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INTEGRATION SCIENCE AND RELIGION IN PHYSIC SUBJECT: AN ANALYSIS IN ISLAMIC HIGHER EDUCATION

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Abstract

The integration of Islamic values in the learning process at UIN Sunan Gunung Djati Bandung has become the hallmark of the campus. The Islamic values integrated into the learning process by providing the verses from the Quran for the concepts studied. This study aims to analyze the ability of students used to live in an Islamic boarding school (*pesantren*) and those who haven't yet live in an Islamic boarding school in identifying the verses of al-Quran related to some concept of physics. The research was conducted through observation in classrooms and analysis of students' assignment on identifying. The results showed that generally, students have a decent ability in identifying Qur'anic verses related to the concept of physics. The students' ability appeared not to be influenced by the *pesantren* educational background. However, largely students are not able to interpret the verses of the Qur'an related to the physics concept in depth.

Keywords: integration; information literacy; physics; Qur'an; verses

Abstrak

Integrasi nilai-nilai Islam dalam proses pembelajaran di UIN Sunan Gunung Djati Bandung telah menjadi ciri khas kampus. Integrasi nilai-nilai Islam ke dalam proses pembelajaran dapat dilakukan dengan menghubungkan ayat-ayat al-Quran dengan konsep-konsep yang dipelajari. Penelitian ini bertujuan untuk menganalisis kemampuan mahasiswa Prodi Pendidikan Fisika yang pernah tinggal di pesantren dan yang tidak pernah tinggal di pesantren dalam mengidentifikasi ayat-ayat al-Quran terkait dengan konsep fisika. Penelitian dilakukan melalui observasi di ruang kelas dan analisis tugas yang dikumpulkan dari mahasiswa ketika mengidentifikasi ayat-ayat Al-Qur'an yang berkaitan dengan konsep fisika. Hasil penelitian menunjukkan umumnya mahasiswa memiliki kemampuan yang layak dalam mengidentifikasi ayat-ayat Al-Qur'an yang berkaitan dengan konsep fisika. Kemampuan mahasiswa tersebut tidak dipengaruhi oleh latar belakang pendidikan di pesantren. Namun, sebagian besar mahasiswa tidak mampu menafsirkan ayat-ayat Al Qur'an yang terkait dengan konsep fisika secara mendalam.

Kata kunci: : integrasi; literasi informasi; fisika, ayat-ayat al-Qur'an

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Introduction

Universitas Islam Sunan Gunung Djati (UIN SGD) Bandung is one of the State Islamic Universities (PTAIN) in Indonesia. Historically, UIN SGD was an institute which then transformed to a university with the addition of several faculties indirectly related to Islamic studies (Lukens-Bull, 2016). However, the emergence of non-Islamic studies faculty should not abandon the identity of UIN as Islamic university or PTAIN. Thus, the so called "worldly" and "secular" faculties at UIN must provide distinguishing features compared to their counterpart at other public colleges. One of the distinguished features is the integration of the Islamic concept taken from the scripture and the physics concept taught in class, which is the integration of religion and science.

The integration of Islam and science is a kind of education model that guides one's mind, body, and soul based on Islamic values and revelation (al-Quran and Sunnah) (Lubis, Musthapa, & Lampoh, 2009). The integration of religion and science is also expected to encourage the birth of Muslim scientists, which can contribute to the development of Islamic science in the world. Other than containing all aspects of human life in a complete and perfect way, which serves their basic function as guidance for human kind, the Qur'an and al-Sunnah also include some scientific investigation as to stimulate the thinking of human. It is always thought and agreed that scientific thinking and activity is an integral part of the Islamic system, which also contributes to the whole structure (Fakhri, 2010). Some of the Muslim figures universally known for their role in the development of Islamic science in the world were Al-Kindi, Al-Farabi, Ibn Sina.

The integration of religion and science has been widely practiced in some countries. The Philippines has successfully integrated both into school subjects to emphasize the values education. The term "value" itself is described as the value of love to one's country, a combination of personality and national self-identity development (Nagahama, 2014). The nurturing process of value through education in the Philippines was started after the new era of people power revolution in 1986. The values were integrated through physical, spiritual, intellectual, moral, economics, social, and political subjects (Nagahama, 2014). In Malaysia, the integration of Islamic values has been formally included in the education. For example, the integration applies in the accounting subjects either in a single ethics program course or by being embedded into other courses in the program. Integration can strengthen internal morale as well as instill the Islamic values, which then influence the thinking and behavior of the students throughout their life. The instilment of values in accounting can improve the ethics of university students to prepare them serving the sharia industry better (Johari, Mustaffha, & Deni, 2016). Brunei has adopted a model of integration learning since 1972 (Lubis, Musthapa, & Lampoh, 2009). In Indonesia, the integration of religion and science has been carried out in many educational institutions (Ibrahim, Yusoff, & Awang, 2016; Sunhaji, 2016), including at UIN SGD.

