

Integration Tree and the Interconnectivity of Science and Religion

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Abstract

This article is a kind of introductory explanation of how Islamic epistemology does not and cannot separate religion from the general knowledge and science in general. The idea will begin from the anxiety of some prominent people in religions of the world on the facts happening nowadays at western universities and higher-education institutions. Based on that, this article tries to introduce the classification of knowledge as far as Islam is concerned. It will be elaborated that by recognizing the senses alone, western scientists are only developing a research method, the observation method, or sensory experiments. This observation method is further developed to a very sophisticated method, but it still empty into the absorption of sense-perception. Sense process-in the form of reasoning-is used, but only to choose, to decide and to reason, not as another instrument in capturing realities. Contrary to Western scientists, as can be seen further, Muslim scientists recognize that the legitimacy of science is not based only on the observation method, but also rational and intuitive methods. In other words, the science does not only recognize the sensory perception in the process of knowledge, but also the sense and perception of the voice of the heart. This has brought about changes and inventions in many fields of knowledge in the early development of Islam. The dichotomy and separation of religion from the general knowledge in Islam as far as history proved had made Islam fail to shine until the time being.

Keywords: Science, Integration, Interconnection, Religion, West.

Abstrak

Artikel ini menjelaskan bahwa epistemologi Islam sama sekali tidak memisahkan agama dari pengetahuan umum dan sains. Pemikiran ini bermula dari adanya keresahan sejumlah tokoh penting agama-agama di dunia terhadap beragam fakta yang sedang terjadi saat ini di berbagai universitas dan lembaga pendidikan tinggi Barat. Oleh karena itu, tulisan ini berusaha mengangkat klasifikasi pengetahuan sejauh Islam

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memandangnya. Akan terurai secara jelas bahwa dengan hanya menerima indra, ilmuwan Barat hanya mengembangkan metode riset mereka, metode observasi, atau percobaan indrawinya. Metode observasi tersebut kemudian dikembangkan lebih jauh menuju metode mutakhir yang sangat rumit, namun tetap bermuara pada penyerapan persepsi indrawi. Proses akal sehat -dalam bentuk berpikir- memang tetap digunakan, akan tetapi hanya untuk memilih, menentukan, dan memikirkan, bukan sebagai alat untuk menangkap segala realitas. Berbeda dengan para ilmuwan Barat, jika dicermati lebih jauh, ilmuwan Muslim mengakui bahwa keabsahan sains tidak hanya berdasarkan metode observasi, tetapi juga berdasarkan metode yang bersifat rasional sekaligus intuitif. Dengan kata lain, sains tidak hanya mengakui persepsi indrawi dalam proses pengetahuan, tetapi juga mengakui proses akal sehat dan persepsi hati nurani. Inilah yang telah membawa banyak perubahan dan penemuan di berbagai bidang ilmu pengetahuan pada awal perkembangan Islam. Sedangkan dikotomi ilmu dan agama atau pemisahan agama dari pengetahuan umum membuat Islam gagal bersinar sampai saat ini.

Kata Kunci: *Sains, Integrasi, Interkoneksi, Agama, Barat.*

Introduction

A number of thinkers and scholars of education, especially in the West, show anxiety and disillusionment to the modern education system in the world and its results, as seen in a number of articles and scientific meetings held in several places. One of them is Huston Smith (1992), an expert on the study of religions in the United States, whose opinions quoted above. Let's examine at a glance what has been stated by him as follows:

"I said that our loss of the Transcendent World has resulted from a mistake, and the mistake is this: We assume that the modern world has discovered something that throws the transcendent world into question, but this is not the case. It is not that we have discovered something. Rather, we have unwittingly allowed ourselves to be drawn into an enveloping epistemology that cannot handle transcendence."¹

Smith's statement above can be considered as a warning signal to the people who live in the modern world today, including those who are involved in education in general. He may feel sorry to see that Harvard University which was once a "Protestant school" or Georgetown University which formerly was a "Catholic school" but later turned out to be a modern university that most their residents have felt no need to deal with God as they are very hectic

¹See Huston Smith, *Essays in World Religion*, (Cambridge: Harvard University Press, 1992)

with all aspects of political science, management, engineering, communications, law and so forth which are forced to be liberated from all values.²

Huston Smith, as can be read above, expressed his regret and feeling that something is missing in today modern people's knowledge. He felt that scholars do not deem it necessary to be a correlation between the modern view and their inventions to the Supreme Creator. Instead of finding something, he says, but we lose something, because we have let ourselves caught up accidentally in the epistemology that does not give space to the Supreme Creator and the recognition of a life beyond this world life. Knowledge affairs are something, and God affairs are something else. "Do not ever mention any verses of the "Book" containing revelations when you discuss science".

