



The Effectiveness of Chemistry Module Integrated with Islamic Values in Atomic Structure Materials on Online Learning of Integrated Islamic Senior High School

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Abstract

The research aims at a) developing a chemistry module integrated with Islamic values on atomic structure material, b) analyzing the feasibility and the effectiveness of the module in online learning. The type of this module is a digital module (PDF) published as the learning media in the pandemic era. The subjects of the research are grade X students in SMA IT Nur Hidayah and SMA IT Ibnu Abbas located in Soloraya. The samples consist of the control class and the experiment class selected by purposive sampling. The instrument of reliability was tested using Cronbach Alpha formula and the content of the module was validated using Aiken formula. The data analysis used was descriptive qualitative. The findings of the research show that the development of the chemistry module integrated with Islamic values was analyzed using Borg and Gall (1983) developing stages that consist of 9 stages. The chemistry module integrated with Islamic values is feasible and it is categorized as “very good” and effective to be used to develop the students' cognitive. Thus, the chemistry module integrated with Islamic values could be implemented to enhance the SMA Islam Terpadu students' cognitive competencies in online learning.

Keywords: *Chemistry Module; Integration of Islamic Values; Online Learning*

1. Introduction

In the 21st-century learning system, the teacher is suggested to empower the student's competencies which are known as 4K (creativity, critical thinking, communication, and collaboration competencies). These competencies are needful for the students to cope and prepare for their future challenges so that they will not become lagging behind technology competencies. The challenge was significant when the Corona Virus Diseases pandemic (Covid-19) has occurred in Indonesia and around the world which interfere the human daily activities including education.

One of the preventive measures to restrain the spread of virus infection was by limiting the need for activities which is called as social distancing. The implementation of social distancing in the education sector such as by performing work from home (WFH) for teachers and study from home (SFH) for

students through online learning (Mustafa, 2020). Furthermore, The Minister of Education and Culture of the Republic of Indonesia through circular number 6962 / MPK.A / HK / 2020 on March 17, 2020 issued a policy on online learning and working from home in order to prevent the spread of covid-19.

Online learning is distance learning in which the teachers and the students are not in the same classroom, but they could still communicate by using the internet network as the media to share, interact, and facilitate support by other learning service. The online learning which is conducted from home (BDR) in pandemic era was focused on extending life skills, activities, and variative assignments (Circle Letter of MPK, 2020).

Online learning is also appropriate with the national education objectives in which the education process is emphasized on shaping the students' life skill that should be completed by the good deeds, so that the student will become a pious and kind person to God the Almighty. This objective is compatible with the national education objective in Sisdiknas number 20 in 2003 which mentions that education aims to develop and shape the character and civilization of a nation with dignity in order to educate the nation's life, develop the potential of students to become human beings who believe and fear God the Almighty, have a noble character, healthy, knowledgeable, competent, creative, independent, and become a democratic and responsible citizen (Depdiknas, 2003).

Online learning has 6 characteristics including: 1) teaching materials are presented in the form of text, graphics, and various multimedia elements, 2) communication is performed simultaneously and not simultaneously through video conferencing, chats rooms, or discussion forums, 3) used to learn at a time and virtual places, 4) it can be used various elements of CD-ROM-based learning, to improve learning communication, 5) teaching materials are relatively easy to update, 6) increase the interaction between students and teachers (Tung, 2000: 15 in Mustofa, et al., 2019). Based on these characteristics, teaching materials are one of the proponents of success in the online learning process. Based on observations that had been conducted at SMA IT Nur Hidayah and SMA IT Ibnu Abbas, it showed that there was still a shortage of teaching materials that can be used by students in online learning. Teaching materials compiled by teachers and which are publicly available on the internet do not completely fulfill the learning objectives in Integrated Islamic Senior High School.

