Developing fundamental physics module integrated with Al-Quran in Physics Education Department, Faculty of Education and Teacher Training, Alauddin State Islamic University of Makassar

S Sudirman[1,a] and M Asriadi[1]

[1]Department of Physics Education, Faculty of Education and Teacher Training, Alauddin State Islamic University of Makassar, Samata-Gowa 92113

[a]Sudirman.raja@uin-alauddin.ac.id

Abstract. The aim of this study is to define, devise, develop and disseminate the Fundamental Physics Module I Integrated with Al-Qur'an in Department of Physics Education, Faculty of Education and Teacher Training, Alauddin State Islamic University of Makassar. This research and development is carried out by using 4-D model. The study instrument used are validation sheet, observation sheet, and questionnaire for the student's responses. The data is then analyzed by using descriptive analysis. The result shows that the module is very valid category (0.89). The module is fully implemented if it indicates the criteria 1.5≤ M ≤2,0. It can be concluded that the module is implemented with the implementation module of 1.62 and the module also indicate the practical criteria. The average value of student responses from all items (aspects) of the learning module that is 3.46. It shows that the response of students is in the positive category. The results of this study shows that the Fundamental Physics Module I Integrated Al-Qur'an worthy to be used as a source of learning because it has indicated the valid, practical and effective criteria.

1. Introduction

A Muslim is required to study and practice his knowledge to worship God and improve the quality of his life. The virtue of having knowledge is explained in (QS al-Mujadilah / 58: 11)

يَٰٓأَيُّهَا ٱلَّذِينَ ءَامَنُوٓا۟ إِذَا قِيلَ لَكُمْ تَفَسَّحُوا۟ فِى ٱلْمَجَٰلِسِ فَٱفْسَحُوا۟ يَفْسَحِ ٱللَّهُ لَكُمْ ۖ وَإِذَا قِيلَ
ٱنشُزُوا۟ فَٱنشُزُوا۟ يَرْفَعِ ٱللَّهُ ٱلَّذِينَ ءَامَنُوا۟ مِنكُمْ وَٱلَّذِينَ أُوتُوا۟ ٱلْعِلْمَ دَرَجَٰتٍ ۚ وَٱللَّهُ بِمَا تَعْمَلُونَ
خَبِيرٌ ﴿١١﴾

Translation:

> O you who have believed, when you are told, “Space yourselves” in assemblies, then make space, Allah will make space for you. And when you are told, ‘Arise.” Then arise , Allah will raise those who have believed among you and those who were given knowledge, by degrees. And Allah is Acquainted with what you do.[1]

This verse explains that Allah will exalt the believer and the knowledgeable. The Qur'an includes not only the guidance of life but also the science that should be studied. Therefore it needs to be enhanced into the realm of education. The national education function of Indonesia is clearly described in the Law RI No.20 of 2003 article 3. It mentions the national education function which is one of the most important points is to create students who are intelligent, faithful, and cautious to God Almighty and have a noble character.

The concept of integration of Islam and science in the subject of physics has not been fully applied in the teaching process. Especially in physics education majors that are in the shade of Islamic University. Based on observations in physics class A and B 2016, during this time the Islamic values are not integrated with the study of physics, especially the fundamental physics I module. Submission of material has nothing to do with the verses of the Qur'an. This is because the lecturer only conveys general physics materials such as the concept of the laws of physics and the equations that accompany it. Likewise with the evaluation system contains only a matter that contains the concept and use of physics equations. Yet as a department that is in the auspices of Islamic University who have the vision and mission to form a physics educator intelligent, skilled and faithful and preaching to Allah SWT, it should connect the verses of the Qur'an with lecture material in order to not separate the science (physics) with a religion known as the scientific dichotomy.

Problems often encountered in the subject of physics is the content of physics is considered quite heavy and the lack of student motivation in the learning process that can impact on student learning outcomes to be low. This is due to several factors such as students not understanding the purpose of studying the material of physics. In fact, if further explored physics is a course that discussed many natural phenomena. In addition, the error selection strategy and teaching methods used lecturers and less precise selection of learning resources that cause less interest students participate in the learning process.

