



Development of Guided Inquiry-Based Chemistry Modules and Insight of Islamic-Science Integration in Chemical Bonding Materials in Iain Kerinci

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Abstrak: Penggunaan bahan ajar berbasis Islam-Sains pada proses perkuliahan merupakan alternatif yang dapat dilakukan dalam rangka menanamkan nilai-nilai keagamaan pada mahasiswa. Selain memperoleh materi dari mata kuliah tertentu, mahasiswa akan mendapatkan wacana keislaman yang penuh dengan pesan moral. Sehingga diharapkan dapat memotivasi mahasiswa untuk lebih semangat belajar. Manfaat lain dari pengembangan bahan ajar berbasis integrasi Islam-Sains adalah mahasiswa dapat menganalisa suatu obyek Sains pespektif Islam seperti yang dilakukan oleh para ilmuwan Islam. *Guided Inquiry* (Inkuiri terbimbing) merupakan suatu strategi yang dapat membangun pemahaman siswa berdasarkan pengetahuan awal, mengikuti siklus pembelajaran berupa orientasi, eksplorasi, pembentukan konsep, aplikasi, dan penutup, berdiskusi dan berinteraksi dengan orang lain, Metodologi Dalam Penelitian digunakan adalah Jenis Penelitian, Prosedur Pengembangan, Subjek Uji Coba, Jenis data, Instrumen Pengumpul Data, Teknik Analisis Butir Item Soal Uji Coba Ikatan Kimia.

Kata Kunci: Modul Kimia Berbasis *Guided Inquiry*

Abstract: *The use of Islamic-Science-based teaching materials in the lecture process is an alternative that can be done in order to instill religious values in students. In addition to obtaining material from certain courses, students will get Islamic discourse which is full of moral messages. So that it is expected to motivate students to be more enthusiastic about learning. Another benefit of developing teaching materials based on the integration of Islam-Science is that students can analyze an object of Science from an Islamic perspective as done by Islamic scientists. Guided Inquiry is a strategy that can build student understanding based on prior knowledge, following a learning cycle in the form of orientation, exploration, concept formation, application, and closing, discussing and interacting with other people. Development, Test Subjects, Types of Data, Data Collecting Instruments, Analysis Techniques for Chemical Bonding Test Items.*

Keywords: *Guided Inquiry-Based Chemistry Module*

INTRODUCTION

Education is an important part of the national development process. According to the Big Indonesian Dictionary (KBBI): Education is a learning process for each individual to achieve higher knowledge and understanding of certain and specific objects. The knowledge obtained formally results in each individual having a mindset, behavior and morals that are in accordance with the education they receive. According to Abduh, a good education is education that in the process is able to develop all the nature of students, especially the nature of reason and religion. With this nature, students can develop national thinking power. Meanwhile, through the nature of religion, the pillars of goodness will be embedded in students which are then implicated in all their life activities (Nizar, 2011).

In the context of learning the disciplines of natural science or science, it is said that Islam informs us that some knowledge comes from revelation and some comes from the human scientific mind, both of which come from Allah SWT (the owner of knowledge) (Nizar, 2011). The success of a student in learning can be seen from the learning outcomes. Learning media or learning resources are one of the factors that determine the success or failure of the teaching and learning process.

The use of Islamic-Science-based teaching materials in the lecture process is an alternative that can be done in order to instill religious values in students. In addition to obtaining material from certain courses, students will get Islamic discourse which is full of moral messages. So that it is expected to motivate students to be more enthusiastic about learning. Another benefit of developing teaching materials based on the integration of Islam-Science is that students can analyze an object of Science from an Islamic perspective as done by Islamic scientists (Muis, 2010).

Based on observations at the IAIN Kerinci campus, the researchers did not find any teaching materials or chemical learning media based on Guided Inquiry and with an Islamic-Science integrity perspective. Even though judging from the history of Islamic scientists

who have succeeded in their research, many of them use the Qur'an as a source of information to support the success of their research.

Based on interviews with lecturers and students at the IAIN Kerinci campus, the learning resources used in the learning process are library books. No one has used media or learning resources based on guided inquiry and Islam-Science. In addition, several chemistry lecturers said that many students were less enthusiastic in participating in the chemistry learning process. To eliminate student boredom in taking chemistry courses, some lecturers usually intersperse chemistry lessons with various stories to revive student learning motivation. Meanwhile, based on interviews with students, most of them think that chemistry courses are difficult, and require a lot of memorization and calculations. Most of them feel bored in taking chemistry lessons because what they see is only element names, calculations, reactions, and many more things that make them feel even more bored when they see chemistry books, and the chemistry books in the library are also limited. Therefore, a strategy is needed that can increase motivation and overcome student boredom. One strategy that can be used is Guided Inquiry.

