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VALIDITY OF GUIDED INQUIRY-BASED PHYSICS LEARNING MODULE

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ABSTRACT

The learning resources used in learning physics class XI SMAN 1 Namorambe is only a package book. In fact, teachers and students are not satisfied with the existing learning resources, therefore a new learning resource is needed and is expected to meet the needs of teachers and students. This research focuses on the development of physics learning modules on sound waves material class XI SMA. This study aims to determine the validity level of the guided inquiry-based module on the subject of sound waves that have been developed. This research is an R & D (Research and Development) development research using the 4-D model which has four main stages, namely the defining stage (define), the design stage (Design), the development stage (Development), and the dissemination stage (disseminate). The research instruments used are validation instruments consisting of validation instruments by material experts and media expert validation instruments. The results showed that the validity level of the guided inquiry-based physics learning module produced was on very valid criteria so it was feasible to use in learning.

Keywords: *Module, Guided Inquiry Model, Validity.*

INTRODUCTION

The purpose of education is to educate students to have positive knowledge, abilities and attitudes that they will use throughout life. Indonesia's education system evolves with the times. Changes in the prevailing curriculum show these developments. The 2013 curriculum aims to improve the learning process in schools and encourage students to participate more actively in the learning process. Permendikbud number 59 of 2014 state that the objectives of the 2013 curriculum are centered on achieving four core competencies (KI): KI-1 relating to spiritual attitudes, KI-2 relating to social attitudes, KI-3 relating to knowledge, and KI-4 relating to skills. These four KIs are implemented through an integrative scientific learning approach (Ikhsan & Hadi, 2018). The scientific approach requires students to be active, creative, fun, and have scientific thinking skills. The purpose of this approach is to help students understand and comprehend various topics using a scientific approach, which shows that knowledge can be obtained from anywhere and anytime, not depending on what is given by the teacher. Therefore, the expected learning conditions are designed to encourage students to know from various sources through observation, and not just be told.

Observation results from a questionnaire distributed to 31 students at SMAN 1 Namorambe showed that 78% of the 31 students did not like physics lessons. In addition, the results showed that 29% of students felt that physics lessons were not important to learn, 26% of students did not want to know about physics material, and 68% of students did not want to ask actively about things that were

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not understood during physics lessons. Students become less active in the lesson if they are not interested in the lesson. At SMAN 1 Namorambe, a questionnaire distributed to 31 students found that students' scientific thinking skills were still low. The observation results showed that out of 31 students, 42% failed to formulate problems to solve physical problems, 84% failed to make hypotheses, and 46% failed to collect, compile, and analyze data to solve physical problems. In addition, the physics teacher said that students' scientific thinking skills were still low. The teacher also said that students have difficulty making and presenting practicum results. This supports the finding that students lack scientific thinking skills.

This contradicts the requirements set by the 2013 curriculum, which requires students to be active, creative, fun and have scientific thinking skills. Student's interest in learning is very influential on student's involvement in the learning process. This interest makes students more active, enthusiastic, concentrated, and try to understand what they are learning. The use of teaching materials that are attractive to students can increase learning interest(Fauziah, 2019). Educational resources can be in the form of printed materials, audio materials, audio-visual materials, video materials, interactive materials, and computer materials. At SMA Negeri 1 Namorambe, teaching materials are only in the form of package books. In addition, the results of the distributed survey show that students are not satisfied with the available learning materials, namely the textbooks. In the interview, the teacher admitted that the lesson materials used by the students currently cannot be considered as a student handbook because the explanations in the book are difficult for students to understand. SMAN 1 Namorambe needs additional teaching materials besides the textbook based on the questionnaire and interview data collected.

One of the teaching materials that can help students and teachers in the learning process is a module. Modules are printed learning materials that contain material descriptions and learning objectives based on basic competencies or indicators of competency achievement that can be used by students independently without the need for other supporting media. Modules can be developed by involving a learning model in it. One of the learning models that is in line with the scientific approach and in accordance with the 2013 curriculum is the guided inquiry learning model. Based on the explanation above, researchers want to develop a guided inquiry-based module with the subject matter of sound waves. The purpose of this research is to analyze the content validity of the developed guided inquiry-based physics module.

