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Development of REACT-Based Module Integrating Qurani in Temperature and Heat Materials in High School

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ABSTRACT

This study is motivated by the limited availability of physics learning resources, which are mostly textbooks, the lack of integration of Islamic values, and the implementation of a teacher-centered education system, resulting in reduced active student participation in the learning process. The aim of this research is to determine the feasibility and practicality of developing a REACT-based module with Quranic integration on temperature and heat material in SMA/MA. This research uses a type of R&D research with a 4D model which has several stages, namely the definition stage, design stage, development stage and disseminate stage. The instruments used in this research were material expert validation sheets, media expert validation sheets, as well as interpretation expert validation sheets and questionnaires. The research results obtained from material expert validation were 94%, media expert validation was 98%, and interpretation expert validation was 93%, resulting in an overall feasibility percentage of 95% with very feasible criteria, as well as practical results obtained from student responses. amounting to 88% with very practical criteria. It can be concluded that the REACT-based module with Quranic integration in temperature and heat material in SMA/MA is very feasible and very practical to use in the learning process.

ABSTRAK

Penelitian ini dilatarbelakangi oleh sumber bahan ajar fisika yang sangat terbatas dan hanya berupa buku paket, guru tidak memiliki bahan ajar yang mengandung nilai-nilai keislaman dan sistem pendidikannya menganut Teacher Center, yang peserta didik kurang aktif berperan dalam proses pembelajaran. Tujuan penelitian ini adalah untuk mengetahui kelayakan dan kepraktisan dari pengembangan modul berbasis REACT berintegrasi Qurani pada materi suhu dan kalor di SMA/MA. Penelitian ini menggunakan jenis penelitian R&D dengan model 4D yang memiliki beberapa tahapan yaitu tahap pendefinisian (Define), tahap perancangan (Design), tahap pengembangan (Development), dan tahap penyebaran (Disseminate). Instrumen yang digunakan dalam penelitian ini berupa lembar validasi ahli materi, lembar validasi ahli media, serta lembar validasi ahli tafsir dan angket. Hasil penelitian yang diperoleh dari validasi ahli materi sebesar 94%, validasi ahli media sebesar 98%, serta validasi ahli tafsir sebesar 93%, sehingga diperoleh hasil persentase keseluruhan

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kelayakan sebesar 95% dengan kriteria sangat layak, serta hasil kepraktisan yang diperoleh dari respon peserta didik sebesar 88% dengan kriteria sangat praktis. Dapat disimpulkan bahwa modul berbasis REACT berintegrasi Qurani pada materi suhu dan kalor di SMA/MA sangat layak dan sangat praktis digunakan dalam proses pembelajaran.

A. Introduction

Life continues to be dynamic with the times, all aspects of life are changing, especially the implementation of education. The education system is expected to continuously adapt to become more modern, relevant, and capable of addressing global challenges. Education is very important, as time goes by the quality of education will become more and more complex[1]. The purpose of education is inseparable from efforts to produce problem solving so that there are always new innovations in the learning model. The development of new innovations in learning materials is urgently needed in order to increase a child's interest in learning[2]. However, the reality in the field indicates a considerable gap. The limited availability of teaching materials has become one of the contributing factors to the decline in the quality of education in Indonesia, especially with more and more educational problems, it is necessary to improve the quality, one of which is in the development of teaching materials[3].

The limitation of teaching materials in learning has caused the decline of education in Indonesia, especially with more and more educational problems, it is necessary to improve the quality, one of which is in the development of teaching materials[4]. Learning materials are divided into four types, namely as follows (1) Teaching materials in the form of prints, for example*: handouts*, textbooks, modules, student worksheets, brochures, *leaflets,* photos, and models or markets. (2) Teaching materials in the form of listening (audio) for example: cassettes, radios, black plates or *audio compact discs.* (3) Teaching materials for visual (audiovisual) for example: for example, *video compact discs* and films. (4) Teaching materials are interactive, i.e. teaching materials that are combined from two or more media (audio, text, images, animations, and videos)[5].

