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The Validity of Guided Inquiry-Based Hydrocarbons Module

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Abstract:- Chemistry subjects are difficult and abstract subjects, so many learners do not meet the Minimum Completeness Standard (KKM). The difficulty of students in understanding chemistry is marked by the inability of students to understand chemical concepts correctly. Hydrocarbons are an important part of chemical materials and require a high mastery of concepts. So that high-level thinking skills are needed, In order to overcome these problems, teaching materials that can guide students to find concepts are needed. This research aims to develop a guide-based query-based hydrocarbon module and reveal the effectiveness of the module. This module was developedmental using a 4-D model, which consists of 4 stages, namely (1) the define stage, (2) the design stage, (3) the develop stage, (4) the deseminated stage. But in this study, the desseminated stage was not carried out. The data collection instruments consist of questionnaire sheets and interview sheets. This module is validated by 5 experts in their fields. Use Aiken's V formula to analyze the validity test data, including content, structure, language and graphical components. The data analysis shows that the level of validity on the aspects of the content, construct,

Keywords: *-Validity, Module, Guided Inquiry, Hydrocarbons.*

I. INTRODUCTION

Chemistry is an important branch of science that changes material research and science[1]. Chemistry subjects are divided into difficult subjects and abstract subjects, so many learners are not interested in chemistry subjects[2]. The 2013 curriculum demands chemistry learning to increase the activeness and critical thinking of students by following per under the demands of 21st-century learning. High-level thinking skills (HOTS) are required to train students to face the global challenges unique to 21st century learning [3].

Modules can help high-skilled students to accelerate mastering learning material. Meanwhile, low-ability students can learn independently by repeating parts that have not been understood[4]. In the learning process, if the learning model is not used, satisfactory results will not be obtained using the module [5]. Because the learning process will run effectively and efficiently if a teacher can choose and use an appropriate and appropriate learning model, both with the material to be delivered and the character of the students.Learning models that are by following per under hydrocarbon material are guided inquiry that can guide students in finding concepts.

Guided inquiry is an inquiry related to the psychology of elementary and middle school students, because in some processes, students will still be guided and guided by teachers during the inquiry process [6]. This guided inquiry model guided by critical-thinking questions or key questions which are the heart of guided inquiry activities[7].

The guided inquiry-based module also contains activities that can develop high-level thinking skills (HOTS), namely by providing questions that are included in the HOTS question indicators, namely analyzing, evaluating and making (C4, C5 and C6) [8]. So this research aims to develop a guided inquiry-based hydrocarbon module for class XI SMA.

II. RESEARCH METHOD

This type of research is research and development (R&D) research with a 4-D development model. The model includes four main phases, namely: (1) definition, (2) design, (3) development and (4) dissemination [9]. But this research is only up to the develop stage, which is to analyze the validity level of the module in the form of content, construct, language and graphic components.

Guided inquiry-based hydrocarbon modules for class XI SMA / MA are validated by 5 experts in their fields. The research data obtained comes from the validity questionnaire sheet used to evaluate the modules that have been developed. The data obtained from the validity questionnaire were analyzed using Aiken V with the following equation[10]

$$V = \frac{\sum s}{[n(c-1)]}$$

Information:

S	=	r – lo
lo	=	The lowest score of validity
c	=	The highest validity score
r	=	Score given by the validator
n	=	The number by the validator

The validity level of this module is converted according to the following table.

Interval	Category
≤ 0.4	Less
0.4 <V ≤ 0.8	Moderate
0.8 <V	Valid

Table 1:- Decision Category based on Aiken's V[11]

III. RESULTS AND DISCUSSION

By following per under the objectives and research procedures, teaching materials have been produced in the form of guided inquiry-based hydrocarbon modules using a 4-D development model. Based on the steps, the following results were obtained:

A. Define Stage

➢ *Final preliminary analysis*

At this stage the researchers conducted interviews with chemistry teachers and students at SMAN 1 Painan, SMAN 2 Painan and SMAN 3 Painan. Based on the results of the interview, it was found that most of the students had difficulty understanding the concept of hydrocarbons. In order for students to understand the concept, teaching materials in the form of a module are required. The module has a guided inquiry learning model with HOTS questions. The project has project indicators C4 (analysis), C5 (evaluation) and C6 (production).

➢ *Analysis of students*

The results of the analysis of students through observation show that high school students have an age of 15-18 years. According to Piaget's cognitive stage, children between the ages of 12-18 are in the formal stage of surgery. At this stage, children can think abstractly and logically [6]. Therefore a learning model is needed that is able to make children think critically, draw conclusions, and develop hypotheses, one of which is a guided inquiry learning model and also required teaching materials that make students play an active role in the learning process, one of which is the module. The module is designed to make it easier for students to learn because the module is equipped with instructions in learning activities.

➢ *Task analysis*

This analysis includes analysis of KI and KD on hydrocarbon material so that indicators of competency achievement can be formulated. Based on the syllabus, hydrocarbon material is in the basic competencies (KD) 3.1 and 4.1 as follows

- Analyze the structure and properties of hydrocarbon compounds based on the characteristics of carbon atoms and their compound groups
- Make visual models of various hydrocarbon molecular structures that have the same molecular formula

➢ *Concept analysis*

The concepts in this material are arranged in a hierarchical form of concepts. The concepts are the position of carbon atoms, hydrocarbon nomenclature, isomers, and hydrocarbon reactions. These concepts are analyzed based on the standard books of Chemistry such as books by Brady, Nivaldo and others.