Fundamental Physics I is one of the subjects considered quite difficult to understand by most students. So to convey the material is not enough only lecturers who explain or deliver learning materials (teacher-led) but there must be an active role of students in the learning process. Based on the results of research from Yati Komalasari (2009) states that RPP, LKS, and Module Integrated-Interconnection with Islamic paradigm can stimulate students to take an active and cooperative role in the class,and can comprehend the material of physics thoroughly.

Fundamental Physics I is closely tied to lessons using a scientific approach, or learning that uses in-depth investigation steps undertaken by the student. Therefore, the researcher tries to create an integrated physics module with al-Qur'an that can help the students to easily understand the material of physics, where they observe directly all the physics phenomenon based on their observation by using the module as the study guide book. Simultaneously with the inclusion of the verses of the Qur'an that relate to the material of physics that can make students realize and belief in the oneness of Allah and the truth of the Qur'an that became the guide of his life as a Muslim.Based on the above description, the author took the initiative to lift the title of research on "Development of Basic Physics Module 1 Integrated with Quran”

2. Research Question

Problem formulation in this study is how results of development of fundamental physics module I integrated with Al-Qur'an that meet the criteria valid, practical and effective at the Department of Physics Education Faculty of Education and Teacher Training, Alauddin State Islamic University of Makassar?

3. Study Purpose

Objectives to be achieved in this study is to know the results development of Fundamental Physics Module I integrated with Al-Qur'an that meets valid, practical and effective criteria at the Department of Physics Education Faculty of Education and Teacher Training, Alauddin State Islamic University of Makassar.

4. Theory

4.1. Development Model

Research and development methods is a research method used to produce such products. To be able to produce a specific product used research that needs analysis and to test the effectiveness of these products in order to function in the wider community. So research and development is longitudinal (gradually can be multi years) [3].

According to Trianto [4] development models of various experts as follows:

1) *Development Model According to Kemp*

According to Kemp the development is a continuous circle. Each development step is directly related to revision activity. Development starts from any point within the cycle.

2) *Model of learning development by Dick and Carey*

The design of teaching according to the Dick and Carey model approach system, developed by Walter Dick and Lou Carey. This development model is similar to the model developed by Kemp, but coupled with the component of carrying out the learning analysis, there are several components to be skipped in the development and planning process.

3) *Model 4D*

The 4-D development model (Four D) is a model for developing a learning module. This model was developed by S. Thagarajan, Dorothy S. Semmel, and Melvyn I. Semmel. The 4D development model consists of 4 main stages: (1) Define, (2) Design, (3) Develop and Disseminate, or Adapted 4-P Model, Defining, Designing , Development, and Distribution.

4.2. Technique of Preparation of Module

According Nasution [5] outline the preparation of modules or module development can follow the following steps:

1) Formulate objectives clearly, specifically, in the form of learners' behavior that can be observed and measured.
2) The order of those goals determines the steps followed in the module.
3) A diagnostic test to measure the background of the learner, the knowledge, and the ability he or she has chosen as a pre-requisite for the module.
4) Establish the reason or rational importance of this module for learners.
5) Learning activities are used to help and guide learners to achieve the competencies as defined in the objectives.
6) Develop a post-test to measure learners' learning outcomes to which they master module objectives.
7) Setting up a resource center in the form of reading that is open to learners whenever they need it.

The module elements consist of clearly defined and specific teaching objectives, teacher instructions, learners' work sheets, worksheets, work sheet keys, and test sheets [6].

4.3. Method of Physical Integration with Al-Quran

According to Rosadisastra [7] the method of analysis to be discussed in interpreting the verses of science in the Qur'an is to choose the analytical method used by contemporary commentators and scholars on the text of the Qur'an, including thematic methods, widely recommended by Qur'an

researchers from Middle Eastern countries in applying at-tafsir Al-Ilmi. The method in question is semantic, thematic, and hermeneutic methods.

