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STEM Education Elements in Islamic Studies Syllabus in Malaysia

Mohd Asmadi Yakob ¹, Amiratul Munirah Yahaya ², Nur Nafhatun Md Shariff ³, Zety Sharizat Hamidi⁴

^{1, 2, 3} Akademi Pengajian Islam Kontemporari, UiTM Shah Alam, 40450, Malaysia

⁴ Institut Sains, Fakulti Sains Gunaan UiTM Shah Alam, 40450, Malaysia

asmadi716@uitm.edu.my, amiratul@uitm.edu.my, nnmsza@uitm.edu.my, zetysh@uitm.edu.my
Tel: 013-2324863

Abstract

STEM education integrates science, Technology, Engineering, and Mathematics knowledge that is emphasized in Malaysia Education Blueprint 2013-2025. A few STEM elements are drawn in Islamic Education syllabus in the lower forms. This study aims to examine the extent to which STEM elements are absorbed in form one to three Islamic Education syllabus. Qualitative study framework that analyses the extent of STEM elements existence in Islamic Education syllabus based on syllabus perception. Excellent and efficient teaching can inculcate students' interest in science, and the awareness of its integration with Islamic religion is needed for the ummah and Islamic civilization advancement.

Keywords: STEM Education, Syllabus, Islamic Education

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1.0 Introduction

Islam is a universal religion and covers various aspects of human life. The implementation of Islamic Education covers various fields in order to fulfill human life dimensions. One of the aspects that are emphasized in education is science and technology. This matter is not new and foreign because there are many verses in al-Quran that relate to the knowledge of science and technology. Science and technology are critical in meeting human life necessities and performing worship activities such as prayer, fasting, zakat, etc. In Malaysia's education system, the education that leans to science and technology is combined in a group known as STEM Education. This study is carried out based on two objectives: identifying STEM Education elements that inform one to three Islamic Education syllabus. Second, to analyze the elaboration of STEM elements inform one to three Islamic Education textbooks.

STEM Education is an education based on integrating four knowledge domains: Science, Technology, Engineering, and Mathematics. In the Malaysian context, STEM Education is one of the agendas emphasized in Malaysia Education Blueprint 2013-2025. STEM is an acronym for 'Science,' 'Technology,' 'Engineering,' and 'Mathematics.' The subjects in STEM fields are Science, Physics, Mathematics, Chemistry, Biology, Basics of Computer Science (*Asas Sains Komputer-ASK*), Design and Technology (*Reka Bentuk dan Teknologi-RBT*) (Nur Amelia bt. Adam, 2019).

In line with 21st-century teaching and learning that is more student-centered through methods like independent learning, project-based learning, and collaborative learning, the STEM approach was introduced in Malaysia in 2014. STEM Education is an approach that explores teaching and learning between any two or more STEM components or can also be between one STEM component with other disciplines of knowledge.

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STEM Education does not descend to only one subject; STEM is a teaching approach to attract students' interest in science and technology with a ratio of 60:40 (science: art) in 2020. Applying STEM education in the teaching and learning process can promote creative and innovative thinking among students. Other than that, it can also encourage debate sessions among students in science and technology knowledge and produce dynamic, creative, and competent students today (Yusiza Mohamd Yusof, 2021).

Given the importance of STEM education to the country, Islamic Education should play a role in piquing students' interest in science and technology. As the core subject in Kurikulum Standard Sekolah Menengah (KSSM), STEM elements in Islamic Education subject should be highlighted so the students will know science and technology from the Islamic point of view and they aware that science and technology is a knowledge needed by the Muslims as one of the *fardu kifayah*. Therefore, this paper will discuss some STEM elements in the Islamic Education subject curriculum.

