



Development of Learning Modules Based Numbered Head Together (NHT) on Substance Pressure Material at the Junior High School Level

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ABSTRACT

Based on observations, the teaching materials used in the learning were only textbooks. This study aims to design and determine the feasibility level, and students' responses to the learning module. This research uses Research and Development (R&D) research with the ADDIE model. The subjects of this study included 3 material expert validators, 3 media expert validators, and 6 students of Subulussalam City Integrated Islamic Junior High School. The data analysis techniques used are qualitative and quantitative descriptive analysis techniques that describe the results of the validity and practicality test of NHT-based modules. The instruments used in this study were material expert validation sheets, media experts, and questionnaire sheets. The research results obtained from material expert validation were 94.4% and media expert validation was 95.5%, so that overall the percentage of results feasibility was 94.95% with very feasible criteria. The student response results obtained were 95.5% with very interesting criteria. As a result, it is possible to conclude that the learning module can be used in the learning process.

INTRODUCTION

Learning is fundamentally a communication process, including learning resources, teachers, and students. The communication engagement is carried out either directly in face-to-face activities or indirectly through the use of media, and the learning model that will be used has been defined in advance. Learning is also intended to provide learning experiences involving mental and physical processes through interaction to develop fundamental competencies (Rusman, 2017; Kustandi, 2020).

For this reason, educators must know what teaching materials and methods match students' characteristics, which can later be used in the learning process. Modules are teaching materials that are effective in achieving learning objectives. Modules as self-study packages that include a series of learning experiences planned and designed systematically to help students achieve learning goals, so that modules can be one of the alternative teaching materials used in the teaching and learning process.

The Numbered Head Together (NHT) learning model is a variant of group discussion. NHT's cooperative learning model provides students with the opportunity to share ideas and consider the most appropriate answers. This learning model can make students more responsible for the tasks

given, make students more active in learning forums and make learning more interesting (Warsono, 2017).

The effectiveness of learning using module-based teaching materials with learning models Numbered Head Together It can be seen from the previous research conducted by Nurhayati (2018), "Module Development Based on the NHT Type Cooperative Learning Model on tenth grade science 1 State High School 1 Tanjung Palas" obtained 85% of the student responses. Furthermore, previous research by Febrianti et al (2020) showed that the expert validation results received an average score of 79% in the Good category, while the limited trial outcomes received an average score of 80% in the good category. Based on Nurhayati's (2018) research and Febrianti, et al. (2020), developing NHT-based modules can help effectiveness in learning. This can be seen from the interest or response of students to the modules, then student learning outcomes increase after the implementation of NHT-based modules. So, the author is interested in developing an NHT-based module on Substance Pressure Material.

This research develops an NHT-based module on substance pressure material. In previous research, developed an NHT-based module on Protista and simple plane materials. Previous research also used the 4D model (Define, Design, Develop, and Disseminate). Then, in the last research, module design did not utilize technology in the modules being developed, but in this research, technology was used, such as creating links and barcodes to access learning videos to make it easier for students who wanted to learn via video.

Modules are teaching materials that include learning objectives, usage guides, material descriptions, the essence of evaluation and feedback, and follow-up, systematically designed to function as a means of independent learning (Ummah et al., 2017). Modules are teaching materials compiled from a learning unit and equipped with independent study instructions without forgetting the learning objectives. This makes it easier for students to achieve learning goals because they only focus on one unit of the material chapter (Asma et al., 2022). To realize student-centered learning, teachers must be able to design strategies to increase student activity in the learning process, one of which is through learning modules. Learning modules as a form of learning media are an important part of the implementation of learning so that the implementation of learning can be more optimal (Hamid et al., 2022).

Module development is carried out using Numbered Head Together (NHT) because NHT is an active learning strategy that promotes student engagement and participation. Through NHT, students actively participate in discussions and problem-solving activities that foster a deeper understanding of concepts. Developing NHT-based modules allows students to practice collaborative skills that are valuable both academically and in their future careers. NHT activities typically involve problem-solving, discussing solutions, and justifying answers, all of which contribute to developing critical thinking skills (Arsanti et al., 2017; Wijaya et al., 2016).

