**Keywords:** Module, High Order Thinking Skill (HOTS)

**Abstract:** The purpose of this study was to determine (1) the design of learning modules based on High Order Thinking Skill (HOTS) in the Research Methodology course. (2) to develop a research methodology module based on High Order Thinking Skill (HOTS). The method used is the R & D method. This development procedure consists of 4-D (Four D Models). "First, define phase, which is the stage that aims to define and define learning needs. Second, the design stage, namely the design of a prototype learning device. Third, is the develop stage, which aims to produce learning tools. and, fourth, is the stage of dissemination (dissiminate), which is the stage of using the developed device. The results of this study are (1) Development of research modules based on high order thinking skills in accordance with Four-D Models with four main stages, namely, define, design, develop, and disseminate; (2) the feasibility of the module based on the results of expert validation obtained a mean score for the feasibility of content 4 (feasible), eligibility for presentation 4.04 (feasible) and feasibility of language 3.92 (feasible); (3) The student's assessment of the module is based on the 3.84 (good) content eligibility, 4.07 (good) language eligibility and 3.85 (good) presentation eligibility.

## 1 INTRODUCTION

Education is the main means in the formation of quality human resources. Education is a human need throughout life and always changes according to the times, technology and culture of the people. Developments and changes in education are increasingly advanced demanding educational institutions can foster and prepare human resources better by improving the quality of learning carried out in the classroom.

Based on the results of reflection in the lecture the research methodology found several problems. As for the first problem that is seen, students are less able to understand the concept of research methodology in preparing research proposals. Second, students tend to think at the low order thinking level so that difficulties in topic selection, targeting, assessment, analysis, and report preparation. To be able to do that, students are required to be active in exploring the actual problems. Third, there is domination by some

students in learning, while most other students are still waiting and dependent on friends or lecturers. Fourth, there is no interest and motivation for students to research. Fifth there is no module for research methodology courses. This resulted in students being less enthusiastic in attending lectures which had an impact on the low level of thinking and student learning achievement.

Based on teaching experience in research methodology courses over the past two years, the lecture material provided so far is still taken from various sources including textbooks and scientific journals that have not been systematically arranged. The implementation of learning with teaching material that has not been systematically arranged as a module is felt to be less effective because the available face-to-face hours are not enough to discuss all teaching material in the form of theory. The problem faced by students so far in addition to the lack of use of interactive learning models is the lack of initiative from students to obtain supporting books on the concept of research methodology. Such

conditions will make the lecture process ineffective, students become passive, they just wait for lecture material from lecturers with limited lecture material. Apart from that the problem is also seen when formative examinations are held, most students are only able to answer questions at the level of knowledge (C1), Understanding (C2) and application (C3) while for questions at the level of analysis (C4), evaluation (C5) and creation (C6) only a small number of students are able to answer correctly.

The results of previous studies conducted by Winarno, Sunarno and Sarwanto (2015) show that through the development of high order thinking modules, there is a significant difference in effectiveness. This is shown by the average achievement of cognitive learning before using module 67.4 and after using the module 85.3. The results of this study are in line with the research conducted by Sabar and Maureen (2013) on the development of modules to improve high order thinking skills in the learning strategy course. 83.33% in the posttest process.

One of the abilities that students must possess is high-level thinking skills. If students do not have this ability, students cannot link information between disciplines so they cannot draw conclusions and take advantage of the information. In the Research Methodology course, this ability is very much needed, because students must be able to link existing learning theories with their application in making research designs. Modules are needed in learning because they function as guidelines for lecturers, student learning guidelines, and guidelines for evaluating.

The research that will be conducted for one semester has two important objectives to determine the design of learning modules based on High Order Thinking Skill (HOTS) in the Research Methodology course. Next to develop a module of research methodology based on High Order Thinking Skill (HOTS).