The teaching materials used in this study are in the form of modules. A module is defined as a tool or means of containing learning information in which there are materials, methods, and others that are designed in a structured and attractive manner in order to achieve the expected learning objectives[6]. The module is one of the learning tools designed based on the running curriculum is expected to achieve the SK (Competency Standards) set[7]. The use of modules has many advantages so that it is suitable as a varied learning material rather than just using package books. The advantages of this module include: a) the pictures in the module explain the material, b) the colors in the module are interesting, bright so that they can increase students' interest in reading, c) they are able to overcome space and time for students and

teachers, d) they develop interaction skills so as to improve learning skills, e) the role of teachers is not only as a teacher but also as a guide, f) students will be healthier in competence, g) can attract students' attention in learning, so that interactive learning emerges that makes children more confident[8].

Based on observations at MAS Darul Ihsan, it can be seen that the source of physics teaching materials is very limited and only in the form of package books, teachers do not have teaching materials that contain Islamic values and the education system adheres to *the Teacher Center,* where students do not play an active role in the learning process. Islamic religious learning only discusses religion, so students consider that there is no connection between religion and physics subjects, even though the two are very related. An example of the relationship between religion and physics is found in Q.S Al-Quraish : 2 which tells about the trade of the Quraish tribes in winter to Yemen and summer to Syria. Winter and summer are the magnitude of the temperature.

The relationship between physics and religion is very suitable to be integrated, so that the physics learning system also not only pursues the cognitive aspect, but also the learning of noble character[9]. The integration of Islamic-based physics in the learning process can raise students' awareness of good character and personality values in accordance with Islamic values[10] The integration of Islamic-based physics in the learning process can raise students' awareness of good character and personality values in accordance with Islamic values[8]

Another problem in observation is that the teaching materials in learning are only package books, so that students get bored quickly in learning. The learning system using package books results in a lack of interaction between students and teachers in the teaching and learning process. Therefore, a learning model is needed that is in accordance with this problem.

The learning model used in this study is *the REACT model,* which will provide opportunities for students to play a more active role in the classroom. *REACT* is defined as part of a contextual learning strategy consisting of five stages, namely *relating* (connecting), *experiencing*, *applying*, *cooperating*, and *transferring* (sharing or transferring). *REACT* will provide opportunities for students to learn to "experience" not just memorize, apply concepts, and practice students' thinking skills optimally.

The advancement of information technology offers opportunities to overcome the limitations of physics learning through the development of module based on React. Learning through a contextual approach enables students to construct their scientific understanding independently by connecting it with events and phenomena that occur in everyday life [15]. The integration of Qur'anic values within this module is considered strategic, as it not only enriches the cognitive dimension but also fosters students' spiritual awareness, leading to a religiously grounded rational understanding of knowledge. The topic of temperature and heat is particularly relevant, as it directly

relates to everyday phenomena that align with Qur'anic verses. Thus, a React-based module that integrates Qur'anic perspectives has the potential to provide science learning that is innovative, contextual, and religiously oriented in accordance with the demands of contemporary education. Based on these problems, the purpose of this study is to determine the feasibility of developing a REACT-based module integrating Quranic on Temperature and Heat materials in SMA/MA, andto find out the practicality of developing a REACT-based module integrating Quranic on Temperature and Heat materials in SMA/MA.

B. Method

This research is a Research and Development (R&D) research. This research aims to test and develop a product in the form of a REACT-based module integrating Qurani which will be the final result of this research. The module was developed using Canva software to support content creation, interactive design, and the integration of various learning features, which serve as the final product of this research. Product development cannot be separated from product validation to produce a higher quality final product. The validation was carried out by six experts, consisting of two material experts, two media experts, and two Qur'anic exegesis experts. Validation refers to the research process where validators collect input and suggestions to assess the suitability of the resulting product[11]. This research uses a 4D model consisting of 4 (four) elements according to its abbreviation, namely, the stages of define, design, development, and disseminate.