Thematic method (Mawdhu'i) is a method of interpretation based on problems that want to know the solution through a verse or a number of verses of Al-Qur'an as a whole. The thematic method in this verse is of two kinds. The first form is to raise various issues of human life to understand revelation that refers to the unity of view towards nature and life. In performing its work, the Mufassir does not begin his interpretive activity from the text of the Qur'an but from the realities of life, whether of pure doctrinal, social, cultural, economic or cosmos or science, and other realities. Then the Mufassir gathered his thoughts for questioning in front of the Qur'an. So the thematic approach will always be constant with human experience as it seeks to see the substantial lines of the Qur'an in finding Islamic views on any issue that exists in life. From the above explanation can be systematically summed up the standard steps taken on thematic method according to Bagir Al-shadr, that is 1) Analysis Rality or phenomena; 2) grouping the results of analysis based on certain categories; 3) a number of analyzes are dialogued with relevant passages.

The second form is the formulation of thematic tafsir method (mawdhu'i) which is quite popular, that is a systematic form by Abdul Al-Hayy Al-Farmawi or better known by the method Mawdhu'i according Farmawi, as follows:

1) Have issues to discuss
2) Restrict the verse that addresses the issue, then collect it and research
3) Arranging the verse in accordance with the order of the descending verse and its an-nuzul asbab.
4) Submit knowledge of reasonable verses in each of the surah.
5) Compiling topics of discussion within appropriate frames, related forms, perfect structure, and integrated parts, is also a unit.
6) Complete the theme of the discussion by relying on the hadith of the Prophet (if possible) so more clarify in his commentary.

Review the paragraphs based on integrated themes, categories, compromises general and special pronunciations, pronunciation Muthlaq-Muqayyad, aligning verses verses, setting nasikh-mansukh, until all texts or verses are found in one unit; without any distinction, contradiction, nor is there any partial disparity in the meanings which are not charged, brought, or explained.

5. Method

5.1. Type and Subject Study

The type of research used in this study is research and development, the development of Fundamental Physics I integrated with Al-Quran. And the subject of research result of the research is Physics Department Major Education student semester 1 2017..

5.2. Module Development Model

The research and development model used is the 4D development model. According to Trianto (2015: 93), this development model is suggested by Thiagarajan, Semmel, and Semmel (1974) which consists of four development stages: Define, Design, Develop, and Desseminate or adapted into 4-P model that is defining, designing, and deployment. The flow of module development can be seen in the following figure.