Guided Inquiry is a strategy that can build students' understanding based on prior knowledge, following a learning cycle in the form of orientation, exploration, concept formation, application, and closing, discussing and interacting with other people (Hanson, 2006). This guided inquiry-based learning process uses a group learning system, and uses guided inquiry-oriented teaching materials based on the exploratory learning cycle, concept formation, and application. The sequence of exploration, concept formation, and application is at the heart of this design.

The process of exploration, concept formation, and application in guided inquiry-based chemistry learning media or resources containing the integration of natural sciences such as chemistry with verses from the Qur'an is expected to increase understanding and arouse students' enthusiasm in taking chemistry lessons, if students feel bored in

studying chemistry from the perspective of Science, then they can learn it from the perspective of the Qur'an, although the detailed explanation is in the science of Science, at least it can reduce student boredom. In addition, to introduce Islamic-Science-based chemistry learning in schools which is seen as very rare and so that it can be used as a reference to increase students' knowledge of science in the field of religion.

Based on the description above, the researcher feels the need to conduct research on the development of a more interesting and fun chemistry learning module based on Guided Inquiry and with an Islamic-Science integration perspective. Guided Inquiry in learning chemistry is estimated to motivate students to learn more because learning is student centred. In the learning process, students are required to think critically. Therefore, chemistry learning is carried out using colored tools/modules equipped with information/models in the form of pictures, formulas, data tables, or graphs and also has an insight into the integration of Islam-Science. In the student activity sheet in the module, verbal information is kept to a minimum. Models/information presented in the form of pictures, formulas, data tables, or graphs, in the formation of concepts students are given key questions to direct students to the intended information, lead students to find appropriate relationships and conclusions, and help students build an understanding of concepts being studied and equipped with exercises. The development of a guided inquiry-based chemistry module with an Islamic-science integration perspective is also expected to contribute to the preparation for the development of the chemistry education department and physics education department so that later there will be teaching materials that will be used in the basic chemistry course.

METHOD

This type of research is development research, which produces a new product in learning, namely the chemistry learning module to teach chemical bonds. The development model used in this study adapts

the 4D model. According to Thiagarajan, et al in Trianto this model consists of 4 stages of development, namely Define, Design, Develop. and Disseminate or adapted into a 4P model, namely Definition, Design, Development, and Deployment.

The development procedure carried out in this research is the stage of defining, designing, and developing. Based on the development procedures carried out, the development steps are:

Defining Stage (define). The purpose of this stage is to determine and define the learning requirements starting with an analysis of the objectives of the material to be developed in the module. This stage includes the main steps, namely (a) front end analysis, (b) task analysis, (c) concept analysis, (d) student analysis (Trianto, 2010).

Stage of Design (design). The purpose of this stage is to design teaching materials in the form of a guided inquiry type module with an Islamic-science integration perspective that will be developed to teach chemical bonding material at IAIN Kerinci. This stage consists of four steps, namely, (1) preparation of tests, (2) selection of teaching materials, (3) selection of formats, and (4) initial design of the product to be developed.

The development stage is carried out by modifying the modules produced at the design stage, before becoming the final product that is ready to be used. In this stage, three steps are carried out, namely product validation (assessment), revision, and testing.

The dissemination stage is the stage of using modules that have been developed on a wider scale, for example in other classes, at other universities, by other lecturers. This dissemination stage is carried out to promote the development product so that it can be accepted by users, whether individuals, groups or systems. Dissemination can also be done through a transmission process to related learning practitioners in a particular forum. The purpose of this distribution is to get input, corrections, suggestions, ratings, to improve the final product development so that it is ready for adoption by product users.

After the module was declared valid by the validator, a limited trial was conducted to

obtain data on the practicality and effectiveness of using the module in the field, as well as to determine students' understanding of the concepts contained in the module. This test was conducted on students who had not yet studied the subject matter of chemical bonds.

The types of data collected in this study are:

Product validity, validity data in the form of product validation results developed in the form of learning modules by validators who are experts in their fields. Product practicality, practicality data obtained from the results of limited trials in the field regarding the practicality and implementation of the developed product. Effectiveness, effectiveness data obtained based on the results of product trials in the field regarding student learning outcomes using the developed product.