This development research is specifically limited to the validation stage of feasibility, while the trial phase was not carried out within the scope of this study. This limitation was determined based on considerations of time constraints, availability of resources, and the research focus, which was directed at assessing the product's feasibility prior to conducting trials in subsequent stages. Therefore, the results of this study are expected to provide an initial overview of the quality of the developed product based on expert evaluation, which can later serve as a foundation for further research at the trial and classroom implementation stages.

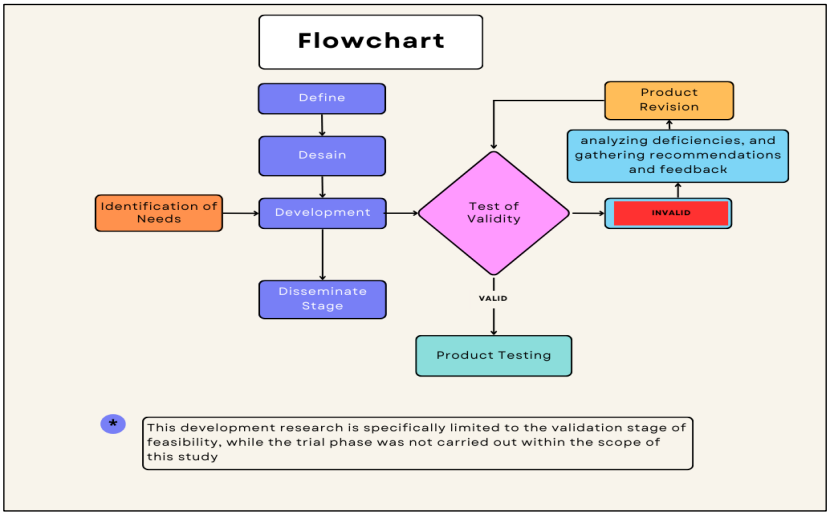

Figure 1. Module Development Flowchart

The research stages start from :

1. The Define *stage is part* of the beginning of the 4D step that determines and defines the learning requirements, namely making initial observations about school conditions. Of course, in determining learning needs, things that need to be considered include learning needs with the applicable curriculum, the condition of the school, how students develop, and even what developments are applied in the school.
2. Design Stage
   The design stage is the stage of designing learning tools. At the design stage, the selection of format, media for delivering learning materials and the process of making products will be the main basis for this stage. This research will focus on initial design planning in the form of learning modules with predetermined materials. Interesting media with material content that can be easily understood by students, so that students are interested in using this learning module. The initial product for the learning module will be adjusted to the suggestions and input of the supervisor to be developed.
3. Development Stage
   This development stage serves to produce products in the form of learning modules after going through revisions based on comments, suggestions and assessments through validators. The following steps describe this stage of development, which are as follows: a) Validation of experts or practitioners; b) Revision I, revision I is carried out after the completion of the validation process; and c) Developmental Testing.
4. Disseminate Stage

The dissemination stage (*Disseminate)* is the final process in the development stage. At this stage, it is carried out to disseminate the product to the public after it is declared that the product developed is feasible and can be used. However, in this study, the dissemination stage was not carried out by the researcher because of the constraints of relatively large production costs.

Instruments are defined as facilities or tools used in research, so that they can make it easier for researchers to process data and produce better results. The instruments used in this study are as follows:

1. Validation Sheet
   a. Material Expert Validation Sheet
      The instrument in the form of a material expert validation sheet will be assessed by validators who are competent in their field. The feedback and suggestions provided will be revised and utilized as valuable input for researchers in order to produce a better product that is feasible to be used as one of the teaching materials.
   b. Media Expert Validation Sheet
      The instrument in the form of a media expert validation sheet will be tested by validators who are experts in the media field.
   c. Interpretation Expert Validation Sheet
      The instrument in the form of an interpretation expert validation sheet will be tested by validators who are experts in the field of interpretation.
2. Questionnaire
   An instrument in the form of a questionnaire will be given to students, which contains questions. The goal is to get results related to practicality with the opinions of students in the *REACT-based* module integrating Qurani on temperature and heat materials.