➢ *Analysis of learning objectives*

The purpose of learning hydrocarbon material is through a guided inquiry learning model by extracting information from various learning sources, and processing information, it is hoped that students are actively involved during the teaching and learning process, have a curious attitude, are careful in making observations and are responsible for expressing opinions, answering questions , provide suggestions and criticism, and can analyze observational data or experimental results using stages in the scientific method, and be able to present and communicate information tracing data about the position of carbon atoms, classifications of hydrocarbons, nomenclature of alkanes, alkenes and alkenes, isomers, the nature and reactions of hydrocarbons by developing the character values of critical thinking, creative thinking (independence), cooperation (mutual cooperation) and honesty (integrity).

B. Design Stage

The design stage aims to design the modules to be developed. The hydrocarbon modules that have been designed consist of; 1) Cover, 2) introduction, 3) table of contents 4) list of pictures, 5) list of tables, 6) core competencies, 7) basic competencies, 8) indicators of competency achievement, 9) learning objectives, 10) instructions for using modules, 11) activity sheet, 12) student worksheet, 13) key student worksheet, 14) evaluation sheet, 16) evaluation sheet key, 17) Reference.

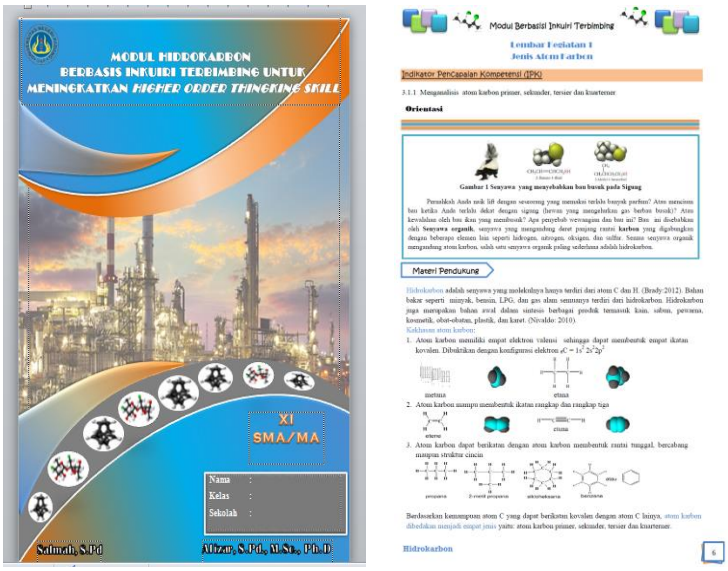

Fig 1:- Display cover and module activity sheet

C. Develop stage

At this develop stage, the validity test was carried out. The validity test aims to reveal the validity level of the guided inquiry-based hydrocarbon module being developed. This test is carried out by 5 people who are experts in their fields. The validity test consists of four parts, namely the content part, the language part, the presentation part and the graphic part. When the validator indicates that the module is valid, the revision will stop.

No.	Component Assessment	Score Validity	Criteria
1	Contents	0.90	Valid
2	Construct	0.89	Valid
3	Language	0.91	Valid
4	Graphics	0.84	Valid
Average		**0.88**	**Valid**

Table 2:- Module validation results

The average validation results of the guided inquiry based hydrocarbon module in the table obtained a value of 0.88 with valid criteria. This means that the module can be used in the learning process.

In terms of the feasibility component, the module content has a valid category with an Aikens V value of 0.90. Based on the average Aikens V value, it shows that the module developed is valid in terms of content feasibility. A product is said to be valid if the product can show a condition that is in accordance with its contents. Already in accordance with the content, it can be interpreted from various aspects[12], like 1). In terms of explaining the material in the module is in accordance with the GPA. Valid teaching materials are teaching materials that are developed based on a strong theoretical and rational curriculum and have internal consistency between the components of teaching materials.[13]. 2). In terms of the key questions contained in the module, it can guide and guide finding concepts so that students can train high order thinking skills of students. This is in line with the function of key questions in guided inquiry learning, that is, questions that can guide students to explore models so that they can develop their thinking skills [7]. 3). Problems contained in the application can apply the concepts they already have. So that it can train students' high order thinking skills.

In terms of construction or presentation components, the Aikens V mean is 0.89 indicating that the module developed is valid in terms of construction (presentation). Perform construction verification to test the suitability of the components listed in the module using predefined indicators [14]. In this research it can be interpreted that the revised module has been arranged systematically and accordingly both in terms of components and from the guided inkuri stage.

In terms of the module components that have been revised, they have been prepared starting from the title, core competencies, basic competencies, competency achievement indicators, learning objectives, activity sheets, worksheets, evaluation sheets, worksheet keys and evaluation sheet keys. In terms of the components, the guided inquiry stages have been arranged starting from orientation, exploration, concept formation, application, and closing. This is in accordance with the guided inquiry stage developed by Hanson[7].

In terms of language, the guided inquiry module has a valid category with an Aikens V value of 0.91 indicating that the revised module is valid in terms of language, which means that the use of the language contained in the module is communicative, unambiguous, and in accordance with Indonesian spelling rules. This means that the module that has been revised according to what Akbar explains, namely a good textbook must be communicative, meaning that the contents of the book are easy to digest, systematic, clear and do not contain language errors.[15]. This category of validity also means that the revised module has clear and understandable key questions.

From a graphic perspective, the module that has been revised is in a valid category with an Aikens V value of 0.84 indicating that the module that has been revised is valid in terms of graphics. This validity category can be explained that the models and fonts contained in the module can be clearly observed and read. In addition, the module is organized in terms of layout and color selection can attract attention.

The average value of the revised module's validity level is in the valid category with an Aikens V value of 0.88 which means that the revised guided inquiry hydrocarbon module is valid.

IV. CONCLUSION

The guided inquiry-based hydrocarbon module developed was categorized as valid. This means that the module has met the requirements for use in the learning process.

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