METHODS

The research method used is Research and Development (R&D). Research and Development is a research method used to produce new products and then study the effectiveness of these products (Sugiyono, 2009) . The model used in this research is 4-D (four D models). The 4-D development model consists of four main stages, namely: (1) Define; (2) Design; (3) Develop; (4) Disseminate. The implementation of module making was carried out from March to May 2023.The research procedure can be seen in Figure 1

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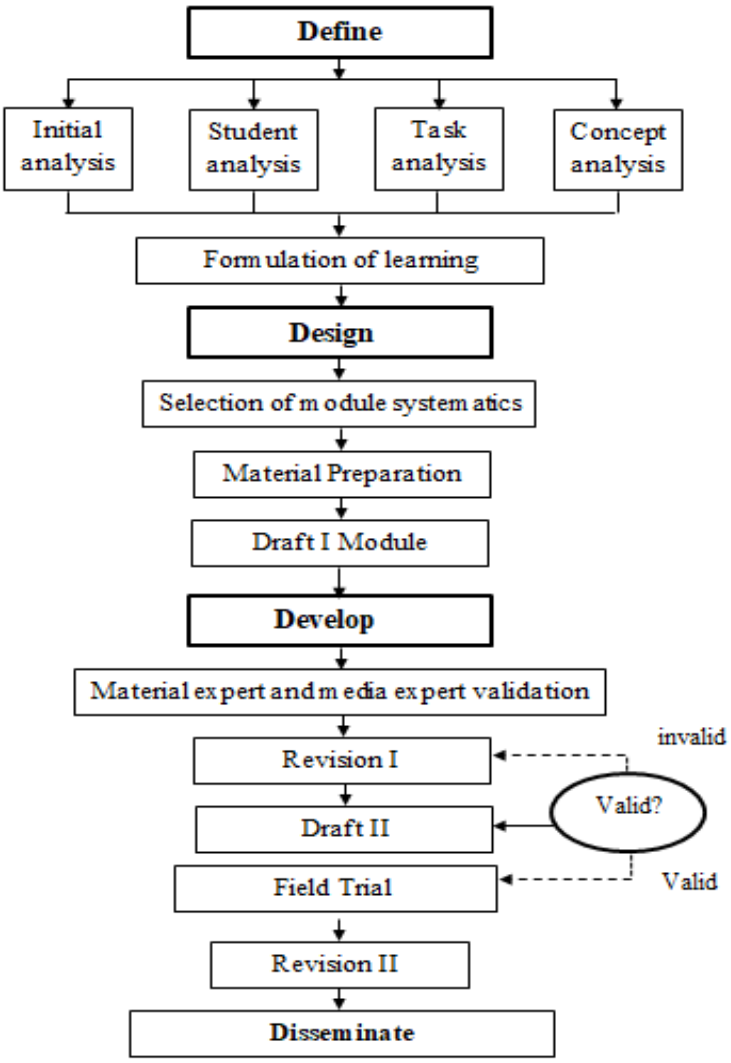

Figure-1.Schematic Of Research Procedur

The defining stage aims to determine and formulate learning requirements. This stage is composed of various analyses, namely (i) initial analysis which aims to find the basic problems encountered in physics learning, (ii) student analysis, namely a review and review of the characteristics of students which includes the level of cognitive development which will affect the process of selecting and designing teaching materials for the physics module developed so that the physics module is in accordance with the characteristics of the students who use it, (iii) task analysis which aims to get an overview of the Competency Standards (SK) and Basic Competencies (KD) in the curriculum which is then used as a benchmark in making modules, (iv) concept analysis which is done by identifying the sub-material that will be discussed in the module to be developed, and (v) formulation of learning objectives which is a conversion of the results of task analysis and concept analysis. The formulation of learning objectives is based on the KI and KD listed in the curriculum on the concept of sound wave material. The resulting learning objectives will underlie the preparation of learning activities and assessment tests in the module.

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The design stage aims to design the prototype of the module to be developed. The design stage consists of (i) the selection of module systematics is done by selecting one of the many module systematics that have been made by experts which then the format is adjusted by the researcher to fit the syntax of the inquiry learning model because the module to be developed is based on inquiry, (ii) the preparation of material adapted to the results of the analysis at the concept analysis stage by taking into account the learning objectives that have been set, and (iii) the initial design of guided inquiry-based physics module media where researchers compile an initial draft of guided inquiry-based physics module instruments by following a predetermined format.