Data collection techniques are very important according to the main purpose of obtaining data, data collection is the main part[11]. Data is obtained from validation sheets and questionnaires. Validation sheets by material experts, media expert validation, and interpretation expert validation will be inputs and suggestions so that researchers know the feasibility of the modules that have been developed. Meanwhile, a questionnaire was given to students containing questions to get results related to practicality with students' opinions in a *REACT-based* module integrating Qurani on temperature and heat materials.

This Quranically integrated *REACT-based* module uses quantitative data by referring to four criteria[12]. Below are the questionnaire criteria:

Table 1. Table of criteria for the questionnaire

Score	Information
1	Very Disagree (SKS)
2	Disagree (KS)
3	Agree (S)
4	Strongly Agree (SS)

Meanwhile, the criteria from the validation sheet use the following criteria[13].

Table 2. Validation sheet criteria table

Score	Information
1	Bad
2	Not Good
3	Good
4	Excellent

Furthermore, the data obtained with data collection instruments are analyzed using percentage analysis techniques according to a predetermined formula. To calculate the average score of each aspect of the equation is as follows:

$$\bar{x}=\frac{\Sigma x}{N}=Average\ Score\ by\ Experts=\frac{Total\ Score}{Number\ of\ Questions} \quad (1)$$

To calculate the percentage as follows

$$Persentage\ Of\ Feasibility=\frac{Average\ across\ all\ aspects}{Maximum\ evaluation\ score}\times 100\% \quad (2)$$

It is possible to match the assessment with the results of its eligibility as shown in Table 3 below[13]

Table 3. Eligibility Criteria

No	Value	Decision
1	76<x<100	Highly Worthy
2	51<x<75	Proper
3	26<x<50	Less Worthy
4	0<x<25	Not Eligible

C. Result and Discussion

This research and development aims to determine the feasibility and practicality of *the REACT-based* learning module integrating Quranic on temperature and heat

materials in SMA/MA. This research and development uses a 4D model that goes through 4 stages as follows:

Define Stage

This define stage contains about activities related to learning at the place of research carried out, namely at MAS Darul Ihsan. The activities carried out by the researcher in this definition stage are divided into several stages of activities which will be discussed in more detail below.

1. Front-end Analysis

This initial analysis was carried out by the researcher with the aim of finding problems during the teaching and learning process. To obtain information about problems that occur during the teaching and learning process, researchers conduct observation activities in schools. Based on the results of observations made by the researcher, the problems obtained during the observation are as follows:

a. Students have difficulty solving problems related to temperature and heat materials.
b. The teaching materials used by teachers are in the form of worksheets and physics handbooks that are still not associated with the Quran.
c. The learning media used are in the form of whiteboards and markers.
d. Learning is based on the explanation of the teacher and students only record the material written by the teacher on the blackboard.

2. Learner Analysis

The analysis of students aims to find out the characteristics of students during the learning process. Based on the observations that have been made on students in class XI SMA/MA, it was found that the characters of some students gave passive responses and seemed not interested in physics lessons during learning. In addition to the characteristics of students, the researcher also observed the level of understanding and knowledge of students in solving physics problems related to temperature and heat materials.

a. Task Analysis

In this task analysis, the researcher details the tasks according to the content of the material based on basic competencies. The details of the content of the material are intended to achieve competency achievement indicators as competency achievement indicators are formulated. In addition, this can make it easier for researchers to summarize learning indicators and objectives.

b. Concept Analysis

In the concept analysis stage, the researcher has formulated material concepts that will be presented in the designed module. The material concepts presented are temperature and heat materials. The materials are adjusted to the material that is important for students to learn so that it is in accordance with the KD and the indicators set.

c. Specifying Instructional Objectives

At this stage, learning objectives can be formulated based on Core Competencies (KI) and Basic Competencies (KD), as well as indicators that are expected to be achieved in learning. The learning objectives are listed in the module teaching materials and lesson plans.