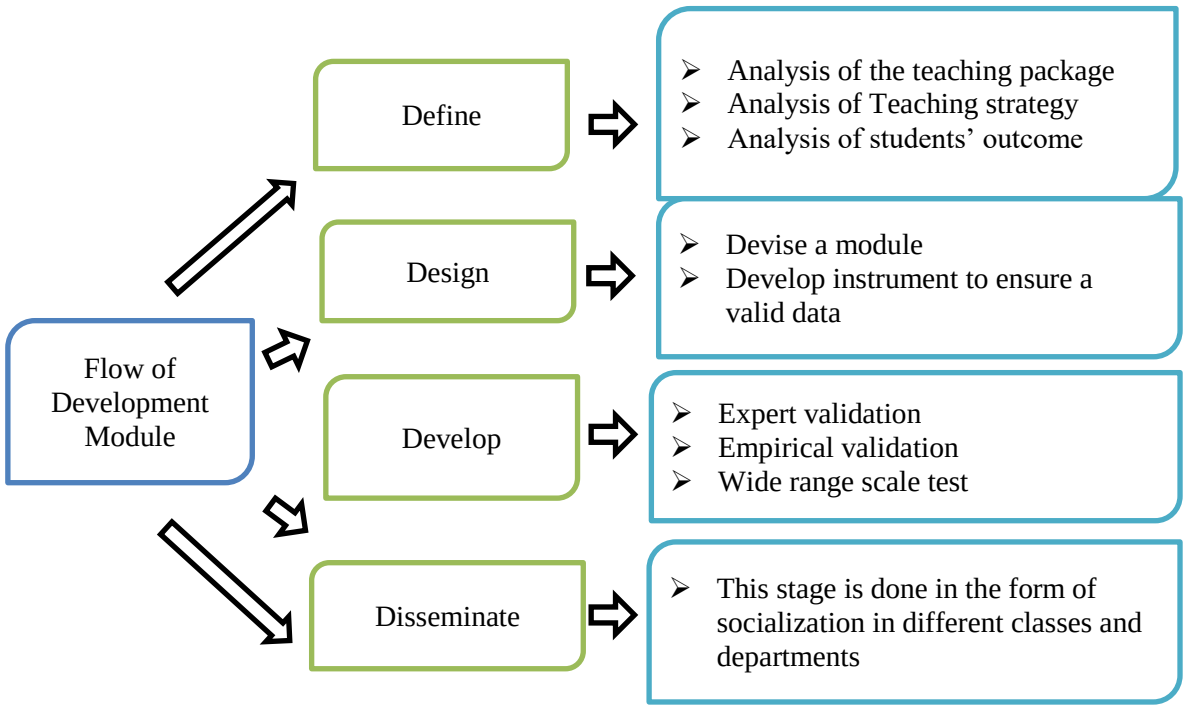

Figure 1. The flow of developing fundamental physics module.

5.3. Data analysis technique

The data of this study were analyzed using descriptive statistical analysis. According to Arikunto (2013, 280), descriptive statistics can be in the form of bar charts, pie charts, modes, medians, mean, and size variabillies. Using descriptive statistical analysis, research data can be analyzed as follows.

5.3.1. Data Validation Expert Analysis

Expert validation data for validation of module and instrument of module implementation and student response questionnaire will then be analyzed with validation level using Aiken Index that is:

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

Information :
V = Index of agreement rater (validator) regarding validation of item
s = The score assigned to each rater (validator) minus the lowest score used
n = Number of rater (validator)
c = Number of categories that can be selected rater (validator)
Criteria
V > 0.8 Very Valid (VV)
$0.4 \leq V \leq 0.8$ Valid (V)
V <0.4 Less Valid (LV)[8]

The criterion used to decide that the module has sufficient validity is the validity value for all the minimal aspects of being in a valid category. If this is not the case, a revision is required based on the suggestion of the validator or by reviewing the underestimated aspects. Then re-validated and then re-analyzed. And so on until it meets the minimum V value is in a valid category.

5.3.2. Observation Sheet of the Implementation of the Module

To analyze the observation sheet of the implementation of the basic physics module 1 integrated Qur'an is as follows:

8) To recapitulate the results of the assessment of experts into the table which includes: (1) aspects (Ai), (2) Criteria (Ki).
9) Looking for an average for each observation aspect of each meeting with the formula:

$$Ami = \frac{\sum_{j=i}^{n} \overline{Kij}}{n} \quad (2)$$

Information :
Ami = average of the i-th criterion
$\overline{(Kij)}$ = score of assessment result against criterion j
n = number of criteria in the i-th aspect

10) Looking for an average of every aspect of observation for t times meeting with the formula:

$$\overline{Ai} = \frac{\sum_{j=i}^{n} Ami}{t} \quad (3)$$

Information :
$\overline{(Ai)}$ = mean of the i-th criterion
Ami = average aspect of the 1st meeting
t = number of findings

11) Determine the category of implementation of each aspect or overall aspect by matching the average aspect $\overline{(Ai)}$ or the total average of M with a predefined category.

5) Category of implementation of every aspect or overall aspects of the implementation of the module as follows:
$1.5 \leq M \leq 2.0$ is done entirely
$0.5 \leq M < 1.5$ partially implemented
$0,0 \leq M < 0.5$ was not performed
Information :
$M = \overline{(Ai)}$ to seek the execution of every aspect
$M = \overline{X}$ to find the overall implementation of the whole aspect

5.3.3. Analysis of Student Response and Results

Data about student response is obtained from questionnaire of student response to module and then analyzed by percentage. Activities undertaken to analyze student response data are:

1) Counting the number of students who responded positively according to the aspect being asked, then calculated the percentage.
2) Determine the category for the student's positive response by matching the percentage results to the defined criteria.
3) If the results of the analysis indicate that the student's response has not been positive, then revision of the module is being developed.

Analysis to calculate the percentage of the number of students who responded to each of the categories asked in the questionnaire using the following formula:

$$PRS = \frac{\sum A}{\sum B} \times 100\% \quad (4)$$

Information :
PRS = percentage of students who respond positively to the category in question.
$\sum A$ = number of students who respond positively to each of the categories asked in the trial.

$\sum B$= the number of students who are the subjects of the trial.