To collect research data, a data collection instrument was used. The instruments used in this research are:

The learning module validation sheet is in the form of a questionnaire used to assess the content validity and construct validation of the resulting module. The data obtained is used to determine the level of validity of the developed learning module. The questionnaires given are student response questionnaires and lecturer responses to the modules used during the learning process. Questionnaire data is used to determine the practicality of using the module during the learning process. Student learning outcomes tests obtained from test results are used to determine the percentage of student success after participating in learning using modules. The learning outcomes test data is then used to see the effectiveness of the modules developed in terms of student learning outcomes. The test is given after learning using the module. The student learning outcomes were analyzed to see the effectiveness of the resulting module.

Analysis Techniques for Chemical Bonding Test Items

Validity The test is said to be valid if the test can measure what is intended to be

measured. For this reason, in compiling test questions, it must be guided by the applicable curriculum. There are two validities that are measured in this study. Content validity, item validity or item validity of a learning outcomes test is the measuring accuracy possessed by a learning outcome test item in measuring what should be measured through the item (Sudijono, 2001).

Question difficulty index (P)

The level of difficulty of the question is a number that shows the difficulty and ease of a question. The formula used to determine the level of difficulty of the questions as proposed by Arikunto is:

$$P = \frac{B}{J_s}$$

Differential power (D)

The discriminatory power of questions is an indicator to distinguish between smart students and less intelligent students.

Test reliability

Test reliability is the ability of the test to give the same (fixed) results if given to homogeneous subjects. To determine the reliability of a test can be used the formula KR-21

The research data were analyzed by descriptive statistics to get the average and percentage figures. Data analysis techniques for each research data are content validity and construct validity analysis techniques, practical analysis technique.

Similar to the content and construct validation sheet analysis, the practicality sheets (lecturer response questionnaire and student response questionnaire) were also analyzed using the Kappa Cohen formula. Effectiveness Analysis Techniques

Analysis of effectiveness data obtained from student learning outcomes assessment sheets. Analysis of learning outcomes test is based on student learning outcomes data in the cognitive domain. The learning module developed is said to be effective if the student's understanding is above 70.

RESULTS AND DISCUSSION

Hanson (2006) states that guided inquiry is a strategy that can build student understanding based on prior knowledge, following a learning

cycle in the form of orientation, exploration, concept formation, application, and closing, discussing and interacting with other people, while the lecturer acts as a facilitator. , so that learning is student centered. This statement encourages researchers to develop a guided inquiry-based chemistry learning module with an Islamic-science integration perspective to teach chemical bonding material. This is in accordance with the results of research revealed by Widya wati: The responses given by students and teachers to the attractiveness of the module are included in the very interesting criteria obtained from the results of field trials obtaining a percentage score of 86.12% and the results of the assessment of teacher responses obtaining a percentage score of 97 ,20%. 2). The validity of the module included in the very valid criteria obtained from the validation results of material experts by 95.83%, media experts by 82.96% and learning experts by 80.00% (Wati et al., 2019).

To achieve the research objectives, namely to reveal the validity, practicality, and effectiveness of the chemistry learning module on chemical bonding materials based on guided inquiry and with an Islamic-science integration perspective. Therefore, a series of product validation activities have been carried out by validators and trials on local 2nd semester students A IAIN Kerinci. The following is a discussion of the validity, practicality, and effectiveness of the products that have been developed.

1. Results of the Validation of Guided Inquiry-Based Learning Modules and Insight of Islam-Science Integration

The guided inquiry-based chemistry learning module with an Islamic-science integration perspective is a teaching material used to explain course learning outcomes, namely students are able to make a relationship between electron configurations and atomic properties, the periodic system of elements, chemical bonds and molecular structures.

The development of the guided inquiry-based chemistry learning module with an Islamic-science integration perspective is based on the principles of developing teaching materials proposed by

Depdiknas, namely 1) starting from the concrete to the abstract; 2) presented appropriately and varied; 3) can motivate students to learn; 4) contains achievement indicators; and 5) pay attention to the diversity of student abilities (Depdiknas, 2008).

The guided inquiry-based learning module with an Islamic-science integration perspective developed must be valid. The learning module is said to be valid if it is in accordance with the material to be taught. The validity measured in this study is content validity and construct validity. The guided inquiry-based learning module with an Islamic-science integration perspective that is designed is said to be valid in terms of content if it is in accordance with the contents of the IQF curriculum, while it is valid in terms of constructs that can be seen from the consistency of the relationship between components in the learning module.