Design Stage

This design stage is used to design products that are suitable and in accordance with the problems that occur during the teaching and learning process. At this stage, the researcher designs the product to be developed. This design stage is divided into several stages, namely:

1. Media Selection

In the media selection phase, the researcher developed media in the form of *a REACT-based* module integrating Qurani. This module contains temperature and heat material associated with the Quran. The presentation of the material and questions that will be included by the researcher still refers to the basic competencies, indicators and learning objectives for students in class XI SMA/MA so that it is very suitable for use in the teaching and learning process.

2. Format Selection

The format used in *the REACT-based* module product integrates Qurani on temperature and heat materials is designed in such a way that it looks attractive. This module is created using Corel Draw starting from the foreword to the author's profile. However, the front and back covers are made using the Canva application which is a design application. The choice of color format is white combined with bright light green.

3. Initial Design

At this stage, the initial design of the module begins to be designed. The initial design of this module is made based on the results of the analysis in the definition phase and adjusted to the selected format.

Development Stage

This development stage consists of the validation of material experts, media experts, and interpretation experts. Some of the grids contained in the validation questionnaire sheet include:

1. Material expert validation sheet: Eligibility, serving components, and linguistic Components
2. Media expert validation sheet: Module size, module cover design, module design
3. Interpretation expert validation sheet: Fill, islamic values, language.

Disseminate Stage

The dissemination stage is the stage where the REACT-based module with Quranic integration on temperature and heat material that has been developed and

revised is disseminated to the target research site. The researcher did not carry out this stage because the researcher was constrained by the large costs required. The results of the development stage which have been validated by material experts, media experts and interpretation experts are as follows.

1. Feasibility of REACT-based Module with Quranic Integration on Temperature and Heat Material

The feasibility or quality of the module product is determined from the results of the feasibility test which is carried out by validating the product that has been developed with two material experts, two media experts and two interpretation experts. This product validation aims to obtain a feasibility assessment and advice from professional experts in their field. The module developed has good quality and is declared worthy of being a module to support education after revisions have been made in accordance with the suggestions of material expert validators, media experts and interpretation experts.

Alpha testing is a validation process carried out by material experts, media experts and interpretation experts to assess the quality and suitability of the learning modules that have been developed. The results of the validation sheet will be used as a reference for revising modules, materials and interpretations.

a. Fasibility of a REACT-Based Module with Quranic Integration on Temperature and Heat Material by Material Experts.

The material experts provide an assessment based on the statement items attached to the material expert validation sheet by ticking the appropriate rows and columns, as well as providing suggestions and criticism as a reference for revising the material being developed. The results of the assessment by material experts on REACT-based module products integrating Qurani on temperature and heat material for each aspect can be seen in the graph in Figure 4.

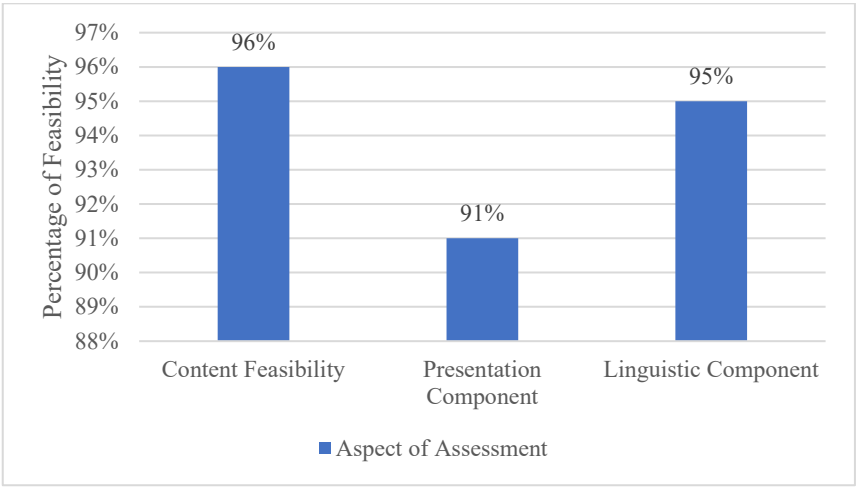

Figure 4. Material Expert Validation Chart

Based on data analysis of material expert validation results in figure 4 which is viewed from three aspects of assessment, namely content feasibility, getting an average of 3.83 with a percentage of 96% which is included in the very feasible criteria. In the presentation component aspect, the average was 3.63 with a percentage of 91%, which is included in the very appropriate criteria. In the linguistic component aspect, the average was 3.80 with a percentage of 95% which is included in the very appropriate criteria. The REACT-based module with Quranic integration on temperature and heat material overall received an average total score of 3.75 with a percentage of 94% which is included in the very feasible criteria.