While the assessment criteria are:

$3.5 \leq M \leq 4.0$ is very positive (VP)
$2.5 \leq M < 3.5$ positive (P)
$1.5 \leq M < 2.5$ less positive (LP)
$M < 1.5$ is not positive (NP) [9]

Modules are effective if at least 80% of all students answer very positively or positively or the final average of the minimum student score is in the positive category.

5. Results and Discussions

5.1. Development Product

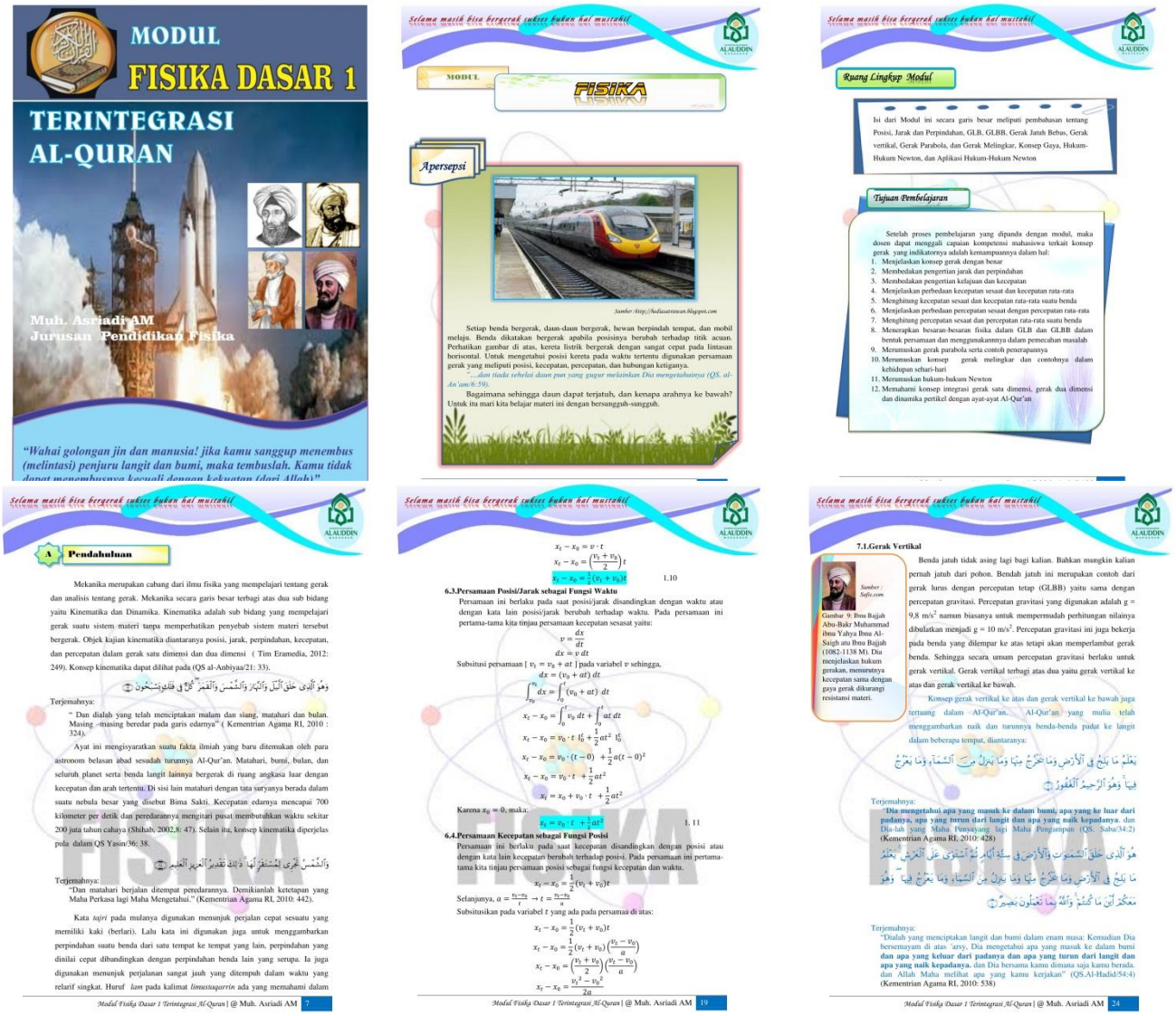

Figure 2. Result of development of basic physics module 1 integrated Al-Quran.