The validity of the guided inquiry-based learning module and the insight into the integration of Islam-science produced can be known by validation by the validator. In this study, three chemistry lecturers were appointed as validators to assess the learning module. The validation results are then analyzed to determine the validity of the module in terms of content feasibility, construct feasibility, linguistic component and graphic component

Based on the validation data on the feasibility of the content of the learning module in Table 4, it appears that the statements validated by validators I, II, and III have very high validity, namely 0.86. So it can be concluded, in terms of content feasibility, the suitability of the learning module with the curriculum which includes course descriptions, CPMK, and sub CPMK has a very high validity category.

Meanwhile, in terms of feasibility, the resulting module construction is systematic, because the module is a set of teaching materials that are presented systematically so that they can be used in teaching and learning activities (Depdiknas, 2008). It can be seen from the validation data of the

feasibility of learning module construction in Table 5, it appears that the statements validated by validators I, II, and III have very high validity, namely 0.96.

In terms of the accuracy of using language in the learning module, the validity category is very high with a kappa moment of 0.85. Meanwhile, in terms of graphics, Table 7 shows that the statements validated by validators I, II, and III have very high validity, namely 0.94. From the results of the validation by Validator I, validator I suggested several improvements before the trial, namely adding information to the module and correcting more appropriate verses. Meanwhile, based on validation by validator II, validator II provides suggestions, namely adding student learning instructions, adding instructions for lecturers.

From the results of the validation by Validator III, validator III suggests several improvements before the trial, namely adding an introduction section which contains a brief explanation of CP, study materials, and instructions for using the module. Based on the results of the validation by the three validators, it can be concluded that the kappa moment of the guided inquiry learning module with the insight of Islam-science integration is 0.89 with a very high validity category. From the results of the validation by the three validators, it can be concluded that the category of the validity of the guided inquiry-based learning module with an Islamic-science integration perspective has a very high category so that it can be used by lecturers to teach chemical bonding material to students for basic chemistry courses.

The results of the validation of the three validators can be concluded as follows:

- a. The learning modules developed are in accordance with the content and demands of the KKN curriculum, namely CPMK and sub-CPMK to be achieved.

- b. The model provided is in accordance with the material to be taught.
- c. The key questions provided in the learning module can help students discover concepts.

The exercises provided can help students in consolidating concepts.

2. Practical Results of Lecturer and Student Response Questionnaires

The level of practicality of the guided inquiry-based learning module and the insight into the integration of Islam-science developed can be seen from the extent to which lecturers and students can use the learning module during the learning process in class. To find out whether the modules made are practical to use or not, a trial was conducted on second semester students of class A majoring in biology at IAIN Kerinci.

In the implementation of learning, the indicator to state that the implementation of this learning module is said to be good is to see whether the components of the learning module can be implemented by the lecturer in classroom learning. The practicality of the module can be seen from the data from the lecturer response questionnaires and student response questionnaires which are processed using the Kappa Cohen formula to obtain the kappa value and see the practicality of the module. The results of the analysis of lecturer response questionnaires and student response questionnaires showed positive results, meaning that the modules developed were practically used in the learning process and helped students understand the concepts being studied.

The acquisition of the kappa moment (k) shows that the practical category of guided inquiry-based learning modules and Islamic-science integration according to the lecturers is very high, namely 0.84, which means that the learning modules developed can be used in learning. Although there are a few obstacles in the learning process, namely

it takes a long time to analyze the model in the form of data, graphs, formulas, or tables, answer key questions, and exercises, and in grouping students, there are 2 groups of students with more members than members. predetermined groups (4 people per group) so that there are some students who are less active in learning activities. The overall interpretation of the practicalities responded to by the lecturers is as follows:

- a. The learning modules developed are in accordance with the IQF curriculum.
- b. The model used is in accordance with the CPMK and sub CPMK to be achieved.
- c. Key questions are interconnected so that students are easy to find concepts.
- d. The exercises provided can strengthen students in finding concepts.

In addition to using a practicality questionnaire for lecturers, the practicality of guided inquiry-based learning modules and having an insight into Islam-science integration also uses a student response questionnaire. Based on Table 9, the kappa moment value of the student response questionnaire was 0.81. This shows that the guided inquiry-based learning module and insightful Islam-science integration is practical to be used in learning or in other words easy and can be used in learning and can help improve student activities in the learning process. The main principle of teaching modules is to increase the efficiency and effectiveness of teaching and learning because students usually spend a lot of time listening and taking notes, so that time is not used for learning activities (Suryosubroto, 2009).

