CRITICAL THINKING FROM STEM EDUCATION AND AL-QURAN PERSPECTIVES

AINI AZIZIAH RAMLI*, NOR HASNIZA IBRAHIM,
FARAHWAHIDA MOHD YUSOF, JOHARI SURIF

Faculty of Education, Universiti Teknologi Malaysia, Skudai, Malaysia
*Corresponding Author: ainiaziziahramli@gmail.com

Abstract

There is a growing interest among educators and professionals in developing educational platforms in order to prepare students critical thinking skill in solving current problems. The integration between STEM Education (Science, Technology, Engineering, Mathematics), which focusing on divergence skill and The Al-Quran, which emphasizes the appreciation of the servant to the greatness of Allah the Almighty, has the ability to position our country for global competitiveness as well as not to marginalize the glory of Allah through the appreciation of Al-Quran. The introduction of STEM education, which is increasingly gaining attention in the Malaysian education field, should not only cultivate problem-solving skills but also critical thinking skills in solving the problem in order to maintain the student's interest. Critical thinking in solving the problem is the skills that need to develop in order for a student to be able to face the world outside their classroom. Therefore, this paper tries to synthesize critical thinking in western perspectives through STEM education, critical thinking in Al-Quran perspectives and rationalize the link between critical thinking from Al-Quran and western perspectives in preparing the student with the most significant 21st century skills.

Keywords: Al-Quran perspective, Critical thinking component, STEM education.

1. Introduction

The 21st century has brought a change in the lives of today's society. According to Rincon and George-Jackson [1], living in a knowledge-based global economy (k-economy) in a borderless world has demanded the product of a community equipped with 21ˢᵗ-century knowledge and skills. In line with this demands, policy redesigns and high-tech culture, new strategies must be implemented in order to enable the nation to stimulate and sustain the nation's economic prosperity. The design of development policies and strategies through the k-economy is once again put pressure on the success of the education system. This is because the country's economy is now heavily driven by contributions coming from discovery and innovation in STEM [2]. The increasing employment opportunities in the growing STEM-related sector has forced the education system to produce a knowledgeable workforce in STEM-related fields.

Hence, an educational transformation that emphasizes the strengthening of the integration of science, technology, engineering and mathematics (STEM) education through Malaysia's Education Development Plan Blueprint (2013-2025) coincides to improving this situation. However, the problem begins when human civilization is growing, the scholarly tradition begins to separate the science concept and the ukhrawi. This is what is said as dualism in the education system. According to Yaacob and Embong [3], the dualism system in education can be said to be practised by almost all Muslim countries. As a result, there is two conflicting generation in developing society. In order to create a society that has a balance between the world and ukhrawi, which is an advanced and competitive generation of Al-Quran lovers, then efforts, should be made to make this system of duality merge into one. The combination of naqli and aqli knowledge in the educational system produces an individual who has a balance of physical, emotional, spiritual, and intellectual aspect as mention in the National Education Philosophy aims.

2. Methodology

This paper is a written study aimed at reviewing the contents of knowledge, theoretical findings and contributions to the critical thinking topics based on the STEM education perspectives from western scholar and Islamic perspectives. Al-Quran in Uthmani script is used to examine critical thinking component based on Islamic perspectives. To make a comparison between Islamic perspectives and western perspective in critical thinking component, research from critical thinking's scholar such as Ennis [4], Norris [5], Swartz et al. [6] and Bailin et al., [7] is used. This study uses document analysis that assesses, analyses, discusses textual content, and translates into narrative approaches.

3. STEM Education Component

Concerns about STEM education are constantly evolving as the need for STEM skills to meet the urgent economic challenges. To boost the country's competitiveness especially in globally, STEM education needs to be explored further. Interest in Science and Mathematics among school students may also be triggered through STEM education [8]. STEM is an acronym for Science, Technology, Engineering and Mathematics. Moore et al. [9] define STEM education as "an effort to combine all or part of the disciplines of Science, Technology, Engineering and Mathematics into a class, unit or lesson based on the

relationship between the subject and context of the real world problem". Asunda [10] believes that STEM is a philosophy or a way of thinking that integrates Science, Mathematics, Engineering and Technology subjects into an education field that is considered appropriate and relevant to be taught in schools as it emphasizes practical aspect and real world situation. Kelly and Knowles [11] define STEM education as a content teaching approach in two or more STEM domains in an authentic context with the aim of linking relevant subjects to improving student learning. In conclusion, it can be concluded that STEM education does not stand alone on discipline that is isolated from one another, it is an integration between disciplines based on the real world.