One of the non-Islamic study programs at *Tarbiya* and Teacher Training Faculty at UIN SGD Bandung is the Physics Education Study Program. The students in Physics Education Study Program should have the ability to integrate *qauliyah* verses, which is the written words of God in the scriptures, with *qauniyah* verses, which is the laws of God in the universe. Hence, the students are expected to have a complete understanding of both the worldly or so called secular science and the Islamic scholarship (Qur'an and Sunnah) to form the

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generation of *Ulul Albab*, or meant the people of intellect (Zain & Vebrianto, 2017).

At the Physics Education Study Program, some lecturers have incorporated the study of the Qur'an and al-Sunnah in the learning process although there is a sizeable number of lecturers who have not done it yet. In this paper, we reported the research regarding the ability of students used to live in an Islamic boarding school (*pesantren*) and those who haven't yet live in an Islamic boarding school in identifying Qur'anic verses in relation to the concepts of physics and also the difficulties faced by students and lecturers in conducting studies of Qur'anic verses in relation to the concept of physics. The research was expected to provide a full picture on the success of religious and science integration in Physics Education Study Program. It is also hoped that this research can be used as a consideration for the preparation of lecture course units and syllabus in Physics Education Program by adding a study of verses of the Qur'an.

Method

The participants were 80 seventh semester students, who are the students of physics education. They were expected to be teachers after graduation. The students were classified as those having Islamic boarding school background and those who did not. Each student was assigned an individual task to study Qur'anic verses related to the Physics concept that has been studied. The data were processed and presented to be analyzed by comparing students' abilities based on the categories stated previously. The data about the difficulties faced by students and lecturers in conducting the studies of Qur'anic verses related to the concept of physics were obtained through interview.

Results and Discussion

Overview of the Physics Curriculum at the Department of Physics Education Faculty of Tarbiyah and Teacher Training UIN Sunan Gunung Djati Bandung

The curriculum structure that is applied in the Physics Education Study Program refers to Kepmendiknas No. 045/2002 and PMA 353, consisting of main competencies, supporting competencies and other competencies. Based on these three categories of competency, the courses are grouped into basic courses, main courses, supporting courses, and elective courses. The numbers of credits for each group are respectively 20 credits, 112 credits, two credits, and 24 credits.

The subjects related to the main concept of physics are included in the main courses. They include mechanics, thermodynamics, electromagnetism, waves, optics, electronics, nuclear physics, modern physics, earth and space science, quantum physics, statistical physics, and solid-state physics. The courses are presented from third to the seventh semester. Students in the seventh semester ideally have taken the subjects and thus understand the main concepts of physics.

Besides, students are encouraged to take supporting courses. Supporting courses are supplementary courses offered to students to be chosen based on their needs. The supporting courses offered are Arabic language, Al Quran / Tafseer Science, Science of Hadith, the science of Fiqh, Islamic Creed/Aqidah and Akhlaq, History of Islamic Civilization. The supporting courses are the unique subjects at the Islamic universities which are not offered at the public universities.

Meanwhile, there are two credits of elective courses (entrepreneurship) which are free to be chosen by students by their specialization.

The Investigation of The Student's Ability in Identifying Qur'anic Verses Related to Physics Concepts

In general, the ability of students to identify the verses of the Qur'an related to the concept of physics was quite well indicated by the number of Quranic verses that were identified by the students. In total, there are 84 Quranic verses related to concepts of physics have been successfully identified. However, the number of verses of the Qur'an identified by each student varies. At the least, students identified three verses, and at most they identified 29 verses. The frequency distribution of the number of Quranic verses identified by the students is shown in Figure 1. Of 80 students, 30 students identified ≤ 5 verses, 28 students identified 6 to 10 verses, 15 students identified 11-15 verses and only two students identified more than 21 verses.

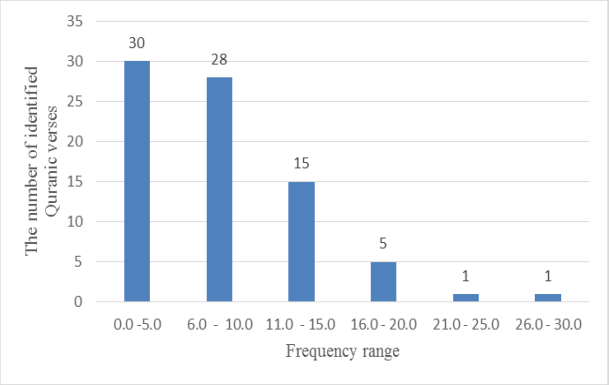

Figure 1. The Frequency Distribution of the Number of Quranic Verses Successfully Identified by Students.