According to Samosir & Nainggolan (2022), the increase in chemistry learning outcomes for students taught with the NHT learning model assisted by e-modules is higher than the increase in chemistry learning outcomes for students taught with the NHT learning model accompanied by student reference teaching materials, with a difference in the increase in learning outcomes of 4.09%. There is an influence of applying the NHT type cooperative learning model assisted by e-modules on student learning outcomes in Chemical Bond material. So, researchers are interested in researching to develop an NHT-based Substance Pressure module to help achieve learning objectives.

In summary, module development using the Numbered Head Together (NHT) method benefits physics majors by promoting active learning, collaboration, critical thinking, communication skills, and application of knowledge. Increase engagement and motivation while allowing continuous assessment and adaptability to different physics topics. Ultimately, NHT-based modules can contribute to a more comprehensive and effective physics education for majors in this field.

RESEARCH METHODS

Research Approach

The type of research used is development Research and Development (R&D). This study aims to design and determine the feasibility level and students' responses to the learning module Numbered Head Together (NHT) model. ADDIE is the model used in this study to produce a product in the form of a module. This model consists of stages: analysis, design, development, deployment, and evaluation (Sugiyono, 2019; Suharyat, 2022).

Research Participants

The subjects of this study included three material expert validators, three media expert validators, and six students of the Integrated Islamic Junior High School in Subulussalam City. The object of this study is a learning module based on Numbered Head Together (NHT) in Material Pressure at the Junior High School Level.

Research Instruments

The instruments used in this study are:

1. Validation Sheet

A validation sheet is required to see product eligibility. A validation sheet is needed to develop a product, which will be given to an expert validator. This validation sheet includes validation on material experts and media experts.

2. Questionnaire sheet

Questionnaire sheets are given to students to provide data on student responses to products so that students can use them in the learning process.

Data Collection

Data collection technique is a very important component in research. The data collection techniques used in this study are:

1. Validation

Validation is a data collection technique to determine the feasibility of a product that has been made or developed by researchers. Where expert validators will provide input or criticism, then provide an assessment of the product to be developed. The validator's assessment consisted of material experts and media experts.

2. Questionnaire

Questionnaires are used to collect data on student responses to products, which are needed by researchers in the NHT-based module development research process.

Data Analysis

A qualitative analysis technique and a quantitative analysis technique were employed to analyze the data. This qualitative descriptive analysis is used to analyze data from a review of material experts, media experts, and student responses in the form of ideas and comments for improving NHT-based modules. Data from questionnaires and validation sheets were analyzed using quantitative descriptive analysis. The validator's analysis is descriptive qualitative in the form of feedback and criticism, whereas the data utilized in module validation and student response questionnaires are quantitative.

1. Product Validity Quantitative Analysis

The data used in module validation is quantitative data with reference to 5 assessment criteria (Widoyoko, 2012), which are as follows:

- a. Score 1, if the assessment is very inappropriate
- b. Score 2, if the assessment is not feasible

- c. Score 3, if the assessment is not feasible
- d. Score 4, if the assessment is feasible
- e. Score 5, if the assessment is very feasible

Data derived from the validation sheet was evaluated or filled up by six expert validators, three of whom were material validators and three of whom were media validators. The level of validity will then be evaluated using the percentage method shown below (Sugiyono, 2019):

$$P = \frac{\sum X}{\sum X_i} \times 100\%$$

The results obtained from the formula above will be referred to the eligibility criteria table below (Arikunto, 2006):

Table 1. Eligibility percentage criteria

Eligibility Percentage Criteria	Eligibility Level
81%-100%	Very Worth It
61%-80%	Worthy
41%-60%	Less Eligible
21%-40%	Not feasible
<21%	Very Unworthy

2. Quantitative Analysis of Student Responses

Analysis of student response questionnaires is descriptive qualitative in the form of inputs and criticism, while the data used in the questionnaire is quantitative data with reference to 5 assessment criteria, namely as follows:

- a. Score 1, if the assessment is very uninteresting
- b. Score 2, if the assessment is not interesting
- c. Score 3, if the assessment is less attractive
- d. Score 4, if the assessment is interesting
- e. Score 5, if the assessment is very interesting

The data received from the results of the questionnaire filled out by students will be used to calculate the level of attractiveness using the percentage calculation shown below (Sugiyono, 2019):

$$P = \frac{\sum X}{\sum X_i} \times 100\%$$

The results obtained from the above formula will be referred to in the attractiveness criteria table below (Nesri & Kristanto, 2020):