## 2 THEORETICAL FRAMEWORK

Learning with modules is learning that uses modules. Even simple modules should make written statements for students that make students learn about the material and how to test students, Dick & Carey (in Putri: 2013). This means that each module contains at least subject matter, practice questions and ability tests. The ability of students to solve practice questions and assignments in the course can illustrate the level of ability of students in the thinking process. The overall ability of students

means recognizing low order thinking skills and high order thinking skills.

High Order Thinking Skill (HOTS) is a thinking process that does not merely memorize and re-convey known information. High-level thinking ability is the ability to connect, manipulate, and transform knowledge and experience already possessed to think critically and creatively in an effort to determine decisions and solve problems in new situations (Rofiah et al., 2013)

Wardana (2010) further explained "The ability to think high-level is a thinking process that involves mental activities in an effort to explore complex, reflective and creative experiences that are carried out consciously to achieve goals, namely acquiring knowledge that includes the level of thinking analyzing, evaluating and creating."

To find out someone's high order thinking skills, indicators that are capable of measuring these abilities are needed. As previously described, thinking skills include the levels of C1, C2 and C3 belonging to the Low Order Thinking thinking aspect, while C4, C5 and C6 belong to the aspects of High Order Thinking.

Brookhart (in Kurniati, Harimukti and Jamil (2016) states that the indicators for measuring analytical skills are focusing on the main ideas, analyzing the arguments, and comparing and contrasting. The indicators for measuring evaluation ability are the ability to take decisions or methods to be in line with the desired goals. measuring creative ability is solving problems with more than one solution, designing a way to solve problems, and making something new.

Furthermore, Ramli (2015) explained that HOTS learning tools include: teaching strategies (methods, models), materials (modules), and assessment instruments to map students' achievements. The material is considered as one of the teaching supporting the most reliable besides pedagogical skills. Characteristics of material formulation for training HOTS are contextual material. Real-word problems, lifting locality, and following the pattern of scientists.

The module of Research Methodology course based on High Order Thinking Skill (HOTS) referred to in this study is a series of learning activities that are arranged systematically to help students achieve the goals that have been formulated in the lecture process and help students in understanding material contextually that can be measured through indicators ability to analyze, ability to evaluate and the ability to create ideas or perspectives on something, design a way to solve problems and be able to organize parts into new structures.

### 3 RESEARCH METHOD

This research method is a research development (Research and Development / R & D) is a research method used to research so as to produce certain products, and then test the effectiveness of the product ". This research develops a new product in the form of a research methodology module based on High Order Tinking Skill (HOTS).

This research will be done in the economic education study program of Medan State University, which is located at Jl.Willem Iskandar Pasar V Medan.

The development model used is 4-D (Four D Models) proposed by Thiagarajan in Trianto (2012: 177) "First, the define phase, which is the stage that aims to define and define learning needs. Second, the design stage, which is the design of a prototype learning device. Third, is the development stage, which aims to produce a learning device, and the fourth is the dissemination phase (dessiminate), which is the stage of using a developed device.

The research subjects in this study were students of economic education study programs registered in the 2018/2019 school year. The classes that the researchers chose were class A Semester V.

The module feasibility analysis is obtained from a validation questionnaire by research methodology experts. The data obtained are then tabulated data for each aspect of assessment and calculated using the formula according to Sukardjo (2012) as follows:

$$\bar{x} = (\sum x) / N$$

Information:

$\bar{x}$  = Total average score

$\sum x$  = score total

N = Number of indicators

Furthermore, the assessment aspect is described by converting quantitative data into qualitative data based on the following criteria:

Table 1: Assessment Criteria

Score	Interval Score	Interval	Criteria
5	$\bar{x} \geq X + 1,8 S$	4,21-5,00	Very decent
4	$X + 0,6S < \bar{x} \leq X + 1,8S$	3,41-4,20	Feasible
3	$X - 0,6S < \bar{x} \leq X + 0,6S$	2,61-3,40	Inadequate
2	$X - 1,8S < \bar{x} \leq X + 0,6S$	1,81-2,60	Not feasible
1	$\bar{x} \leq X - 1,8 S$	0- 1,80	Very