b. Feasibility of a REACT-Based Module with Quranic Integration on Temperature and Heat Material by Media Experts

The assessment by media experts aims to determine the suitability of the module in terms of module size, module cover design, and module design. Media experts consist of two lecturers, namely: (1) SR is a lecturer in Electrical Engineering Education, Faculty of Tarbiyah and Teacher Training, Ar-Raniry State Islamic University Banda Aceh, and (2) KA is a lecturer in Information Technology, Faculty of Science and Technology, Ar-Raniry State Islamic University Banda Aceh. The results of the assessment by media experts on REACT-based module products with Quranic integration on temperature and heat for each aspect can be seen in the graph in Figure 5.

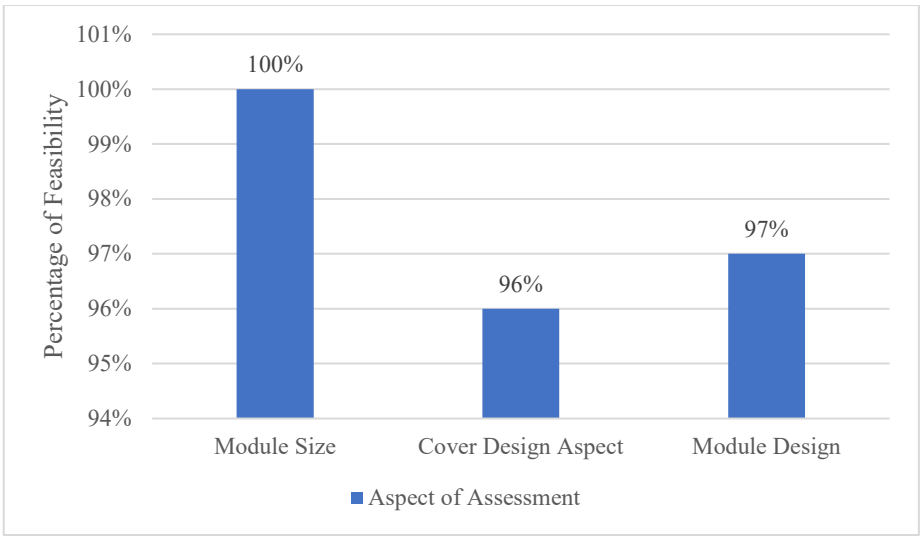

Figure 5. Media Expert Validation Chart

Based on data analysis of media expert validation results in figure 5 which is viewed from three aspects of assessment, namely module size, getting an average of 4 with a percentage of 100% which is included in the very feasible criteria. In the cover design aspect, the module received an average of 3.86 with a percentage of 96% which is included in the very feasible criteria. In the module design aspect, the average was 3.89 with a percentage of 97% which is included in the very feasible criteria. The REACT-based module with Quranic integration on temperature and heat material overall received an average total score of 3.92 with a percentage of 98% which is included in the very feasible criteria.

c. Feasibility of a REACT-Based Module with Quranic Integration on Temperature and Heat Material by Tafsir Experts

The assessment by interpretive experts aims to determine the suitability of the module in terms of content, Islamic values and language. The exegesis experts consist of two lecturers, namely: (1) RD is a lecturer in Physics Education, Faculty of Tarbiyah and Teacher Training, Ar-Raniry State Islamic University Banda Aceh, and (2) FQ who is a lecturer in Al-Qur'an and Tafsir Science, Ushuluddin Faculty, Ar-Raniry State Islamic University Banda Aceh. The results of the assessment by exegetical experts on the REACT-based module with Quranic integration on temperature and heat material for each aspect can be seen in the graph in Figure 6.