Table 2. Interesting percentage criteria

Percentage Criteria	Interesting Level
81%-100%	Very interesting
61%-80%	Interesting
41%-60%	Less attractive
21%-40%	Not attractive
<21%	Very Unattractive

RESULTS AND DISCUSSION

Results

The results of this research begin at the analysis stage, this level of requirements analysis was completed by conducting observations and interviews with scientific subject teachers at the Darussalam Integrated Islamic Junior High School in Subulussalam City to identify difficulties in the learning process. Based on preliminary observations made for a needs analysis on April 13, 2022, at the Darussalam Integrated Islamic Junior High School in Subulussalam City, the researchers discovered that the teacher only used one teaching material and preferred the lecture method due to a lack of facilities and infrastructure. Many students in class VIII SMP still do not comprehend the material pressure content because the approach employed in the learning process is extremely tedious, namely lectures, and the learning tools utilized are simply textbooks.

After the needs analysis stage is carried out, the module design stage is then carried out. This design stage includes designing modules, selecting materials, and compiling lesson plans. The front and back covers are designed using an application canvas, while the contents, from the flowchart to the end, are designed using an application Microsoft word.

The module Numbered Head Together(NHT) that has been designed is then tested for feasibility by an expert validator to get input and suggestions for the module. The following table shows the overall percentage of the feasibility of NHT-based modules as follows:

Table 3. Validation percentage data

Validator	Percentage	Criteria
Material Expert	94,4 %	Very Worth it
Media Expert	95,5 %	Very Worth it
Average Total Score	94,95 %	Very Worth it

Based on the information in Table 3 above, the Numbered Head Together (NHT) module developed achieved an average percentage score of 94.95% with very good criteria. Students were given a response questionnaire to determine their responses to the modules being developed. There were only six students involved in this research, and the distribution was only carried out on a small scale, this is because it required more time and more funds. Student responses to the development of the Numbered Head Together (NHT) science-based learning module regarding material pressure can be seen in the following table:

Table 4. The results of student response data

Assessment Aspect	Assessment Criteria	Score Total	Σ Every Aspect	Average	%	Criteria
Module Cover	1	29	85	4,7	94,4	Very Interesting
	2	28				
	3	28				
Fill in the Module	1	29	232	4,8	96,6	Very Interesting
	2	30				
	3	29				
	4	28				
	5	29				
	6	29				
	7	30				
	8	28				
The average sum of all scores			317	4,7	95,5	Very Interesting

The table above shows that the percentage of students' responses to module-based Numbered Head Together(NHT) developed obtains 95.5% with very attractive criteria.

Discussion

The research findings are supported by previous studies on developing Numbered Head Together (NHT) based learning modules, specifically focusing on Substance Pressure material at the junior high school level to improve conceptual understanding. Previous research in science education has indicated that NHT-based learning modules can enhance students' conceptual understanding of scientific concepts. For instance, a Slavin (2014) study found that cooperative learning approaches, including NHT, lead to improved comprehension of complex scientific ideas. When applied to Substance Pressure material at the junior high school level, NHT-based modules may help students grasp abstract concepts related to pressure, such as gas laws and their applications.

Research by Johnson (2009) on cooperative learning shows that students who engage in cooperative activities such as NHT tend to retain and apply their knowledge more effectively, while NHT can create a supportive learning environment. In the context of Substance Stress, students can help each other understand challenging concepts, thereby improving overall class performance. These findings are particularly relevant when developing a module for middle school students studying Substance Stress. By actively participating in NHT activities, students can better understand stress principles and apply them in real-world scenarios, thereby improving their problem-solving skills.

Increased Motivation and Engagement: NHT fosters student motivation and engagement, as demonstrated in studies by Kagan (1992). The structured and collaborative nature of NHT activities can make learning about Substance Pressure more exciting and enjoyable for junior high school students. This heightened engagement can increase participation and a positive attitude towards science and the development of Communication Skills. NHT promotes effective communication and teamwork, which are valuable skills for students at the junior high school level. Research by Barkley et al. (2014) on cooperative learning highlights the positive impact of collaborative activities on communication skills development. In Substance Pressure, students may need to explain their reasoning and findings to their peers, reinforcing their ability to communicate scientific concepts.