The profile of the respondents is as follows. From 80 respondents, 44% have the *pesantren* educational background. The rest of the students, 55%, never studied in *pesantren*. However, the students' ability in identifying Quranic verses related to the physics concept appeared not to be influenced by the educational background. Students who have never lived in *pesantren* have a higher ability in identifying Qur'anic verses related to the concept of physics. In this experiment, there were seven students who could identify more than fifteen verses and five of them have lived in *pesantren*.

Student's Ability in Relating the Tafseer Qur'anic Verses to Physics Concepts

In general, the ability of the students in linking Qur'anic verses with the physics concepts is limited only to the literature search. The ability of students to search the references related to the explanation of Qur'anic verses with the physics concept was found to be quite fine. As many as 95 percent of students wrote the explanation on the relationship between the Quranic verses and the concept of physics through the reference search. The rest, about 5% of the students, only identified the Qur'anic verses without giving any explanation. The results of the identification of Qur'anic verses related to the physics concepts are shown in Table 1.

Table 1. The Identification of Qur'anic verses related to the physics concept conducted by respondents.

No	Quranic verses	Physics Concept
1.	Al- Qamar 49, Al Furqan 2, Ar-Rad 15, ar Rahman 7-9	Physics quantity
2.	Al Fushshilat 53	Space and dimension
3.	Ar Rahman 60	Dynamics
4.	Ar-Rad 4	Work and energy
5.	Al Jaatsiyah	Impulse and momentum
6.	Al Kahfi 54	Vibration
7.	Ar Ruum 46	Wave
8.	Al Jaatsiyah 5	Fluids
9.	Al Quran 57: 25	Solid state
10.	36:36	Magnet
11.	22:47, 70:4	Time relativity
12.	Ar-Rum 41-42, Yunus 5, An Naml 88, At Taqwir 15-16, Ali Imran 190	Space and earth science
13.	An Nissa 40, Yunus 41, Saba 3, Al Baqarah 138	Particle
14.	Al-Hajj 65	Gravitation
15.	Al Mulk 3-4	Scientific activity
16.	Al Ar'Raf 157, Asy Syuura 52, Al Ahzab 43, An Nisaa 174, Al Maidah 15-16, 44-46, AL An'Am 1, 91, 122, At Taubah 32, Yunus 5, Ar Ra'du 16, Ibrahim 1, 5, An Nur 35 & 40, Faathir 20, Az Zumar 22 & 69, Al Baqarah 17 dan 257, Al Haddid 9, 12, 13, 19, 28, Ash Shaff 8, At Tahrim 8	Light
17.	Huud 67, Al Kahfi 90, Al Mu'min 72, Faathir 9, Az- Zumar 21, Abasa 34, Maryam 25, Ar Arraf 107.	Energy

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Based on the analysis of students' worksheet, it was found that there was no difference in explaining and interpreting the meaning of verses of al-Quran with the concept of physics between the students with *pesantren* background and students without *pesantren* background. They interpreted the meaning of the Qur'anic verse by using various references. A total of 39.5% of the students used the Tafseer of the Qur'an al-Karim written by Jalaluddin al-Suyuthi and Jalaluddin al-Mahalli (Al-Mahally, 1990), the Tafseer of Al-Mishbah written by M. Quraish Shihab (Shihab, 2003) and the Tafseer of the Qur'an al-him written by Ibn Kathir (Al-Hafidz Ibnu Katsir Ad-dimasyqy, 2006). A total of 55.5% of the students used other sources such as books, web and blogs, while 5% of the students interpreted by themselves.

The use of Al Suyuthi and Mahalli's Tafseer (exegesis) of *Al-Qur'an al-Karim* (Al-Mahally, 1990), Tafseer al mishbah of M. Quraish Shihab (Shihab, 2003), and Ibn Katsir's Tafseer of *Al-Qur'an al-'Azhim* (Al-Hafidz Ibnu Katsir Ad-dimasyqy, 2006) were actually inaccurate to explain the phenomenon of science. These works do not specifically elaborate on the relation of Al-Qur' verses with the scientific phenomenon. The explanation place emphasis on theology and moral of God's might be more.

There are a number of exegesis that can be used as references to explain the scientific phenomena such as the Tafsir Mafatih al-Gayb by al-Razi (Al-Razi, t.t), the Qur'an and Science by Ahmad Baiquni (Baiquni, 1997), Tafsir Ilmi: Recognizing Scientific Verses in the Qur'an by the Ministry of Religious Affairs Team and LIPI (Kementrian Agama (Indonesia), 2012).