			Unworthy
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Information:

$X = \frac{1}{2}$  (Ideal maximum score + ideal minimum score)

$S = \frac{1}{6}$  (Maximum score ideal-ideal minimum score)

$\bar{x}$  = Average value

The assessment analysis for students on research methodology modules based on high order thinking skills (hots). In this case students are given a questionnaire according to the rating scale as follows:

Table 2: Student rating scale

Information	Score
Strongly Agree	5
Agree	4
Enough	3
Desagree	2
Strongly Disagree	1

Then the data tabulation is done, the data obtained is then calculated the average score total score of each aspect of the assessment. The mean total score is then interpreted into qualitative values based on the following criteria:

Table 3: Student Assessment Criteria

Score	Interval score	Interval	criteria
5	$\bar{x} \geq X + 1,8 S$	4,21-5,00	Very good
4	$X + 0,6S < \bar{x} \leq X + 1,8S$	3,41-4,20	good
3	$X - 0,6S < \bar{x} \leq X + 0,6S$	2,61-3,40	enough
2	$X - 1,8S < \bar{x} \leq X + 0,6S$	1,81-2,60	Not good
1	$\bar{x} \leq X - 1,8 S$	0- 1,80	Very bad

Information:

$X = \frac{1}{2}$  (Ideal maximum score + ideal minimum score)

$S = \frac{1}{6}$  (Maximum score ideal-ideal minimum score)

$\bar{x}$  = Average value

## 4 RESULTS AND DISCUSSION

The development of the research methodology module based on high order thinking skills through 4 stages, namely define (definition), village (planning), develop (development), and disseminate (dissemination).

### Define

At this stage there are 4 activities that must be done, namely: 1). Curriculum analysis; 2) Analysis of the characteristics of students; 3) Analysis of the material and; 4) Formulate goals.

At the first stage, researchers need to study the current curriculum at the State University of Medan. In the curriculum there are competencies to be achieved. Curriculum analysis is useful for determining the competencies in which the teaching material will be developed.

In the second stage is the analysis of students. at this stage the characteristics of students are studied in the activities of lectures to find out the problems encountered while carrying out lectures by observing during the lecture process. The observations show several problems faced by students, namely students lacking enthusiasm in following the teaching and learning process because of monotonous learning condition, the teaching materials used by lecturers are less attractive so students are less interested in attending lectures that have an impact on student learning achievement.

In the third stage, the students' tasks were analyzed in the research methodology subject. Along with the implementation of the KKNI based curriculum in the economic faculties of Medan State University there are six tasks that must be done by students including routine assignments, Critical Book Report (CBR). Research Review / Journal Review, mini research, engineering ideas and projects. In the Semester Learning Plan (RPS) the instructions for working on the six tasks are included with the assessment rubric.

Further material analysis was done in accordance with the syllabus of the research methodology course. In this case the material was developed into 12 chapters detailed into 12 learning activities. The next step is to formulate lecture objectives. The expected learning experience is that students are able to explain the basic concepts of educational research methodologies, compare processes, variables and research paradigms, construct the background and formulation of problems, build a theoretical foundation, thinking framework and research hypotheses, distinguish measurement scales and

construct research instruments, determine populations and sample in research, design and do Ex post facto research, design and do experimental research, design and do classroom action research, design and do research and development, carry out analysis of research data, arrange research reports and scientific publications of research results.

### Design

The preparation of instruments test that are in accordance with the preparation of lecture objectives that become a benchmark of student ability that refers to Bloom's taxonomy. The next step is the selection of the module format and the initial draft of the module. The format of the module contained in this study includes a description of learning achievement, subject matter, material description, material summary, job description, formative test and answer key. The supporting factors in the module are the introduction in which there are instructions for using modules to facilitate students in understanding the contents of the module. This module is equipped with a cover, preface, table of contents and also a bibliography at the end of each subject.