The development stage aims to produce modules that have been validated and have received suggestions from material and media expert validators which are then field tested. This stage consists of (i) expert validation, namely the assessment conducted by material expert validators and media expert validators to determine the level of validity and get suggestions for module improvement, (ii) revision, namely improvements to the module made based on the results of validation by material experts and media experts, and (iii) field trials conducted in class XI MIA-1 SMAN 1 Namorambe.

The dissemination stage aims to disseminate the physics module products that have been developed after the field trial. At this stage, the researcher will provide the developed module to the Physics Teacher of SMAN 1 Namorambe for further use in learning.

The steps taken by researcher to determine the validity level of the developed module are through content validity. Content validity is testing the feasibility of research instruments by experts.The instrument used in this study is a module validation instrument aimed at assessing the validity of the inquiry-based learning module on sound wave material developed. the validation instrument in this study is a questionnaire consisting of a validation questionnaire for material experts and a validation questionnaire for media experts. Material experts assessed 4 main aspects, namely aspects of content feasibility, presentation feasibility aspects, guided inquiry presentation aspects, and language. Meanwhile, media experts assessed the graphic aspects with 4 indicators, namely the use of fonts, layout and layout, module display design, and illustrations and images in the module. The assessment on the validation sheet uses a Likert scale, namely Very Good with a value of 5, Good with a value of 4, Quite Good with a value of 3, Less Good with a value of 2, and very poor with a value of 1 (Sugiyono, 2019).

The data from the validation results were analyzed with the following steps:

a) Quantifying the validation results according to predetermined indicators by giving scores according to predetermined weights.
b) Making data tabulation.
c) Calculating the percentage of relative frequency with the formula:

$$P = \frac{\sum f}{N} \times 100\% \quad (1)$$

Description:
P =category percentage
f =the number of answer scores in the selected category

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N = ideal score (Sudjana & Rivai, 2007)
The calculation results obtained are then matched with the table below according to sugiyono (2019) so that the module validity level can be known.

Table-1. Validity test assessment criteria

Percentage of assessment	Category
$(\mathbf{81-100})\%$	Very valid
$(\mathbf{61-80})\%$	Valid
$(\mathbf{41-60})\%$	Valid enough
$(\mathbf{21-40})\%$	Less valid
$(\mathbf{0-20})\%$	Invalid

RESULT & DISCUSSION

At the definition stage of this research, several problems were found with physical learning in the classroom. Among these were students who were not active during physical lessons and had difficulty understanding and solving physical problems. In addition, neither school resources nor handbooks met students' needs and students' interest in physics was considered low. Low interest in physics has an impact on student participation in learning, although the current curriculum emphasizes the importance of student participation in learning (Lutfiah et al., 2020). This problem is the reason for researchers to create and develop modules. Guided inquiry-based modules can increase student interest in learning (Purnamasiwi, 2017). Before making the module, the researcher analyzed the students in class XI MIA-1 SMAN 1 Namorambe. The results showed that all students were in the formal operational stage, which is the stage of cognitive development according to Piaget. This means that students have the ability to think systematically to solve problems and have the ability to think concretely and abstractly (Fauziah, 2019). The results of student analysis show that the guided inquiry-based physics module is in accordance with the characteristics of grade XI students. This is because the module is designed by considering the stages of guided inquiry learning. Then through concept analysis, it was determined that the sub-matter to be discussed on the subject matter of sound waves based on the 2013 curriculum physics syllabus, namely (i) the speed of propagation of sound waves, (ii) the phenomenon of strings and organa pipes, (iii) sound intensity and sound intensity levels, (iv) the doopler effect. after that, researchers formulated 10 learning objectives covering cognitive levels C1, C2, and C3.

In the design stage, researchers determine the format of the module to be made. This format should consist of cover, preface, table of contents, description, instructions for use, core competencies, basic competencies, indicators, learning objectives, presentation, evaluation at the end of the module, evaluation answer key, and bibliography. Rahmi, Ibrahim, and Kusumawardani (2021) said that the module is organized into the smallest components of a complete material concept, so that students can learn on their own without the help of a teacher. Therefore, the sound wave material designed for the module is divided into three learning activities, namely (i) sound sources and devices that will discuss the definition of sound waves, the speed of propagation of sound waves, strings and organa pipes,