Regarding the use of references from books, webs and blogs indicate that students are no longer illiterate for all types of information. This has been predicted by futurologist (Toffler, 2002)that in the third millennium there will be a leap in human development due to the development of science and technology. In this information age, students can access any information available through the internet. The ease of accessing such information is supported by library facilities that have served internet access. The access and accessibility of library resources are centered on the use of technology to support all users' ability to utilize library materials and services (B. Blummer, 2018).

The changing learning approach in the era of digital information has greatly changed the learning environment in college. The application of information technology in education has been a concern in modern education (Chen, 2016). The global development of knowledge and rapid ICT integration do encourage students to have skills related to this digital world. Digital skills are not only required to support teaching and learning activities but are also needed for work and participation in society. Certain skills in the 21st century such as seeking and evaluating information, problem-solving, and information exchange or idea development in a digital context are considered important. This development thus needs some attention for the identification and acquisition of individual competencies to participate actively and effectively in communal knowledge (van Laar, van Deursen, van Dijk , & de Haan, 2017; K. Ananiadou, 2009).

Lecturers, which are among the first-line people to face change, must be literate enough to search for information from the Internet so that the integration of information technology into learning can be done smoothly. However, a learning environment prepared with adequate technology equipment cannot guarantee excellent learning performance. Lecturers need to present adequate information literacy to integrate information technology into the learning process (Chen, 2016).

The use of resources from webs or blogs by students in accessing information about the

relation of the Quranic verses with the concept of physics is considered less credible. Students can utilize scientific publications through journal access. Several journals on Islam and science have been widely published (Murad, 2012; Iqbal, 2011; Iqbal, 2009; Parsania, 2006; Setia, 2008).

Students who interpret the Qur'anic verses with the concept of physics must be well appreciated. However, the interpretation of the Quranic verses seemed quite remote from the physics concept being discussed. This led to some misinterpretations on the *Tafseer* itself, and it caused biased meaning on the verse.

Interpreting the Qur'an, theoretically, requires: (1) mastering the sciences of the Qur'an, (2) the science of the Arabic language, (3) social science, and the methodology of interpretation (Shihab M. Q., 2013). Certain Muslim figures such as al-Kindi, al-Farabi, Ibn Sina, long before had developed social and natural science mastered the Qur'an and its interpretation first. The Qur'an in many verses motivates people to use their reason ('aql) so that they are moved to conduct research, observation, both in the laboratory and in the universe. They have proven the development of science inspired by the Quranic verses.

The Difficulties Faced by Students and Lecturers in Studying the Quranic Verses

The difficulties faced by lecturers in conducting the study of verses of the Qur'an related to the concept of physics were caused by some factors. First is the educational background. The lecturers in the Physics Education Study Program have diverse educational backgrounds. The lecturers that teach specifically on physics did not have formal education on Islamic study. Therefore they are a non-Arabic speaker and lack of knowledge in the *Tafseer* of Quran. Hence, they lack the ability and skill to interpret the verses of the Koran. Similarly, these difficulties are also faced by the students. Secondly, the curriculum is still partially arranged between the "worldly" and "secular" science and the Islamic study so that idealism to integrate the religious science and general science is difficult to materialize. The Islamic studies with the study of science in it tend to use the pattern as proposed by Hodgson, (1977): Firstly, education is commonly conceived as the teaching of fixed and memorizable statements and formulas which can be adequately studied without any process of thinking as such. Second, that education was normative in purpose. Based on this assumption, the students at UIN are therefore designed to mingle with the normative-classical tradition and do not deal with the social science, natural science, and humanities as developed in modern universities in the Western world. Thirdly, the competence of both lecturers and students also affect the results. A competent lecturer influences the students' ability in mastering the science. The competence of the lecturers in Physics Education Study Program is so specific that they usually cannot handle other than their subjects. Hence a team of lecturers is required so that lecturers of the Islamic studies can collaborate with lecturers in the physics-related subject so the relation between the physics concepts and the Islamic science can be understood well by the students.

Conclusion

The students of Physics Education Study Program at UIN SGD Bandung still cannot fully integrate religion and science. The students are just on the level of identifying and tracing the meaning of Qur'anic verses about physics. A deep understanding on the meaning of Qur'anic verses regarding the concept of physics still needs to be explored. Religious competence such as Arabic language and *Tafseer* are still required since the Qur'an does not describe practical science and does not explain the science

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explicitly. The Qur'an is basically the *huda li al-nas*, or a guidance for mankind, which stimulate human to search and study the universe so to develop the scientific thinking and knowledge. Therefore, it is necessary to formulate an integrated curriculum for the physics content courses and the religious subjects. To fulfill this, it is necessary to form a team teaching in preparing *SAP* and *syllabus lectures* in Prodi Education Physics by adding a Quranic study course. In the era of where information is widely available, the ability to integrate religious and scientific scholarship must also be supported by the competence of information literacy. Information literacy shows the mastery of students in tracing references through ICT networks.

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