That is why Robert Kiely (1988) further wrote in a journal of religion and education as follow:

"The whole idea of religion suffered in our institutions of higher learning. One impression that is commonly given to American undergraduates when they first arrive on a university campus is that truly educated and smart people cannot continue to be believers. Yet I think dismissals of religion within some branches of the academy are similarly ill-informed and arrogant. They are based not on analysis and patient reflection but on ignorance and prejudice."³

Classification of Knowledge⁴

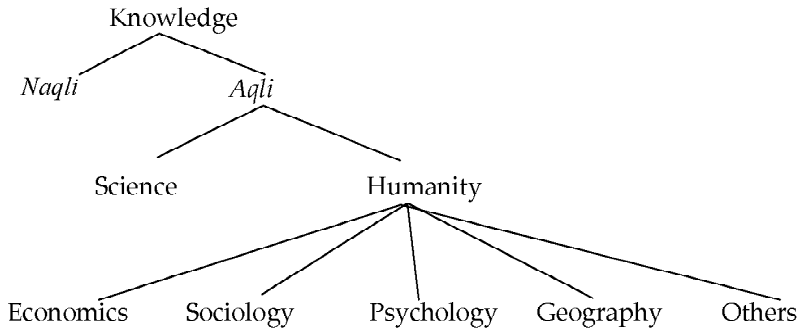
The First World Conference of Islamic Education in Makkah in 1977 classified knowledge into the *naqli* knowledge (revelation) and the *'aqli* knowledge (obtained by mind, sense or thinking). Then, the *aqli* knowledge classified again into natural-science and social sciences and humanities.⁵

²The development of science in the West seems irreconcilable with the doctrine of the church as Islamic scholars conciliated science taken from the Greeks to the al-Qur'an. As a result, science developed in the West or in Europe is a secular one like science and knowledge in Greece at the very beginning.

³Robert Kiely, "Religion in (and out of) the University Curriculum" in *Daedalus, Journal of the American Academy of Arts and Sciences, Religion and Education*, Spring, 1988.

⁴Worldwide Sciences classification initiated by the West is divided into three categories: 1. Natural Sciences, 2. Social Sciences, and 3. Humanities.

⁵For more complete report on this conference, see Hamid H. Bilgrami and S. Ashraf Ali (Eds.), *The Concept of Islamic University*, Trans. Machnun Hussein with the title *Konsept Universitas Islam*, (London: Tiara Discourse, 1989).



So, if we want to implement Islamic values in humanities, then we mean that economics, sociology, anthropology, psychology, geography, management, commerce, communications, and others. In addition, we must realize that science is growing every day. For example, in humanities, there are some theoretical, such as economics, psychology, sociology, and so on, and some are practical such as management, commerce, education, counselling, and others.

Next, we need to put the definition of knowledge widely accepted by educational experts, it is said that “science is a concept and hypothetical construct and realized as a result of the observation and experimentation process, which in turn leads to more observations and experiments”.

If we accept this definition, then we will come to the conclusion that science contains two main elements, namely the content of science and processes that led to the finding of facts and concepts to form the content of science, and then help prepare and organize the facts and concepts on the interconnected level which further encouraged to gain more new knowledge. In order for a person to have right and qualified skills, he/she must meet two basic requirements: 1) know and understand what is required by the job (cognitive area) and 2) desire to do the job well and qualified.

The second fundamental requirement is consistent with the meaning of a prophetic tradition (*hadith*) of the Prophet PBUH which means, “God loves a person who when he/she is doing something and doing it well and qualified”.⁶ When traced, human

⁶See Hasan Langgulung, “Islamisasi Pendidikan dari perspektif Metodologi”. Paper presented at the International Seminar *Islamization of Knowledge: Meeting the Challenge*, Department of Education, International Islamic University, Malaysia, 14-16 July 1998.

is more powerful than the angels “in the context of a caliph on the earth.” What is human superiority? “Ability in developing Science and creativity”. As it is described in the Qur’an, 2:31: “*wa ‘allama Ādam al-asmā’ kullahā*” (And He taught Adam the names of all things).