Integrated Islamic Senior High School that is on behalf of the Integrated Islamic School Network (JSIT) implements a national curriculum combined with an Islamic approach, namely integrating religious and general sciences. Islamic religious knowledge is integrated into sciences by instilling the Islamic values in every lesson which is connected to the material being studied. This is performed to make the students to have the competence of knowledge, skills, spiritual attitudes, and social attitudes completely (Fatonah, 2006). This integration is expected to create an Islamic curriculum that has the following principles: (1) contains basic unity values for the equality of Islamic values at any time and place; (2) contains the value of unity of interest in developing the mission of Islamic teachings; (3) contains material which includes spiritual, intellectual, and physical development (Ali M & Luluk, 2004). Based on the principles of the Islamic curriculum, the development of material that has spiritual, intellectual, and physical content should be applied both in the learning process and in the teaching materials that can be used independently by students.

The Learning process which implements the Islamic teaching system has been proven to be able to improve the character of students, one of the evidences was the Ismail's (2013) research finding that the Islamic system was able to improve student's discipline. This is in line with Lenggono & Yuzarion (2020) stated that a learning process integrated with Islamic values could enhance the learning motivation, achievement, and student learning outcomes. Hamidi F, et al. (2010) more broadly proved that learning process based on the Holy Qur'an could improve the mental health of students so that it is expected to stimulate their achievements. Al-Quran as the main guideline for the Islamic ummah does not only

contain the rules of human life, but also a lot of information about natural science. Chemistry learning in the Al-Qur'an is not only proof of the oneness of Allah SWT, but also includes learning good morals in daily life such as its relation to the atomic structure material.

Based on this introduction, it is necessary to develop the teaching materials in the type of electronic modules in PDF (Portable Document Format) integrated with Islamic values as a means of learning material for Integrated Islamic High School students that is easily accessible online during the Covid-19 pandemic era. The module is expected to provide more meaningful learning and improve learning achievement and the character of students.

2. Method

This research belongs to research development. The research development model aimed to develop a particular product and measured the effectiveness of the product. The chemistry module developed in this study refers to the development stages of Borg & Gall (1983). The stages of Borg & Gall's development research include: (1) research and information collecting data which includes literary studies, field observations, and interviews; (2) planning; (3) developing a product draft (develop a preliminary form of product); (4) preliminary field testing; (5) main product revision; (6) main field testing; (7) operational product revision; (8) operational field testing; (9) final product revision and (10) product dissemination and implementation. In this research, the tenth stage was not implemented because it focused on testing the effectiveness and completing the final product of the module.

This research was conducted at SMA IT Nur Hidayah and SMA IT Ibnu Abbas in Soloraya, Central Java. The subjects of the research included teachers and students from the school. Research and development were conducted from the end of 2019 to the end of 2020 by offline and online learning. The subjects of the research to test the module effectiveness were two classes from SMA IT Nur Hidayah selected by purposive sampling. The number of samples in each class is in accordance with the number of field test samples according to Suparman (2012), which is a minimum of 15-30 people. The data obtained from the test of effectiveness were qualitative data and quantitative data. Qualitative data was in the form of module eligibility response data from validators, students and teachers. While the quantitative data was in the form of data from the students' pretest and posttest which is strengthened by statistical analysis of the t-test to determine the effectiveness of the developed module.

The module content validation was conducted by using Aiken's (1985) formula to determine product feasibility based on expert judgment. The Aiken formula was used as a measuring tool to determine the validity of the module content. The value of V as the result from Aiken's formula test was ranging from 0-1 and the criteria for an instrument was categorized to be valid is when the value $V_{count} > V_{table}$. The V_{table} values can be seen in the table number of rating categories. In this research, there were 8 raters for module validation so that the value of $V_{count} > 0.75$ to be as considered as valid.