3. Student Learning Outcomes (effectiveness)

The effectiveness of the learning module is related to the learning outcomes obtained by students after participating in the learning process using the guided inquiry-based learning module and the developed science-Islamic

integration perspective. In accordance with the opinion of (Sudjana, 2009) states that the assessment activity is an action or activity to see the extent to which learning objectives have been achieved or mastered by students in the form of learning outcomes that they show after participating in the teaching and learning process. The guided inquiry-based learning module with the insight of Islam-science integration was tested in the biology tadaris department of IAIN Kerinci, a basic chemistry course on the subject matter of chemical bonds. The learning module is said to be effective if the test results obtained by students are in line with expectations, namely the student's score can reach a grade of A or B. The trial was carried out on 26 students, the student learning outcomes of the trial there were still 1 student whose score was below 70, namely 68. However, it can be seen that classically the average score is 87.36. It can be concluded that students' understanding of using the chemistry learning module is in the good category so that the product is very effective for use in learning.

4. Test Question Validation Results

The test questions were carried out on the fourth semester students of IAIN's biology majors. Student test results were then analyzed to see the validity of the items, discriminatory power, difficulty index, and reliability of the questions. Questions that are classified as good can be used in research to measure student understanding, while questions that are not good, different power is bad and the difficulty index is easy/hard to throw away/cannot be used to test learning outcomes. Of the 35 questions that were tested, after being analyzed, it turned out that there were 25 questions that could be used to measure students' understanding of chemical bonding.

5. Product Revision

Based on the results of data analysis, the resulting product is a guided inquiry-based learning module with an

Islamic-science integration perspective that is already valid with a very high validity category. Before the guided inquiry-based learning module with the insight of Islam-science integration is declared valid by the validator, there are several parts of the module that must be improved.

From the results of the validation by Validator I, validator I suggested several improvements before the trial, namely adding information to the module and correcting more appropriate verses. Meanwhile, based on validation by validator II, validator II provides suggestions, namely adding student learning instructions, adding instructions for lecturers. From the results of the validation by Validator III, validator III suggests several improvements before the trial, namely adding an introduction section which contains a brief explanation of CP, study materials, and instructions for using the module.

CONCLUSIONS AND RECOMMENDATION

Based on the results of the validation data analysis and the test results of the guided inquiry-based learning module with an Islamic-science integration perspective that was developed, the following conclusions can be drawn:

- a. The guided inquiry-based learning module with an Islamic-science integration perspective on the subject of chemical bonds has been able to be used as a suitable learning module for learning chemistry, the subject matter of chemical bonds in the basic chemistry course at the biology tadrīs department of IAIN Kerinci.
- b. Guided inquiry-based learning modules and Islamic-science integration based on the subject matter of chemical bonds developed are valid according to the validator, because they are in accordance with the correct curriculum and concepts and have used good language and the modules developed already have a good consistency of relationships between

components. However, there are still some components that need to be perfected.

- c. The practicality test shows that the guided inquiry-based learning module and the Islamic-science integration perspective developed have been practically used in learning.
- d. Guided inquiry-based learning modules and Islamic-science integration insight on the subject matter of chemical bonds have been effectively used in learning.

REFERENCES

- Depdiknas. (2008). *Panduan Pengembangan Bahan Ajar*. Jakarta: Direktorat Jenderal Manajemen Pendidikan Dasar dan Menengah.
- Hanson, D. M. (2006). *Instructor's Guide to Process-Oriented Guided-Inquiry Learning*. Pacific Crest: Stony Brook.
- Muis, A. (2010). *Pengembangan Modul Kimia Berwawasan Integrasi Islam-Sains untuk kelas X Materi Pokok Hidrokarbon dan Minyak Bumi*. Yogyakarta: UIN Sunan Kalijaga.
- Nizar. (2011). *Ibadis Tarbawi: Membangun Kerangka Pendidikan Ideal Perspektif Rasulullah*. Jakarta: Kalam Mulia.
- Sudijono, A. (2001). *Pengantar Evaluasi Pendidikan*. Jakarta: RajaGrafindo Persada.
- Sudjana, N. (2009). *Penilaian Hasil Proses Belajar Mengajar*. Bandung: Remaja Rosdakarya.
- Suryosubroto. (2009). *Proses Belajar Mengajar di Sekolah*. Jakarta: PT Rineka Cipta.
- Trianto. (2010). *Model Pembelajaran Terpadu*. Jakarta: Bumi Aksara.
- Wati, W., Amriyah, C., & Astuti, T. W. (2019). Pengembangan Modul Fisika Berdasarkan Hambatan Belajar Siswa Development Of The Physical Module Based On Obstacles Of Student Learning. *Indonesia journal of science and mathematic adication*, 02(no.01), 107–115.