Once again, here we are different from the concept of the West. The Qur’an explains that the acquisition of knowledge could be by an “attempt” or without an “attempt”; it is “given” and the knowledge is granted by Allah SWT based on his grace. We could attempt to learn but there is another way to obtain knowledge. Imam al-Gazali provides an example that knowledge is like water poured into a container, and the container of human is his/her heart or “inner capacity”, his “soul and spirit”, his “*Rūḥ*”. Another illustration states, “if the container is like a pond, then how to fill it with water. The first way is by channelling water from outside into the pool, for example from a river, or by scooping water into the pond until it is full of water.

The second way is to make the container like a “well”. Instead of making the water come from the outside, one can try to dig a well, so that water spouts out from the bottom of the well. The water may be much clearer. Like the Zam-Zam water, it will spout relentlessly. Knowledge sought through human effort is like the water that comes from outside and flow into the pond. But if you want to get clearer water and may flow constantly, the heart should be like a well. The well must be dug up and the soil as well as the stones should be removed from it until its source could be found. Such was the metaphor expressed by the Sufism experts.⁷

Acquisition Instruments of Knowledge

Modern worldview will not be enough and considered insufficient just like adopting textual knowledge per se. Modern worldview is not the only universal perspective in line with the view of human nature fundamentally. Scientific issues presented above lead us to the fundamental question in epistemology, including “How or by using what could someone identify and know

⁷ M. Quraish Shihab often used this metaphor to describe how the knowledge is acquired according to Sufi’s perspective. See and Listen to Shihab’s general lecture at al-**Markaz al-Islamy Makassar on HR and See his book** *Membumikan al-Qur’an*, (Bandung: Mizan, 1993) and *Secercah Cahaya Ilahi*, (Bandung: Mizan, 2000).

an object or anything that could be understood as being included in the scope of science?"⁸

Muslim scientists agree that humans have three kinds of instruments to capture the whole reality. The three instruments are the five senses, reason, intellectual, and intuition (which includes the revelation and inspiration), while the West scientists in principle only recognize a single instrument, namely the five senses. By recognizing the senses alone, Western scientists are only developing a research method, the observation method, or sensory experiments.⁹ This observation method is further developed to a very sophisticated method, but it still empty into the absorption of sense-perception. Sense process -in the form of reasoning- is used, but only to choose, to decide and to reason, not as another instrument in capturing realities.

Contrary to Western scientists, Muslim scientists recognize that the legitimacy of science is not based only on the observation method, but also rational and intuitive methods. In other words, the science does not only recognize the sensory perception in the process of knowledge, but also the sense and perception of heart. For example, the observation and experimentation method applied by Abu al-Hasan bin Haytsam (965/1039), a mathematician and optics in his research on the theory of vision. In the introduction of his famous book *al-Manāẓir (The Optics)*, which assessed by S.H. Nasr as the best medieval works on this field, he did not only criticize scientific theories of his predecessors which were controversial, but also conducted experiments that he created on his own to support his scientific theory or to find solutions for some complex problems arose in the field of optics.¹⁰

As mentioned above, in addition to the five senses, Muslim scholars also recognize mind as the instrument to know the truth

⁸ Epistemology is one of the important areas of philosophy. It deals with the nature, source and limits of knowledge. One of the central questions in epistemology is: what should be added to the true beliefs so they can become knowledge. See Peter D. Kellin, "Epistemology", *Routledge Encyclopedia of Philosophy*, CD-ROM Version 1.0. (London: Routledge, 1998).

⁹ Ziauddin Sardar, *Exploration of Islamic Science How We Know: 'Ilm and the Revival of Knowledge*, (London: Grey Seal Book, 1991).

¹⁰ "Menjajaki Kemungkinan Islamisasi Ilmu Pengetahuan", *Republika*, (July 19, 1997), and Seyyed Hossein Nasr, *Science and Civilization in Islam*, (Cambridge: Harvard University Press, 1968), 31-32.

called rational or discursive method (*baḥts*). As the senses could capture objects, the mind, according to their views, could also capture the spiritual objects (*ma'qūlāt*) or metaphysical in syllogistic and to draw conclusion about the unknown things and the known things. This is the way the human mind, through reflection and study of the universe, could know God and other supernatural things, such as knowing angels and spiritual substances.