The module testing was begun by a limited-scale trial, then continued by a broad-scale trial in two classes, namely the control class (without modules) and the experimental class (using modules). The findings obtained from this broad-scale test were an assessment of the product effectiveness in improving the students' cognitive abilities based on the value of the gain confirmed (n-Gain). The results of n-Gain were used for normality, homogeneity, and effectiveness test. All tests were conducted by using SPSS 18. The method in this study was quasi-experimental, in which the nonequivalent control group design was almost the same as the pretest-posttest control group design (Sugiyono, 2019: 138).

The data analysis technique implemented to analyze the data was descriptive qualitative and quantitative descriptive. Qualitative descriptive analysis was implemented to describe and interpret the

data obtained in the field from respondents, while quantitative descriptive was implemented to see whether there was a difference between the n-Gain score and the effective results with the t-test.

3. Result and Discussion

The Development of Chemistry Module Integrated with Islamic Value

The development of the chemistry module integrated with Islamic values was begun by the needs analysis. The needs analysis was conducted by analyzing and collecting the information which consists of analysis of literature studies and field studies. The needs analysis was the most important part before conducting a module development so that it is in line with the target (Rahmah, et.al, 2017).

The field study analysis findings were obtained in the form of a questionnaire on the needs of students and teachers and interviews. The findings of the questionnaire on the needs of teachers and students showed that SMA IT Nur Hidayah and SMA IT Ibnu Abbas required a teaching material consists of learning methods which are in accordance with the demands of the national curriculum (K-13) and the cultivation of Islamic values in accordance with the uniqueness of the Integrated Islamic School (SIT). This is emphasized by the results of teacher interviews which stated that there were still limited teaching materials that support the chemistry learning process that is in accordance with the objectives of the national curriculum and the SIT curriculum. Teachers have not been able to develop modules independently due to existing limitations. In addition, the results of interviews by students stated that the chemistry learning process was still monotonous, it was teacher-centered and the teaching materials implemented were less attractive to be studied independently.

The appropriate learning method in a teaching material could help students to be more independent, think creatively and critically, and find problem-solving of the challenges in the learning process. Modules can be used as a solution for teaching materials needed by teachers and students because modules are teaching materials that are compiled as a whole and systematically and the modules consists of learning experiences which are planned and designed so that the students can use them independently (Ditjen PMPTK, 2008; Prastowo, 2010). The characteristic of abstract chemistry material is a simplification of the actual concept, sequentially and developed rapidly and it is not limited to solve the problems in chemistry, but the students should learn some descriptions such as chemical facts, chemical rules, and chemical materials which are related to one another. This reason causes chemistry to be considered as a difficult subject to understand so that the students are not enthusiastic about studying chemistry (Nazalin, et.al. 2016 in Sari & Vebriato, 2017).

The atomic structure material was chosen as material in module development based on the analysis findings of the absorption capacity of the National Examination score in grade X that was still relatively low. The chemistry teacher stated that the atomic structure material was the beginning material for students which consists of abstract properties, so it needs a proper understanding of the concept. Ruengtam (2013) in his research stated that students may experience difficulties in distinguishing atomic and orbitals models in an elemental atom. Students have difficulty understanding atomic theories, determining quantum numbers, configuring electrons, and determining the group and period of an atom based on its atomic number and quantum number (Nastiti, 2018).

Therefore, the development of an integrated chemistry module integrated with Islamic values using the Search, Solve, Create and Share (SSCS) learning model can make it easier to understand the concept of material because the SSCS model is a model that teaches a problem-solving process and develops problem-solving skills (Lartson, 2013 in Hatari, 2016). In addition, the integration of Islamic values that are connected in students' daily life and in accordance with the beliefs of students in SMA

Islam Terpadu added motivation in understanding the material. This is in line with Lenggono & Yuzarion (2020) proposed that the learning process integrated with Islamic values can enhance learning motivation and achievement and students' learning outcomes.

The model of integrating Islamic values in chemistry material was in accordance with the integrated learning model in the research conducted by Imran Siregar in Probolinggo, East Java, namely the Integrated model. This model was integrated learning that implemented an interdisciplinary approach by setting curricular priorities and finding that skills, concepts, and overlap attitude in several fields of study (Ikhwan, 2014).