Aligning NHT-based modules with curriculum objectives is crucial. By incorporating the principles of NHT into Substance Pressure teaching materials, educators can ensure that the modules are designed to meet specific learning goals and standards set for junior high school science education. Students will be able to develop a deeper understanding of the concept of Pressure of Substances, as NHT-based modules encourage active interaction between students and provide opportunities for them to work together in groups, discuss, and carry out relevant experiments and assignments (Muharromah & Ibrahim, 2021).

The science-based learning module Numbered Head Together (NHT) is a print module that is designed and designed according to the ISO standard size, namely A5. The A5 size is used so that the module is easy to carry anywhere and doesn't take up much space, so the module is more practical to use. The module is also designed with a dominant bright blue color both from the cover and on the inside of the module. Design the cover section using the application canvas, while the inside is designed to use Microsoft Word and also has a mixed background between bright blue and Tosca blue. In the design phase, the researcher also designed a lesson plan using the NHT learning model so that the developed module is NHT-based. After making the designs above, an NHT-based learning module on substance pressure material was developed.

The feasibility of the module can be seen by validating media experts and material expert validation. Media experts assess the three aspects of the validation sheet: module size, module cover design, and module content design. Meanwhile, media experts assess five aspects: the feasibility of the content, the accuracy and correctness of the material, the presentation components, and the learning model Numbered Head Together (NHT), language, and communication. The data from the assessment is in the form of score data converted into five categories: not good, not good, good enough, good, and very good.

The score from each validator will be converted into a percentage for the eligibility requirements. According to Table 3 of the research mentioned above findings, the validation results of material experts have a percentage of 94.4% with very viable criteria, where as the validation results of media experts have a percentage of 95.5% with extremely feasible criteria. With very good criteria, the total derived from material and media expert validation is 94.95%. As a result, the validation findings show that the learning module Numbered Head Together(NHT) is quite usable.

The validity results from the expert validator assessment with a total score of 94% are included in the valid category and are very suitable for use as a learning module. The validity of these teaching materials or modules is supported by Wardiyanti and Jayati, who think that valid teaching materials fulfill the validity standards of assessments by expert validators, and all expert validators have stated their validity (Wardianti & Jayati, 2018). So it can be concluded that modules declared feasible by the validator can be used in the learning process.

Using student response surveys, we tested student reactions to NHT-based learning modules. Table 4, data analysis from the student questionnaire, demonstrates that the student replies fall into the extremely interesting group. According to the results in Table 4, the module products supplied to 6 students have a percentage of 94.4% with extremely interesting criteria in terms of module cover and a percentage of 96.6% with very fascinating criteria in terms of module content. It can be stated that the modules designed are very attractive to students, as evidenced by the results of sending questionnaires to students.

This research is in line with research conducted by Febrianti et al. (2020) entitled "Development of an Integrated Science Learning Module Based on Cooperative Number Head Together (NHT) Type on Class VIII Simple Aircraft Material," which obtained expert validation results getting an average score of 79% in the category Good, the results of the limited trial got an average score of 80% in the Good category. Furthermore, research conducted by Nurhayati (2018) with the title "Development of a Module Based on the NHT Type Cooperative Learning Model on Protista Material obtained results in the very feasible category, and the results of the student response questionnaire to the module developed obtained a percentage of 85% in the very interested category.

Based on the description above, it can be concluded that the module developed is following the needs of students, this can be seen from the results of the feasibility test by material and media expert validators. Then a limited trial was also carried out on students at SMP IT Darussalam, Subulussalam City. The results were that the students considered this module very practical and interesting.

CONCLUSION

Learning modules based on feasibilityThe Numbered Head Together (NHT) level of Junior High School produced by the validators meets the eligibility criterion. The data analysis demonstrates these results from validating material and media experts, which obtained 94.95% with extremely good criteria. Based on questionnaire data, students' responses to module-based learning Numbered Head Together(NHT) get a positive response from students. This can be proven from the data analysis obtained by 95.5% with very interesting criteria based on the results obtained, and the NHT-based module can be used to reduce student dominance theoretically. The results of this research also show that teachers can apply the learning module because it is based on students' responses who think that this module is very interesting to use in learning.

For further research, this module needs to be tested on students so that students' activeness can be seen directly and thoroughly. For researchers to conduct more in-depth research by comparing the application of the Numbered Head Together Learning Model using module media in the experimental class and control class, and for the development of other media related to the module, the module can be further developed for other materials and lessons and use different learning models. other. Module development can be made with a better design so that it has a more attractive appearance.

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