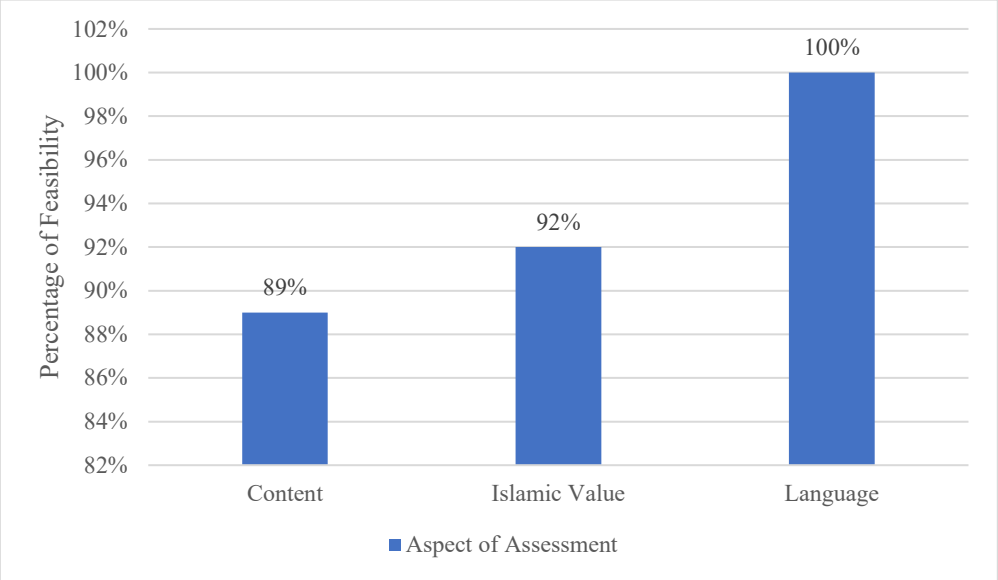

Figure 6. Expert Interpretation Validation Chart

Based on analysis of data from the validation results of interpreting experts in Figure 6 which is viewed from three aspects of assessment, namely content, the average is 3.55 with a percentage of 89% which is included in the very appropriate

criteria. In the aspect of Islamic values, the average was 3.67 with a percentage of 92%, which is included in the very appropriate criteria. In the language aspect, it gets an average of 4 with a percentage of 100% which is included in the very appropriate criteria. The REACT-based module with Quranic integration on temperature and heat material overall received an average total score of 3.74 with a percentage of 93% which is included in the very feasible criteria.