Based on the development of school-based curriculum in SMA IT Nur Hidayah, it implements a national curriculum combined with an Islamic approach, namely integrating religious and general sciences. Islamic knowledge is integrated into science by instilling Islamic values in every lesson that is connected to the material being studied. This process was performed in order to make the students have the competences of knowledge, skills, spiritual attitudes, and social attitudes completely. These efforts can be realized with the role of teachers, parents, and the community/environment (JSIT, 2006). This is in line with the emergence of core competencies (KI) which belongs to the changing elements to the 2013 curriculum content standards. Core competencies (KI) which are expected to be understood by the students consist of four parts, namely spiritual attitudes, social attitudes, knowledge, and skills. These core competencies should be implemented in every lesson including chemistry subjects, not specifically for civic education and religious education (Susilowati, 2017).

Therefore, the developed chemistry module complements the needs of students and teachers as teaching materials in SMA Islam Terpadu. The chemistry module integrated with Islamic values combined with the syntax of the SSCS learning model could represent the integration of the national curriculum with the Islamic approach used in Integrated Islamic Senior High School. Islamic values in the module were presented in an integrated manner with chemistry material which includes *Ilahiyah* (divinity) and *Insaniyah* (human) values so that students have a good relationship vertically with God and horizontally with the society and the environment after studying chemistry materials. In addition, the SSCS syntax used in the module was based on the information process learning model so that the formation of independent concepts by students trains the students to think creatively, critically, and have good problem-solving skills.

The chemistry module integrated with Islamic values with the syntax of the SSCS model has consisted of three main parts, namely the opening, core, and closing. They are 1) the opening part of the module consists of a cover page, a french page, a foreword, an introduction, a table of contents, a description of the contents, and the technicalities for using the module; 2) the core part consists of core competencies, basic competencies, and indicators, lesson plans for teachers, concept maps, and the main discussion is the learning activities with four learning sub-materials. Each learning activity consists of the syntax of students' learning activities starting from Study (containing chemistry material integrated with Islamic values), Exploration (containing questions as provisions for students to solve concepts), Formulating (containing questions as a means of participants students build concepts and produce as creative products as possible related to problems and solutions, Presentations (in the form of drawing conclusions from students on the material being studied and shared with other friends), and Ukhrowi Worldly Applications (the students can take lessons from the material that has been studied to support their attitudes and spiritual values in everyday life). The additional components in the core section include character info, scan me (literacy link to the internet), and competency tests. 3) The closing section consists of a bibliography, glossary, answer keys, and the periodic table of the elements.

The Feasibility of Chemistry Module Integrated with Islamic Value

The chemistry module integrated with Islamic values for online learning was assessed for its feasibility through expert validation and assessment in the form of questionnaires answered by the teachers and students. Product/instrument validation was an important part of developing a product. Validation was performed with the aim of knowing whether the product is feasible or not feasible to use (Adib, 2017). Validation was performed by 4 expert validators and 4 education practitioners, while the questionnaire assessment from teachers and students conducted through two stages, namely the small/limited scale test and the large scale test or field implementation. The findings of the expert validators and educational practitioners stated that the chemistry module integrated with Islamic values was feasible to use and it has very good quality. This finding was based on the assessment of the material, presentation, language, and graphic aspects. The findings of the validation with Aiken's calculations are shown in Table 1.

The Aiken validity test was performed to validate the overall module content based on the assessment instrument adapted from the 2014 BSNP textbook assessment instrument. The lesson plan used as a reference in each learning process shows the results were feasible to use. Each aspect final score of the material, presentation, language, and graphics in Table 2 and Table 3.