2.0 Literature Review

A study by Anastopoulou *et al.* (2012), United Kingdom, showed that the students were not attracted to science as one of the subjects in school. The same thing happened in Malaysia; the Malaysia Academy of Science study showed that only 21% of upper form students chose science in 2014. Therefore, in 2015, UUM's Vice-Chancellor Datuk Seri, Dr. Mohamed Mustafa Ishak, suggested reviewing the science subject's teaching and learning process. He concluded from the Malaysia Academy of Science study that the students have lost interest in the science domain. This issue is getting critical due to the low number of students in the STEM domain.

Based on the guidelines stated in Malaysia Education Blueprint 2013-2025 at the secondary school level, the Ministry of Education wants to coordinate a high-performance education system among the students to compete at the global level. The objective can be achieved by empowering and increasing the quality of Science, Technology, Engineering, and Mathematics education (STEM) (PPPM, 2013).

STEM implementation in the Malaysia Education system emphasizes bridging the gap between the subjects taught in school. Multidiscipline education is also suggested in this blueprint so the education quality can be increased, besides handling the challenges in overall Malaysia's education system. Therefore, STEM Education plans to encourage teachers' and students' involvement in two or more domains through teaching and learning (PdPc), project-based learning, and collaborative learning.

In other words, STEM implementation is one of the government's efforts to attract the students' interest in the science and technology stream. Numerous suggestions were made to stimulate students' interest in science and technology, including the involvement of many parties, particularly parents, to explain the value of STEM to achieve this goal. Not forgetting the importance of STEM can also be added in religious talks in mosques or musollas (Amimah Mohammad Ayub, 2018).

These suggestions show the importance of religious scholars as one of the factors to encourage STEM literacy among students. It is more systematic if STEM elements are expanded in Islamic studies especially from one to three Islamic Education. After form 3, the students will choose the course they want to. Without deep interest, it is difficult for them to choose the science course or science subjects.

3.0 Methodology

This qualitative study is based on document analysis. There are two documents to be analyzed: Islamic Education's *Dokumen Standard Kurikulum dan Pentaksiran* (DKSP) of form one to three and the textbooks used for teaching and learning in the lower form. Both documents will be analyzed to evaluate the extent of STEM existence in Islamic Education teaching and learning (PdP).

4.0 Findings

Kurikulum Standard Sekolah Menengah (KSSM) for Islamic Education is drawn up to fulfill the need to build and shape Muslim personality who understands, practices, and appreciates Islam as a whole. Islamic Education KSSM goals are to built and shape a caliph and Allah SWT servant who is knowledgeable, religious, pious, deeds to worship, virtuous, and competence-based on al-Quran and al-Sunnah and contributes to enhancing the race and country's civilization and the nature's well-being in order to achieve the well-being in the world and hereafter. Based on the goals, there are many domains in Islamic education, such as Al-Quran, Hadith, *Aqidah*, *Sirah* and Islamic Civilization, and *Akhlaq Islamiah* (Form 1 DKSP Islamic Education, page 1).

4.1 STEM in Elements Across the Curriculum (EMK)

Islamic Education KSSM good intention to shape Muslim personality and enhance the race and country's civilization is strengthened with the combination of elements across the curriculum (EMK) in various aspects such as language, environment sustainability, positive attributes, science and technology, patriotism, creativity and innovation, entrepreneurship, information and communication technology, global sustainability and financial education. EMK is an added value applied in the teaching and learning process other than the ones stated in the content standard. These elements are applied to strengthen the skills and human capital competence intended as well as deal with current and future challenges (Form 1 Islamic Education DKSP)

The science and technology aspect is clearly explained in Elements Across Curriculum (EMK). Among the science and technology elements in Islamic Education EMK are:

- i. Increases students' interest in science and technology and increases science and technology literacy among students.

- ii. The use of technology in teaching helps and contributes to effective and efficient learning.
- iii. Integration of science and technology in teaching and learning covers four subjects, namely:
 - a. Science and technology knowledge, facts, principles, and concepts related to science and technology.
 - b. Scientific skills (thinking process and specific manipulative skills)
 - c. A scientific attitude such as accuracy, honesty, and safety.
 - d. Use of technology in teaching and learning activities.