Based on Lamberg and Trzynadlowski [12], STEM's educational objective to produce a student with STEM literacy who are able to apply and integrate the STEM concept in order to understand the problem and solve it creatively, critically and innovatively through STEM integrated learning that implements real-world contexts using hands-on approaches and open exploration. This STEM education goal is seen in line with the National Education Philosophy that emphasizes the importance of the intellectual development of an individual and KSSM's objectives, which is "to develop and enhance intellectual and rational, critical and creative thinking". To achieve this objective, it is important for our education system to educate and produce a student who is not only knowledgeable and skilled but also who can think critically and creatively in order to solve the problems and making decisions.

4. Critical Thinking through STEM Education

Based on Wang and Zheng [13], critical thinking is the result of an exploration of thought to evaluate an idea logically and rationally to make reasonable judgments using reasonable reason and evidence. From the point of the cognitive process, Ennis [4] stated that there are five skills needed to generate critical thinking, which is interpreting, argument, making inferences, decision making and reflection. Norris [5] findings show critical thinking consists of collecting information skill, making an inference, identifying assumptions and assessing arguments. Meanwhile, Swartz et al. [6] divided critical thinking skill into two component, which is the process of information gathering and conclusion making skills. Based on a study by Bailin et al. [7]. Critical thinking skills are also be characterized by cognitive operations such as differentiate, observe, generate ideas, synthesize, evaluate, and generalize and metacognitive. Overall, there are six skills based on the definition of critical thinking from a western scholarly perspective; interpreting meaning, analysing, evaluating, concluding, justifying and metacognitive.

Based on the skills acquired from the definition of this critical thinking, it can be seen that this critical thinking skill is capable of producing students who think deeply and meticulous in making a decision, which is characterized by a good problem solver as desired of introducing STEM education. But this critical thinking should be based on the Tauhid paradigm in the process to find the truth and it will lead to enhancing human faith to Allah's power [14-16].

5. Critical Thinking through Al-Quran Perspective

Education is a very important thing in human life. Without education, humans will not be able to read and possibly have knowledge either formal or informal. The

demand for knowledge is strongly emphasized in Islam when the first Al-Quran verse revealed to the Prophet is concerned with the importance of learning.

"Recite in the name of your Lord Who created. Created man from a clot of congealed blood. Recite: and your Lord is Most Generous. Who taught by the pen. Taught man what he did not know." (Surah Al-'Alaq 96: 1-5).

Obviously, the first revelation that was sent to our beloved Prophet Muhammad saw is an order to cultivate knowledge through reading, learning and teaching activity. According to Rashed and Tamuri [17], while attitude and critical thinking skills are always synonymous with those who read, think and has wide knowledge. Besides this first revelation, the verses in the Al-Quran repeatedly emphasize thinking activities, using common sense to listen, see, understand, evaluate, take lessons and making decisions as mention in Surah Ar-Ruum 30:8, which ask on people to think about what they have done to themselves, Surah Al-Ankabut 29:20 encourage people to travel on this earth to see and appreciate Allah's creation and Surah Yusuf 12:101 that calls upon people to observe and think about creation of sky and earth that prove the power of Allah SWT. Although the teachings in the form of scientific principles are not directly expressed in the Al-Quran, but the verses contained in Al-Quran become the source of ideas and guidance to scientific studies such as quote from surah Yunus 10: 5 that gives an idea about concept of calculating the year and month by referring to the movement of the moon. Therefore, we as a Muslims are encouraged to do ijtihad. Through this Ijtihad, it can be seen that education in Islam is not just about learning, but educates people to think and fulfil their responsibilities as slaves to Allah Almighty [18].

6. Critical Thinking Component from Al-Quran Perspective

The critical thinking component proposed by western scholars has long been expressed in the Al-Quran since the 14th century. Some critical thinking components have been shown by Allah through the Al-Quran verses.

6.1. Summarising

"Behold! In the creation of the heavens and the earth and the alternation of night and day, there are indeed Signs for men of understanding. Men who celebrate the praises of God, standing, sitting and lying down on their sides, and contemplate the (wonders of) creation in the heavens and the earth, (with thought): "Our Lord! Not for naught have you created (all) this! Glory to Allah! Give us salvation from the penalty of the fire." (Surah Ali 'Imran 3: 190-191).

This verse illustrates that people who think will observe Allah's creation by using their hearts and then they will see the power of Allah. In order to feel this, humans need to summarize something to help them understand it more easily.