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(ii) sound intensity and sound intensity levels, and (iii) the doppler effect and its application to sound waves. then the module is then compiled starting from the cover to the bibliography in accordance with a predetermined format. The preparation of the module is fully made using Microsoft Word 2010 application where the type of paper used in the preparation of the module is A4 (21 x 29.7), the type of font used for the module title is Arial black with a font size of 28 pt. The typeface used in the content of the module is Times New Roman with sizes 12 pt, 14 pt and 24 pt. The presentation of each learning activity in the module uses guided inquiry-based learning stages. The module was made by considering the characteristics of the module namely self instruction, self contained, stand alone, adaptive, and easy to understand by the user (DIPP UNAIR, 2022). In preparing the module, researchers also paid attention to the criteria for good module elements concerning format, organization, attractiveness, font size, blank space, and consistency (Rahdiyanta, 2016).

At this stage, data obtained from validation results by material experts and media experts. Material expert validation data is presented as follows

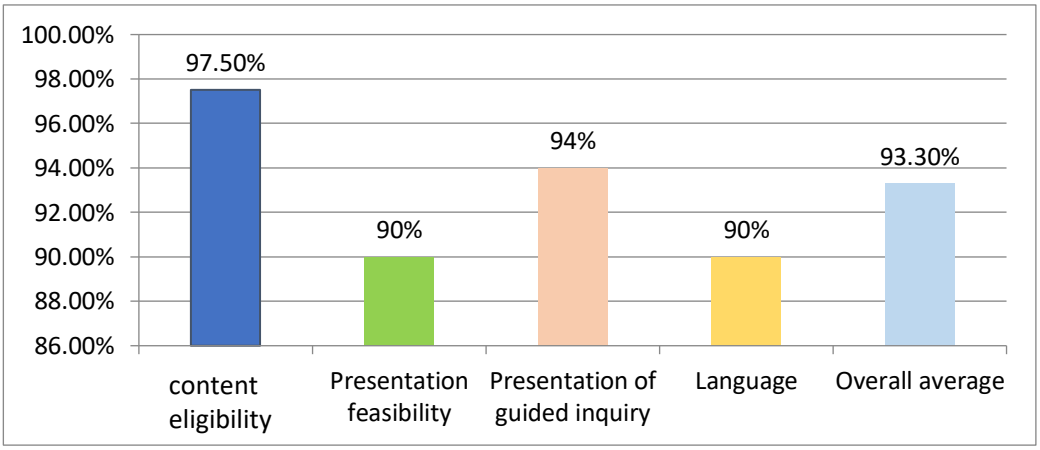

Figure-2. Module validity level graphics based on material expert assessment

There are four aspects assessed by material experts, namely (i) aspects of content eligibility, (ii) presentation feasibility, (iii) guided inquiry presentation, and (iv) language. The content feasibility aspect consists of two indicators, namely the suitability of the material description with SK and KD, and the accuracy of the material. From the results of the material expert's assessment of the module, the content feasibility aspect is in the very valid category. This shows that the description of the material in the module is accurate and in accordance with the SK and KD contained in the 2013 curriculum as described by Muslich (in Pradita 2018) regarding the feasibility aspects of textbook content. The presentation aspect includes things that support the presentation of module content such as instructions, evaluation questions, and sample questions. The presentation aspect includes the guided inquiry learning stages applied in the module, as well as elements that support the content of the module, such as instructions, evaluation questions, and sample questions. The presentation feasibility aspect is based on the results of the material expert's assessment of the module, and this aspect is in the very valid category. This shows that the module has explained the stages of guided

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inquiry. These stages begin with problem orientation, formulating problems, proposing hypotheses, planning investigations, gathering information, processing data, drawing conclusions, and communicating in line with the results of Wena's (2009) research on the stages of guided inquiry. Linguistic aspects include communication, interaction, flow of thought, and the use of terms and symbols (Muslich in Pradita, 2018).

The results of the material expert validation show that the linguistic aspects of the module are very valid; overall, the results show that the developed learning module is very valid, but requires minor improvements. The accuracy of the use of punctuation in the subject matter is an aspect that needs to be improved according to the material expert's assessment. The material expert also suggested making evaluation questions at the end of each lesson to determine the level of understanding of students after using the module and if the evaluation results have met the kkm value (75) then it is allowed to continue to the next lesson, but if it has not met the kkm students must re-learn the subject matter in the lesson. Based on the assessment of the material expert, the module is suitable for use in learning after being revised according to the suggestions.The results of validation by media experts can be seen in the graphic below