In science and technology, the application of Information and Communication Technology (ICT) elements in PdP ensures students can apply and strengthen the knowledge and basic ICT skills they learned. ICT application not only drives students to be creative, but PdP will be more exciting and whole, exciting, and increase the quality of learning (Form 1 Islamic Education DKSP)

5.0 Discussion

5.1 STEM Elements in Islamic Education Curriculum

Based on the study, some STEM elements in Islamic Education curriculum covers al-Quran, fiqh, and *aqidah*. From the four STEM elements, science is more exposed in Islamic Education subject syllabus.

5.1.1 Al-Quran Domain

There are two topics in the al-Quran that can be related to science. The topics are:

First:

In Form One DKSP, Learning Standard 1.9.2, there is a title '*Makanan Halal Lagi Baik*', a discussion on verse 168, surah al-Baqarah.

The meaning of the verse:

O humankind, eat from whatever is on earth [that is] lawful and good and do not follow the footsteps of Satan. Indeed, he is to you a clear enemy. (Sahih International)

The issue of good and halal food is among basic things and has become the need for Muslims. Nevertheless, today, with the advancement in food manufacturing techniques, the halal determination method is closely related to science and technology. Explanation to this matter can create awareness that science and technology knowledge is vital for the Muslims to manage their lives, so it is in line with al-Quran.

Based on the textbook examination, the study found no explanation and elaboration from science and technology aspect in halal nutrition issue. The explanation was based only on religion and health (Form One Islamic Education Text Book, 2019). Islamic shariah puts a high standard in determining whether the food is halal or haram. The halal concept in al-Quran said that "*halalan toyyiban*" means the food and drink must be halal and pure, and it is a nutritious food as in the food pyramid, and it will not harm the health, such as does not contain the chemical substance. Attention must be given to the purity of the food through slaughter following the *syara'* and made it halal to eat. Slaughter is the process of removing blood from the body of an animal. Scientific research showed that slaughter could prevent blood clotting, and studies showed that eating blood clots can harm human health (Muhammad Nazir Mohammed Khalid, 2021).

Second:

In Form Three DKSP, Learning Standard 1.251, there is a title '*Penciptaan Manusia Bukti Kekuasaan Allah*', a discussion on verse 67 surah Ghafir:

It is He who created you from dust, then from a sperm-drop, then from a clinging clot; then He brings you out as a child; then [He develops you] that you reach your [time of] maturity, then [further] that you become elders. And among you is he who taken in death before [that], so that you reach a specified term; and perhaps you will use reason. (Sahih International)

This verse discusses the process of human evolution from a sperm into an adult human and becoming old. This verse is one of the verses in the *I'jaz al-Ilmiy* category that proves Allah SWT's greatness and power. Based on other Islamic Education books, there is a detailed explanation about human evolution according to the science perspective. The explanation is given with scientific terms such as sperm, ovum, zygote, embryo, and fetus (Form Three Islamic Education Text Book, pages 54 to 55). Human development starts from inside the womb, involving biology, socio-emotion, and cognitive (thinking). Biological changes process in human physically is a natural change such as brain development, increase in weight and height, hormonal change and cardio strength development that will decrease when a person gets old. According to a scientific study, God's creation of anatomic brain structure is unique involving the intelligence in thinking, its function to control the body movement with sure signs including emotional aspect. The part of the brain is called the "prefrontal cerebrum" (Muhammad Nazir Mohammed Khalid, 2021).

5.2 Fiqh Domain

In Form One DKSP, three topics can be related to science. The relations between the topics with science are also stated in the syllabus learning standard. Among the topics are ablution, prayer, and fasting.

5.2.1 Ablution

The knowledge of ablution is essential to the Muslims, and it is included in fardu 'ain knowledge. Although the knowledge of ablution is more towards ibadah, it can also be discussed in the science aspect, especially the many benefits of wudu from the health aspect. In Form One DKSP, Learning Standard 4.5.2., there is a topic explaining the benefits of ablution from a scientific aspect (Form One DKSP, page 66). The explanation about the benefits of ablution from the science aspect can be obtained in the Form One Islamic Education textbook (Form One Islamic Education Text Book, page 123).