In addition to the sensory and rational methods, Muslim scholars of the golden age of Islam also recognize other methods to capture spiritual and metaphysical objects, that is intuitive or experiential methods (*dzawq*) as developed by the Sufis (Muslim mystics) and illuminated philosopher (*isyraqiyyūn*). Although both methods could also capture the spiritual objects, but reason and intuition have fundamental methodological differences on grasping the objects. It is because when the sense caught the objects inferentially, the intuition captures the spiritual objects directly; therefore, it could traverse over wide gap between subject and object.¹¹ This process called by psychologist as “*virtual borderless capacity*”, means potential and unlimited storage of explored human “*inner capacity*”.

The Universality of Islam

Islam and its teachings are universal.¹² Therefore, its scientific paradigm is also universal as long as human resource requirements of people who taught it could be met and attempted. Establishment's intention of State Islamic Institute (IAIN) was to make IAIN a “*university*” rather than being merely an institute. However, because historical conditions and circumstances when the IAIN was first established, it only allowed itself to just become an institute, then the academic institutions form is received but still have an ideal to make it a greater institutional form.

¹¹ See more in Mulyadi, “Menjajaki Kemungkinan Islamisasi Ilmu Pengetahuan”, *Republika* (July 19, 1997). See also his other article, “Membangun Kerangka Ilmu: Perspektif Filosofis”, in Komaruddin Hidayat and Hendro Prasetyo, (Eds.), *Problem dan Prospek IAIN: Antholog Pendidikan Islam*, (Jakarta: Ditbinperta Islam, 2000), pp. 245-71.

¹² See Abdallah H. al-Kathany, *The Universality of Islam*, (Beirut: Dar-al Moayyad, 1995) and HAR. Gibb in *Mohammadanism*, (New York City: Halt Riney Publishing Company, 1955), which also states “*It is a complete civilization*”.

In terms of broad message contexts, the Qur'an and hadith contain instructions which cover all aspects of life. And the division of the Islamic sciences taught at IAIN such as *Uṣūl al-Dīn* (Theology), *Fiqh* (Islamic Law), *Tafsīr* (the Qur'an Exegesis), *Ḥadīth* (Prophetic Tradition), *Tarbiyah* (Education), *Akhlāq* (Morals), *Tārīkh* (History), and so on, do not adequately describe or capture the universality messages of Islam. However, its institutional form (moreover State Islamic High Institution/STAIN) does not allow it to expand the scope of its scientific fields that most those institutions conduct. In other words, there are still a lot of areas of knowledge that have not been discussed in a "container" called the "Institute". In fact, viewed from the basis of academic competence, there are a number of lecturers of IAIN (and perhaps STAIN) who have interests and academic background in some fields such as politics, law, linguistics, science, management, sociology, psychology, etc. Some of these areas by the fact were explored further by the lecturers of IAIN themselves both in educational institutions outside the IAIN in Indonesia or even abroad.¹³

By coincidence, there is a tendency that the government institutions and private sectors might not understand the reality of the IAIN internal development. One of its effects is that they ignore the fact that although in many cases, IAIN alumni are often capable to present themselves more proficient in areas outside their fields of study at IAIN, they are still hindered to take part in secular professional institutions in accordance with their secondary or additional competence. This is mainly due to the "stereotype" image and narrow public perception towards IAIN as a mere institution that creates religion experts only.

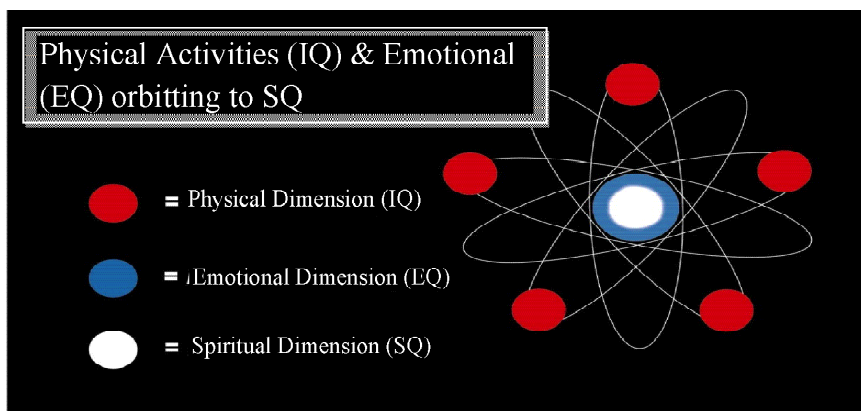
Now the fact says that there is no life untouched by technology, including at IAIN or STAIN. This is what we need to develop soon so that our understandings of the world and the realities are not incomplete.