6.2. Synthesis

"Do you enjoin right conduct on the people, and forget (to practice it) yourselves, and yet you study the scripture? Will you not understand?" (Surah al-Baqarah 2:44).
This verse shows that Allah reprimand on a few humankind those asks others to follow Allah's law but he himself does not do so. Allah condemned this kind of people by saying "Do you understand?" To understand the truth, man needs to synthesize the information in the first place before making a conclusion.

6.3. Analysis

"Many are Jinns and men we have made for hell: They have hearts wherewith they understand not, eyes wherewith they see not, and ears wherewith they hear not. Thay are like cattle, nay more misguided: for thay are heedless (of warning)". (Surah al-A'raf 7:179).

This verse states the relationship between a heart and mind. When the human heart wants to do something, he will analyze the information to identify the right or wrong, the advantages and the weaknesses. In addition, there is a verse from the surah Al-Hujurat (49:6), which also calls upon people to carefully examine and do the analysis first to determine the validity of the information obtained before accepting it.

"Believers, when an ungodly person brings to you a piece of news, carefully ascertain its truth, lest you should hurt a people unwittingly and thereafter repent at what you did". (Surah Al-Hujurat 49: 6).

6.4. Comparing and differentiate

"Then ask them: Are the blind and the seeing alike? Do you not then reflect?" (Surah Al-An'am 6:50).

"The example of the two parties is that one is blind and deaf, and the other capable of seeing and hearing. Can the two be equals? Will you, then, not heed? (Surah Hud 11:24).

Two verses of Al-Quran above are examples that emphasize the element of comparing and differentiate the two groups of people who are blind and literate in surah Al-An'am verses 50 and the disbelievers and believers in surah Hud 11:24. Comparing and differentiate skills is one of the critical thinking skills as stated by Swartz et al. [6] in the definition of critical thinking in his perspective.

6.5. Assessing argumentation

Islam encourages us to think deeply. By thinking, people can stay away from accepting opinions without a valid argument, believing in the superstition that prevents the truth, punishing without checking and prejudice. Furthermore, providing evidence during argument process was emphasized as stated in Surah Al-Baqarah 2:111, which means; "They say: "None shall enter the Garden unless he is a Jew or (according to the Christians), a Christian." These are their vain desires. Say: Bring your proof if you are speaking the truth." (Al-Baqarah 2:111)

Based on these versus, we can see that the argumentation skills is one of the critical thinking components that actually existed since the Al-Quran was revealed for mankind to implement in their daily life. Furthermore, through surah Ali Imran 3:190, surah Ath Thuur 52:38 and Surah Shaad 38:27 once again emphasised the use of the mind to think in strengthening our belief.

Overall, the critical thinking component presented by the western scholars is parallel to the ones mentioned in the Al-Quran relating to the emphasizing in think critical, instead, the Al-Quran has previously mentioned this critical thinking component since the 14th century. Even this component of critical thinking from this two perspective was parallel, based on Islamic perspective, critical thinking is linked to faith or belief. According to Gilani-Williams [14], Nordin and Surajudeen

[16] and Zhaffar et al. [19] belief that acquired without going through a critical thinking process will make it easy to falter when facing difficulties, otherwise if the belief is based on a good understanding after go through the critical thinking process, the belief will not be easy to waver when facing difficulty or in critical situation.

7. Conclusion

Since Al-Quran the days of Islamic scholars, critical thinking skills are considered as essential skills and need to be applied in the educational process to produce quality workforce and in the 21st century, learning to think critically is once again emphasized and is a major goal in education through STEM education. A good student is not only able to memorize the information given but must also be capable of processing, analysing and give evidence in arguments before receiving the information. This aspiration has been clearly stated in the National Education Policy that emphasis on critical and creative thinking skills should be given in the mission of producing a world-class quality workforce.

The Qur'an is the foundation for building thoughts and minds to make the world and the end of the world in order to create an advanced society to shape the generation of the Al-Quran. The generation formed by the Qur'anic mould is the generation that succeeds in forming and implant elements of fear of Allah Almighty, brave and brilliant in constructive ideas and independent soul. Comprehensive thinking will form a perfect and thoughtful mind besides strengthening faith. The positive mind is not despairing of God's grace, not arrogant and not forgetting when given success, because he knows it is from God. This is the Quranic mind. The mind that affects the formation of high morals, creates the spirit of sacrifice and selflessness.

Acknowledgement

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