5.2.2 Prayer

Prayer is the second pillar of Islam after reciting shahadah. Discussions on prayer can be found in many books, either in fiqh book or other books. However, prayer has many benefits from the scientific aspect. In Form One DKSP, Learning Standard 4.7.10, a topic explains the benefits of prayer from a science aspect (Islamic Education DKSP, page 37). The benefits of prayer are explained in the Form One Islamic Education textbook (Form One Islamic Education Text Book, page 136).

5.2.3 Fasting

Fasting is the third pillar of Islam that is a must for all Muslims. Discussions on fasting can also be found in many books, either fiqh, tafsir, hadith, and others. There are many advantages of fasting from the spiritual, physical, and science. In Form Two DKSP, Learning Standard 4.12.12, the topic describes the benefits of fasting from a scientific view (Form Two Islamic Education DKSP, page 40). From the view of science, the explanation of fasting is explained in Form Two Islamic Education (see Form Two Islamic Education Text Book, page 138). According to science, fasting can accelerate the healing process because, generally, bacteria need iron to act actively. The absence of food in the body can weaken the bacteria reaction. According to Allan Cott, a specialist from the United States, in his book "Why Fast," such as resting the human's internal organs, prolong aging, lower the blood pressure and fat rate, sharpens the sensory, lower the mental stress, and control the sexual drive. Indirectly, fasting is in line with intermittent fasting (IF), *sunat*, two days in a week, usually on Mondays and Thursdays, which is the practice of Prophet Muhammad s.a.w. (PBUH) Alternatively, fasting on every other day was practiced by prophet Daud a.s. Fasting is a time for rest from food processing and is an effective way to control body weight (Muhammad Nazir Mohammed Khalid, 2021).

5.2.4 Aqidah

Aqidah is related to faith and complete confidence in the heart until the soul becomes calm because there is no doubt and ambiguity to believe in Allah S.W.T. (al-Banna, 7). To obtain a confidence *jazm*, the theologians have organized the methodology of *aqidah* based *dalil naqli* and *dalil 'aqli*. In *dalil 'aqli* is the proof based on scientific knowledge. In content standard 3.7.1. on faith towards the books by Allah, there is a topic on scientific findings in al-Quran (learning standard 3.7.6). This topic is explained in the textbook involving two scientific findings in the al-Quran, namely the human evolution process and the process and function of human skin (Form Two Islamic Education Text Book). The fetus in the womb experiences three darkness as stated in al-Quran, surah *al-Zumar*, verse 6, translated by the scientists such as Prof. Keith Moore, the three layers for the fetus, namely the mother's stomach skin, the mother's womb wall, and the water layer. Other than that, the Muslims' *aqidah* and faith can be highlighted with other suggested topics such as nature's events that prove Allah's greatness and power, as stated in al-Quran. Among them are explained on the cycle of rain in surah *al-Rum* verse 48, the meeting of two seas that are different in colours and the contain of salt in surah *al-Rahman*, verses 19-is the function of mountains as the anchor in surah *al-Anbiya'*, verse 31 (Muhammad Nizar Mohammed Khalid).

6.0 Conclusion and Recommendation

Based on the discussion above, the study concluded that science and technology are crucial knowledge to be mastered by the Muslims to fulfill their life needs and worships. Science and technology elements combined in STEM Education exist in Form One to Three Islamic Education subjects. Three domains are related to science discussed in Islamic Education textbooks, namely al-Quran, fiqh, and *aqidah*, also explained in the Islamic Education textbook. Among the science discussions in the textbooks are the human evolution process and the benefits of certain worships such as prayers, ablution, and fasting. The existence of science knowledge in the Islamic Education syllabus proves that there are STEM elements in Islamic Education syllabus.

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