Table 1. The Result of Aiken Validity Test

No	Learning Instruments	Amount of Indicators	Validity Index Obtained	Aiken Validity Index	Conclusion
1	Module	105	0,94	0,75	Feasible
2	Lesson Plans	17	0,91	0,78	Feasible
3	Test Instrumens	25	0,88	0,78	Feasible

Table 2. The Validation Result Measured by Validators

No	Validator	Percentage (%)	Qualification
1	Material Expert	93,14	very good
2	Language Expert	98,44	very good
3	Media Expert	94,87	very good
4	Learning Expert	91,67	very good

Table 3. The Module Feasibility Result Measured by the Teachers and Students

Measurement of Module Quality	Teachers		Students	
	Percentage (%)	Category	Percentage (%)	Category
Small Scale	78,47	Good	87,92	Very good
Large Scale	87,50	Very good	89,17	Very good

The small/limited scale test was performed on the students who have received atomic structure material so that it can be used to determine the readability of the module. In addition, in the limited test, the reliability test/question instrument was conducted. Reliability relates to the consistency of measuring instruments. Reliability is a coefficient that shows the extent to which an instrument/measuring device can be trusted, meaning that if an instrument is used repeatedly to measure the same thing, the results are

relatively stable or consistent. The value of the reliability coefficient ranges from 0 to 1, where the higher the coefficient, the more consistent the measurement results are (Khumaedi, 2012).

The results of the instrument test reliability showed that the value of the test reliability coefficient was 0.73, so it could be interpreted that the learning outcome test instrument was reliable. The Cronbach Alpha formula was used to test the reliability in this study, where the reliability test criteria for the knowledge instrument stated that if the test reliability coefficient was greater than or equal to 0.70, then the learning outcome test was declared reliable (Ali & Ansori, 2014).

The Effectiveness of Chemistry Module Integrated with the Islamic Values in Online Learning

The chemistry module integrated with Islamic values was presented to the students in the type of version PDF in online learning. The modules in PDF type are similar to a digital modules or electronic versions of print modules. This facilitates the publication of the module in digital form consisting of text, images, or both. The module in PDF type also makes it easier for students to study because it can be read on a flat-screen computer, smartphone or another electronic devices. The digital module has also been presented by the Ministry of Education and Culture via the web address <https://modul.belajar.kemendikbud.go.id> as shown in Figure 1 below.

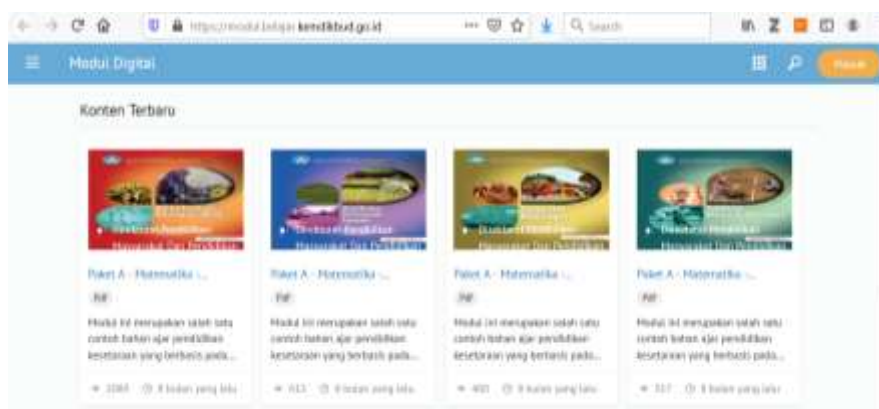


Figure 1. Digital Module Form by Kemendikbud

The digital module issued by the Ministry of Education and Culture is not yet available for the whole subjects and it is not suitable for the needs of certain schools, including the Integrated Islamic High School. Therefore, the chemistry module integrated with the Islamic values developed for students in the integrated Islamic Senior High School which was tested or measured for its effectiveness to support online learning. Effectiveness can be said as an impact or result arising from action, in this case, the use of digital modules on the student learning outcomes. The effectiveness was conducted as a measurement of the success rate of a learning process (Laili Ismi, et al., 2019).