¹³ For example, the writer himself is a lecturer of Arabic (further in "management" at IAIN). He went to S2 programs at five universities in the United States with 4.00 GPA in the field of Communication and Anthropology, Linguistics, and English Language Teaching. He then continued his management training at the University of Kentucky (in 1989), at the School of Management, Boston University in Boston (in 1992-1993), and at the Management Institute, McGill University, Montreal, Canada (in 1996).

Tree: Symbol of Integration and Interconnectivity

Based on the previous explanations, it is important to create a tree picture formula¹⁴ describing integration, interconnectivity of metaphorical roots, grain, fruit, and twigs, and transcendental goals of knowledge which are more universal which could be formed in a “container or forum” called the “university” as we shall see later. The tree picture depicts something life and creates comfortable and cool scene. Since it is a tree, then it will continually grow and develop into a conical tree. Finally, the tree will be shadier and shadier. This tree will bear a fruit and its fruit will bear a name of a knowledge which will surely bear fruit again and so on. This illustration is often revealed by Prof. Imam Suprayogo, rector of UIN Malang. Parts of the tree are integrated and interconnected. The picture of the tree’s cells (other picture) describes the synthetic interconnectivity aspects, while another image shaped like “a pine tree” describes the end of the transcendental communication through the apostolate of Muhammad to the substance of God.

Metaphorically, “the pine tree” will be illustrated after presenting an overview of Physical & Emotional orbiting the spiritual Quotient (SQ) of the reality as proposed by Ary Ginanjaras shown below:



¹⁴ A credit should be rendered to Prof. Dr. Imam Suprayogo who gave initial inspiration to the author about the image of the tree knowledge despite a slight different explanation on the roots and the trunks of the trees.

Meaning of "The Tree"

Although there are minor differences on reasoning the tree of UIN Alauddin and UIN Malang initiated by Prof. Dr. Imam Suprayogo, in a curriculum perspective, the building of integrative knowledge- religious and general knowledge-that UIN Alauddin has, is parallel to UIN Malang in using the metaphor of a tree that grows lush, dense, and rapidly.

According to Imam Suprayogo, each part of the tree, even the ground where the tree is growing could be used to describe the whole kind of knowledge that must be reviewed by someone in order to be acknowledged as he or she has completed the study program. As a tree which grows above the ground, its roots stuck strongly into the ground. The strong roots will make the tree's trunk stands upright and sturdily. It also fosters healthy and fresh branches, twigs, leaves, and fruits. The sections were used as tools to explain the position of each type of field of study or courses that must be taken by someone in order to be acknowledged as having completed the entire study program.

The tree that grows sturdily is used to describe an academic building. A series of knowledge to be studied depict in the tree form. A tree of any size must be grown on fertile soil. If the academic building or knowledge is portrayed metaphorically as a tree, then it needs maintenance and continuous enrichment. Trees may not grow except on a fertile land. Therefore, fertile soil (The intention is good and "mukhlas" and the inner capacity is completely sharp) condition has to be met when the tree is expected to grow sturdily and rapidly. Therefore, both - the soil and the tree - are equally important. In this view, knowledge is not explored and developed without a purpose. Knowledge is sought and developed to deliver welfare to humankind without race, ethnicity, religion, and nationality discrimination.

Islamic education is in need of cultural forces, continued Mr. Imam. It is because according to the Islamic view, knowledge should be practiced. Knowledge will be useless if it does not create charity. Therefore, educational institutions - no exception to higher educational institutions - must be equipped with adequate facilities therefore they can grow and develop love to their knowledge fields through habituation or providing a model. Modes, knowledge and composition of the educational institution that are developed and

able to foster appreciation and sense of the knowledge referred to its cultural dimension. Concretely, what has been developed ideally during my term of rectorship at the Islamic State University of Alauddin Makassar, the university should not only equip with a mosque but also dormitories where the noble character building or *akhlāq karīmah* is fostered. The existence of these facilities is essential to familiarize students with spiritual values and morals in order to develop “*character building performance view*”. That is what I have in mind when I was initially appointed as the last rector of IAIN Alauddinin 2002nd and the first president of the UIN Alauddin in 2006.¹⁵

It is impossible to learn Islam only from reading books in the library and from conducting research in the laboratory. The activities above should be enhanced with real activities either in the mosque or in the nuance of boarding school dormitory or Islamic atmosphere. The importance of this habituation can be seen through a comparison between the undormitorized Islamic higher-education institution alumni and that of the Islamic boarding school. In many cases, the boarding schools alumni tend to be more mature to play their roles in social, communal, and religious life, than that of the undormitorized Islamic higher education institutions. That is because education in boarding schools also develop positive culture through habituation. While at the higher Islamic institutions, student merely pursued studies through attending lectures and analysed activities which areno more than just filling the left hemisphere. The refraction of religious activities will create the appreciation of religious values or strengthen the spiritual maturity or social maturity directly, which is usually inserted in the right hemisphere. Islamic education that adopts balance and comprehensive thoughts has to be conducted comprehensively as well, which is by developing the right and left hemisphere simultaneously.