5.2. Results of Module Validation

Based on the description of expert validation results obtained the average value of the total validity of the module is 0.89. As per the criteria of validity and the Aiken Index this value is expressed in the category "very valid" (V> 0.8). So in terms of overall aspects, the module is stated to meet the criteria of validity. The validation results of this module can be illustrated in the following graph:

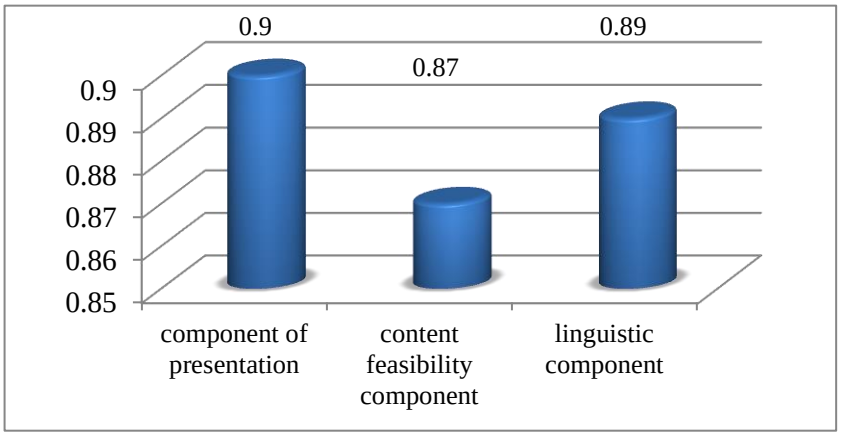

Figure 3. Graph of expert validation results on basic physics module 1 integrated al-Qur'an.

5.3. The result of the module's observation

Based on the observation data, the module is said to be fully implemented if it meets the criteria $1.5 \leq M \leq 2.0$. So it can be concluded that the module is done entirely because it gets the average value of the implementation of the module of 1.62 and the module meets the practical criteria for use in the lecture. The results of the observations of the module can be described in graphical form as follows:

.

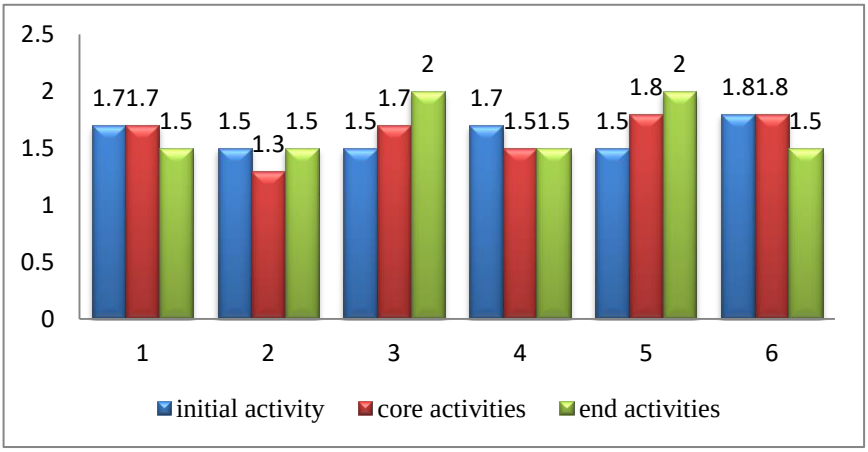

Figure 4. Graph of observation results of module implementation.

5.4. Result of student response to module

Based on the results of student response analysis of basic physics module 1 integrated al-Qur'an on large-scale trial, obtained average student response from all items (aspects) learning module that is 3.46 means student response is in the positive category so that the module used to give a positive effect on students in the lecture process. If expressed in the percentage of student responses to the lecture process all items (aspects) agree and strongly agree. Therefore it can be obtained the average percentage of respondents learners are 100% who gave a positive response to the lecture.

The result of student response to the module can be described in graphic form as follows.