The cognitive learning analysis as the result of the learning process using the chemistry module integrated with Islamic values was obtained from the pre-test scores of the control class and the experimental class (user) of the product. This method was in accordance with the quasi-experimental method, namely the pre-test and post-test design (Cresswell, 2008). The results of the pretest and posttest scores are shown in Figure 2. The pretest values obtained before the treatment in the control and the experimental classes showed relativity of the same value, but in the post-test results, after the experimental class received the treatment by using the digital module product, the results of the development obtained a higher score from the posttest results of the control class who were not treated with digital module products.

The results of the post-test scores in the control class and the experimental class showed that there were differences in online learning outcomes achieved by implementing the developed module product and the one that did not implemented it. The test of the effectiveness of the development module was further strengthened by the results of the analysis of hypothesis testing using parametric statistical tests. The data analyzed for the parametric statistical test was based on the value of the pre-test and post-test scores of students.

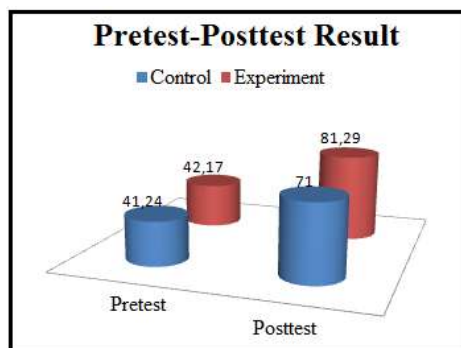


Figure 2. The Graphic of Pre-test & Post-test Result

The results of n-Gain were used to test for normality, homogeneity, and effectiveness test. Normality test and homogeneity test were conducted as prerequisite tests to determine the effectiveness test using parametric statistical tests or non-parametric statistical tests.

The results of the normality test obtained a significance level of 0.200 for the control class and 0.200 for the experimental class. The results of the significance level obtained were greater than 0.05, it means that the data was normally distributed. The next test was the homogeneity test carried out to determine whether the samples from the two test groups have the same variance or not. The results of the homogeneity test obtained a significance level of 2.935. These findings indicated that the significance level was greater than 0.05, which means that the samples have the same variance (homogeneous).

The results of the normality test and the homogeneity test that had been carried conducted have met the prerequisites for the parametric statistical test, then the t-test statistical analysis was also conducted. The results of the t-test analysis found that the value of t count (2.935) > t table (0.005) and the value of p Sig. (2-tailed) < 0.05, then there was a significant difference from the learning outcomes of the students who use the chemistry module integrated with Islamic values and who did not use it in the online learning process. This was in line with the results of research by Okmarisa, et.al. (2016) which states that there is a significant difference in the learning outcomes of students who are taught using chemical teaching materials integrated with spiritual values with the learning outcomes of students taught using high school chemistry textbooks. The observation findingd also show that students with good learning outcomes tend to have high spiritual values and vice versa. Research by Rahmah, et.al. (2017) also proposed that the effectiveness of a chemistry module that is integrated with Islamic values with a national learning model approach to improve student learning outcomes in the realm of cognitive, attitudes and skills.

Conclusion

The chemistry module that had been developed is a chemistry module integrated with Islamic values on atomic structure material in the form of a digital module (PDF) that was implemented in the online learning process. The activities in the chemistry module integrated with Islamic values refer to the syntax of the SSCS model. The development of chemistry module integrated with Islamic values was

conducted by using nine stages in the Borg & Gall (1983) development model. The chemistry module integrated with Islamic values in the atomic structure material was declared with high feasibility for use in the chemistry learning process. Besides, the chemistry module integrated with Islamic values on the atomic structure material used in online learning in integrated Islamic Senior High Schools was effective in improving learning outcomes in the form of students' cognitive abilities.

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