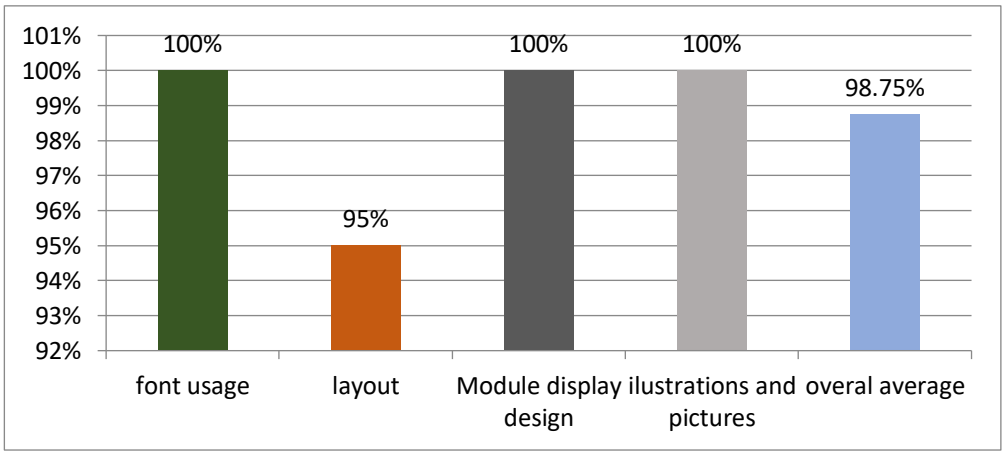

Figure-3. Module validity level graphic based on media expert assessment

The results of media expert validation show that each indicator is in the very valid category, according to Muslich (in Manurung et al 2021) regarding the agraphic aspects of textbooks. The four indicators are the use of fonts, layout and layout, module display design, and illustrations and images. This shows that (i) the font and font size used are appropriate, (ii) the layout of images, page numbering, and margins are appropriate so that the module looks neat, (iii) the cover and colors used in the module attract students to read it, and (iv) the illustrations and images listed on the module clarify the information. Overall, the results of the media expert validation show that the module meets the criteria, but still needs some improvements. As suggested by the media experts, improvements were made by (i) reviewing the evaluation questions, adding or removing some that were not in accordance with the learning objectives, (ii) adding instructions for working on the evaluation questions, and (iii) using italics to reduce foreign

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language in the module.

According to the results of the media expert validation, the module meets the criteria, but still needs some improvements. As suggested by the media expert, improvements should be made. The questions should be clear, varied, and easy for students to understand. Teachers and students should interact with each other when solving the questions. In addition, foreign language words in the module should be corrected. Based on the assessment of media experts based on four criteria (Depdiknas, 2008), namely the use of fonts, layout and layout, module display design, illustrations and images, the module is suitable for use in learning. This shows that (i) the use of fonts and font sizes is appropriate, (ii) the layout of images, page numbering and margins is appropriate so that the module looks neat, (iii) the module cover and colors used in the module are able to attract students to read the module, (iv) illustrations and images listed on the module clarify the information in the module.

The results of expert validation show that the product developed has met very valid criteria. Therefore, the product is suitable for use in physics lessons at SMA Negeri 1 Namorambe. The results of the validity of this inquiry-based module are in accordance with the findings of researchers (Purnamasiwi, 2017), which show that guided inquiry-based modules are one of the best for use in learning. The modules developed during his study were validated by material experts and media experts. This study differs from Purnamasiwi in terms of the elements assessed by the validators. In Purnamasiwi's study, material experts assessed the material, language and presentation, media effects on learning strategies, and overall appearance. While media experts assessed the material, language and presentation, and media effects on learning strategies. This guided inquiry-based module meets the learning needs of students. The inquiry stage used in the module allows students to participate more actively in learning.

Module products that obtained highly valid criteria by material experts and media experts and obtained practical criteria based on student responses and proved to be able to increase student learning interest with moderate criteria were then distributed by providing inquiry-based module products to Physics Teachers of SMAN 1 Namorambe in pdf form for further use in learning.

CONCLUSION

Based on the results of research conducted by researchers, it can be concluded that the inquiry-based physics learning module is in the valid category. The validity of the guided inquiry-based physics module produced based on the assessment of material experts is in a very valid category, and based on the assessment of media experts the developed module is in a very valid category too so that the developed module is suitable for use in learning.

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