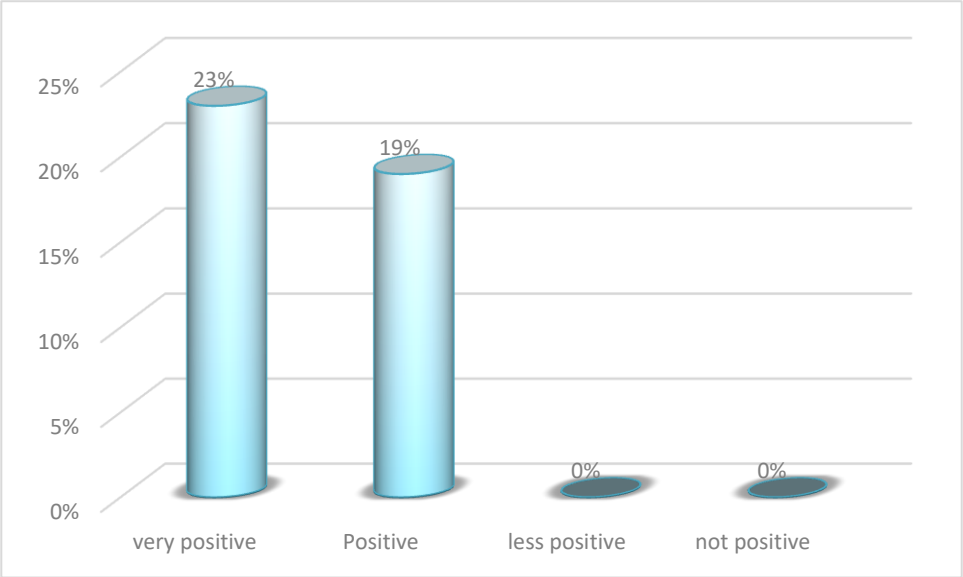

Figure 5. Graph of student response to module.

So it can be concluded that the module given can be said to be effective. Of all students answering the average agree or positive or the final average of the student scores at least are in the positive category above 80% of the specified standard.

In the preparation of basic physics module 1 integrated al-Qur'an for the part of physics integrated with al-Qur'an researchers wear using thematic tafsir method. The standard steps taken on thematic method according to Bagir Al-shadr, namely 1) analysis of reality or phenomena; 2) grouping the results of analysis based on certain categories; 3) a number of analyzes are dialogued with relevant passages.

The steps that researchers undertake in constructing the basic physics module 1 integrated in the Qur'an are described as follows. 1) Analysis of Reality or phenomenon ie researchers in this case do not interpret the verses of the Qur'an to be integrated with theoretical physics directly but researchers looking for the appropriate verse according to the researchers in terms of the meaning of language / translation of the verse, 2) Grouping the results of analysis based on certain categories ie the verses relating to theoretical physics are then grouped and searched for his interpretation in the tafsir books. 3) A number of analyzes are dialogued with relevant verses that is, by using their own language researchers try to relate the interpretation of the verse related to theoretical physics[7] **.**Modules and instruments are valid if the expert and practitioner's assessment indicates that the development of the device is based on a strong theory and has internal consistency, ie the interconnection between components within the developed device.

The validity of this module is based on the assessment of the four validators. Based on the assessment of the four validators, it shows that the overall components assessed in the module are declared very valid. As for the instrument in the form of observation sheet of the implementation of the module and the questionnaire of the student response to the module is valid. Although the overall data collection modules and instruments developed meet the criteria of validity, there are several components that need to be revised for the refinement of such modules and instruments. The highly valid modules and instruments can then be tested.

Observation on lecture syntax aspects using fundamental physics module I integrated al-Qur'an during the trial where the lecturer has been able to carry out the lecture phases well. The average

observations on the lecture syntax using the basic physics module I integrated in the Qur'an are in the category fully executed. But there are some obstacles that are obtained at the beginning of the meeting in the implementation which is encountered in the lecturers process has not been able to implement such teaching, still lack in motivating the students about the importance of the material taught, the students who learn with the help of modules sometimes do not understand the existing material so that lecturers need to explain in more detail the material that has not been understood so that the lecture takes a long time. So that the time has been determined not in accordance with the time set in the process of teaching. The division within the heterogeneous group is not predetermined so that there are still many students who still have difficulty following the process of group division which has been specified before, awards to the creativity of the students in the discussion is still given to the group, and no appreciation to the individual towards the achievement of the student's learning outcomes.