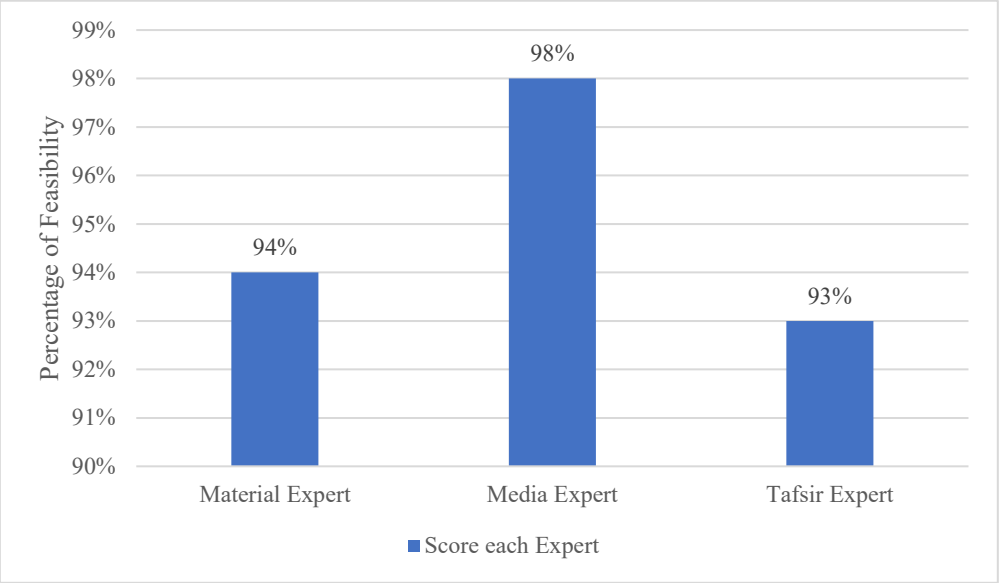

Figure 7. Total Validation Score

Figure 7. above shows that the validation results of material experts have a percentage of 94% with very feasible criteria, the validation results of media experts have a percentage of 98% with very feasible criteria, and the validation results of interpretation experts have a percentage of 93%. The total obtained from material expert validation, media expert validation, and interpretation expert validation is 95% with very feasible criteria. The REACT-based module with Quranic integration on temperature and heat material developed by researchers shows that it is very suitable to be used as a module in the learning process.

Based on Validation Percentage Data, it is known that the REACT-based module with Quranic integration in the temperature and heat material that has been developed has an average overall percentage of 95% with very feasible criteria. Based on the validation sheet from the learning experts, suggestions for improvement and input were obtained to produce a better module so that it is suitable for use in the learning process (Figure 8 & 9).

Figure 8. Module Cover Display and Conceptual Map

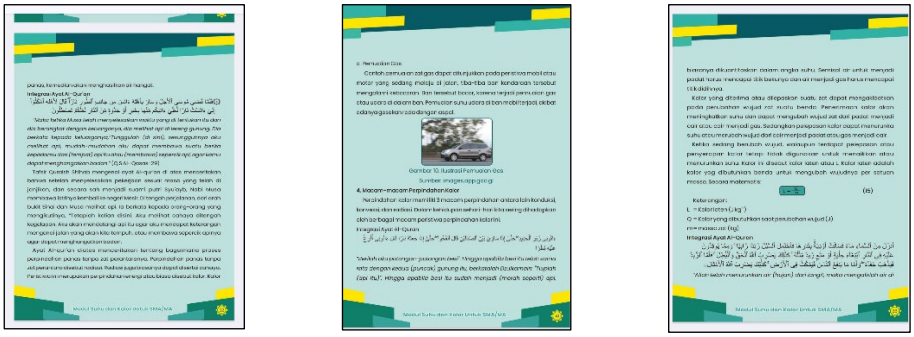

Figure 9. The visual design of a REACT-based module incorporating Quranic perspectives

2. Practicality of REACT-Based Modules Integrating Quranic Materials on Temperature and Heat

The practicality of the REACT-based module integrating Qurani on temperature and heat material was carried out in beta testing. Beta test or beta testing is full testing of the final product by end users (student response) [14]. The students' responses aim to find out the practicality of the REACT-based module with Quranic integration that has been developed in understanding temperature and heat material.

The students' practical results for the REACT-based module product with Quranic integration on temperature and heat material showed a percentage score of 88% with very practical criteria. This shows that the existence of a REACT-based module with Quranic integration in temperature and heat material will help students in the learning process.

The results of the research on the REACT-based module with Quranic integration on temperature and heat material in SMA/MA are in line with Chandra, et al's research [15] with the results of the practicality assessment on the REACT-based module with Quranic integration on temperature and heat material for class VII MTsN Talawi students which was stated to be very practical by the students' responses with the percentage of 91.76% is included in the very practical criteria.

D. Conclusion

Based on the results of research and discussions from the development of REACT-based modules with Quranic integration on temperature and heat material in SMA/MA, it can be concluded that:

The feasibility of the REACT-based module with Quranic integration on temperature and heat material is categorized into very feasible criteria in terms of validation results by material experts with a feasibility percentage of 94%, validation results by media experts with a feasibility percentage of 98% and validation results by interpretation experts with an eligibility percentage of 93%. The overall percentage results obtained from the validation of material experts, media experts and interpretation experts were 95%, so it was declared very suitable for use.

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