Based on the selected module components. Then the module is written. The module writing begins with attention to the syllabus of courses that have been designed in advance which is the main reference in preparing the material in the module. Then proceed with developing module material, which consists of material descriptions, summaries, formative assignments and tests. Furthermore, at the final stage, the design and layout of the modules are then printed and ready to be validated by experts.

### Develop

This stage aims to develop a module draft through the expert validation phase aimed at validating material content contained in the draft module. Validation is carried out by an expert lecturer so that it can be known that the module developed is suitable or not to be used. This validation result is used as input for the repair process.

Modules assessed by material experts use a 5-scale questionnaire with 20 statements for aspects of suitable content, 12 items for suitable presentation, and 13 statements for suitable language. The following are the results of the suitable assessment by material experts shown in table 4.

Table 4: Validation result by expert

Aspect	Average Score	category
suitable content	4	Feasible

suitable Presentation	4,04	Feasible
suitable Language	3,92	Feasible
Average total score	3,99	Feasible

Based on table 4 about the validation of material experts, the module of research methodology courses is categorized as feasible. This means that the module has suitable content. With language that is easy to understand and interesting presentation. The next step taken by the researcher is the stage of development, that is revision. The validated module is then revised according to the advice of the validator.

The development test is the last step in the develop phase. The development test was conducted to find out the student's assessment of the research methodology module. Student assessment of the research methodology was obtained from a questionnaire with a scale of 5. The questionnaire was made containing 12 statements consisting of 3 aspects of assessment, one aspect of suitable content, suitable language and suitable presentation. The results of student assessment of the module can be seen in the following table 5:

Table 5: Results of Student Assesment

Aspek	Rerata Skor	Kategori
suitable content	3,84	Good
suitable Presentation	4,07	Good
suitable Language	3,85	Good
Average total score	3,92	Good

Based on Table 5, students' assessment of the research methodology module is good. This means that the module in terms of suitable material linguistic and good presentation is applied to semester v students of unimed economics faculty.

### Disseminate

After limited trials carried out repairs and proceed to the limited dissemination stage. That is conducting an experiment in class A in the fifth semester of an economic education study program. then do the final revision. The final product in this study is in the form of a print module consisting of 12 learning activities, namely:

1. Learning Activity-1 discusses the basic concepts of educational research methodology
2. Learning Activity-2 discusses the process, variables and research paradigm
3. Learning Activity-3 discusses the background and formulation of the problem

4. Learning Activity-4 discusses the theoretical foundation, thinking framework and research hypothesis
5. Learning Activity-5 discusses measurement scale and constructs research instruments
6. Learning Activity-6 discusses population and sample in research
7. Learning Activity-7 discusses Ex post facto research
8. Learning Activities-8 discuss experimental research
9. Learning Activities-9 discuss classroom action research
10. Learning Activity-10 discusses research and development
11. Learning Activities-11 discuss analysis of research data
12. Learning Activities-12 discuss the preparation of research reports and scientific publications of research results

The components contained in the module consist of: module cover, preface, table of contents, module overview, learning activities, summary, assignments, formative tests along with answer keys.

At this stage is the stage of using modules that have been developed on a wider scale. However, because of the limitations of researchers in the use of time, costs, and the ability of researchers in product development, the researchers only use the final draft for researchers' needs only.

## 5 CONCLUSIONS

Based on the results of research and development, it can be concluded as follows: (1) Development of a research methodology module based on high order thinking skills using the Four-D model. Define obtained that students need modules that can help students learn independently. Design, obtained the results of teaching materials that are in accordance with the needs of students in the form of research methodology modules based on high order thinking skills. Develop, validated by experts and revised according to expert material suggestions, as well as development trials in class A of the fifth semester of economic education study program at Medan State University. Disseminate, the module is disseminated to the fifth semester students of the economic education study program.

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