In terms of social interaction during the trial, there are constraints from lecturers that generally students still need to be familiarized with learning patterns that require students to actively involve themselves to construct their knowledge with the help of lecturers and student activeness in cooperative groups, with some students who tend not to listen when the group's friends are talking, while presenting only a few groups are more active in the interaction process in each discussion of problems solved both individually and in groups.

Observations on the principle aspects of the reaction during the trial experience the constraints of lecturers have not been firm to master the overall class sometimes arise in the process of lecture, in the process of guidance only certain groups are always given appreciation of his achievements. The effectiveness of the module is assessed based on a good student response to the module used and to see student learning outcomes. Some criteria of effectiveness as has been stated, obtained the effective module when viewed on the criteria can be stated that the students give a positive response to the fundamental physics module I integrated the Qur'an is 100%. After testing the above criteria have been met so that the module is obtained effectively.

The result data showed that student's response to the module was in positive category, it was in accordance with the questionnaire result which stated that the student was happy to use the module and the questions in the module given as the problem to be solved challenged the students to think and find the answer either with how to solve individually or in groups. By using the fundamental physics module I integrated the Qur'an in lectures many passionate students, interested and even happy to follow the recovery. In addition, there are some notes that students give to the modules and lecture process using the module, namely: learning outcomes increase, allowing students to understand the material, increase the knowledge and creativity of students in learning to understand new information in the lesson, with the reason students are taught to think develop a problem in order to be solved and provide challenges to think so that students better understand the material learned, good learning outcomes and can exchange ideas between groups, so that all members can express / express their own opinions and finally get a better answer.

Another note is that students perceived difficulty during recovery is difficulty in analyzing the problem because the formulas that exist in the module are general while the given problem requires completion by combining between several formulas. Understanding, terms, and symbols used are not fully understood by the students. The existence of the difficulty, the suggestions given by the students to the module is the presentation of the material still need to be added again so that more knowledge and new information obtained by the students, the picture presented in the module should be more interesting, preferably each exposure of one material is equipped with sample problem to make it easier understood, and the language used in the module to make it simpler.

6. Conclusions

Conclusion that can be taken from research conducted Result of Development of Basic Physics Module 1 integrated with Al-Qur'an at Department of Physics Education Faculty of Education and Teacher Training UIN Alauddin Makassar have fulfilled valid criterion, practical and effective that is got average value of total of validity of module is 0,89. The average value of the module is 1.62. The

average value of student responses from all items (aspects) of the response to the module is 3.46 means student responses are in the positive category. Therefore it can be obtained the average percentage of learners response is 100% which gives a positive response to the lecture process, meaning that the module used to give a positive effect for the student during the learning process

References

[1] Kementrian Agama RI 2010 *Al-Quran Tajwid dan Terjemahnya* (Bandung: Syamil Quran)
[2] Depdiknas 2003 *Undang-Undang Republik Indonesia Tahun 2003 tentang Sistem Pendidikan Nasional* (Jakarta: Dirjen Pendidikan Dasar dan Menengah)
[3] Sugiyono 2015 *Metode Penelitian Pendidikan* (Bandung: Alfabeta)
[4] Trianto 2015 *Model Pembelajaran Terpadu: Konsep, Strategi,dan Impelementasinya dalam KTSP* (Jakarta: Bumi Aksara)
[5] Nasution 1992 *Berbagai Pendekatan dalam Proses Belajar dan Mengajar* (Jakarta: PT Bumi Akasara)
[6] Suriyono 2015 *Teknik Belajar Mengajar dalam CBSA* (Jakarta: PT Rineka Cipta)
[7] Rosadisastra A 2007 *Metode Tafsir Ayat-Ayat Sains dan Sosial* (Jakarta: Amzah)
[8] Retnawati H 2016 *Analisis Kuantitatif Instrumen Penelitian* (Yogyakarta: Parama Publishing)
[9] Trianto 2011 *Konsep, Landasan, dan Implementasinya pada kurikulum Tingkat Satuan Pendidikan (KTSP)* (Jakarta: Kencana)