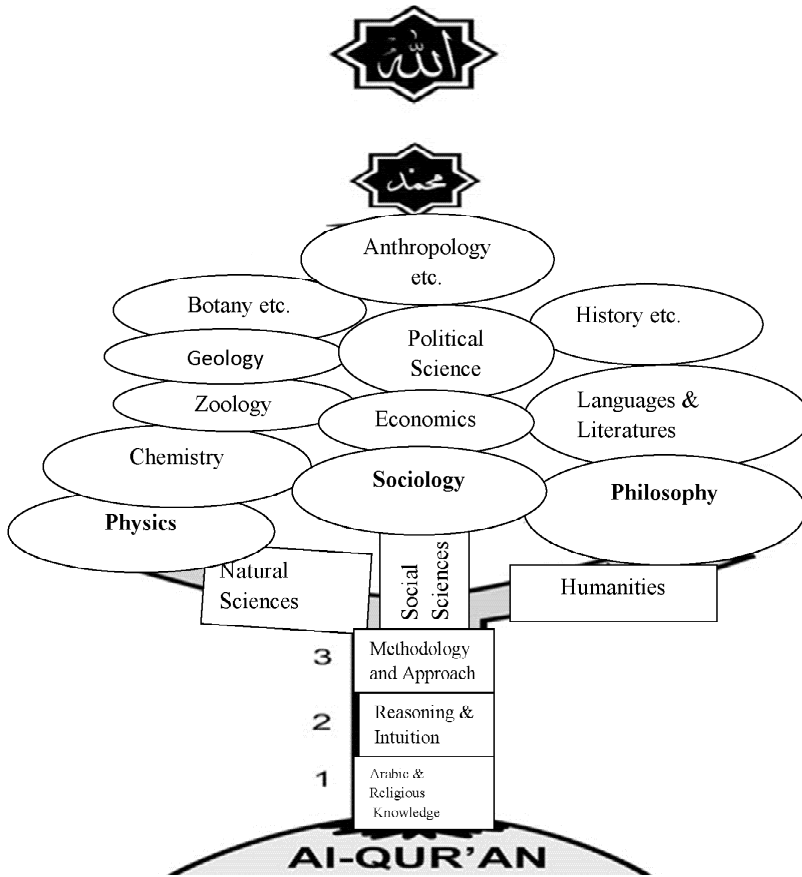
¹⁵ Since dormitory (*Ma'had*) had not been existed until 2010, the improvement still needs to be done, a program of the Enlightenment Faith and Life Skills (PIKHI) was then created as a first step agenda. After the appointment of the new Minister of Religious Affairs, MaftuhBasuni, since promised to build dormitories in some IAINs and UINs. Later in 2010, at the end of my tenure as Rector the first dormitory began to be built buKemenag at the UIN Alauddin, two new dormitories also launched. One dormitory is supported by KEMENPERA and the other from the IDB. It is continually planned that more dormitories are to be built.

The tree as a metaphor describing the building of knowledge. The roots describe someone's knowledge source of inspiration which must be mastered by every student are the knowledge source studies from the Qur'an, the Prophetic tradition (Hadith) and Islamic thoughts. The trunk illustrates languages such as Indonesian, Arabic, and English, logical reasoning, gaining intuition and developing inner capacity of students and their communication skills as well as learning methodologies and approaches. All students of any major, without any exception should study them. Adhering to the concept above, studying them is considered as individual duty (*farḍu 'ain*). While the branches, twigs, and leaves of a tree describe faculties chosen by students. If learning 'the trunk' is mandatory, then the branches, twigs, and leaves are sufficiently duty (*farḍu kifāyah*). It means that every student might take different majors. If the student is enrolling in one type of faculty, he or she is not obligated to take the other faculties. Types of knowledge described as branches, for example are psychology, economics, law, engineering, mathematics, and so on. As a thriving tree that will bear fruits, in this case, fruits describe the integrative product of knowledge between revelation and science, i.e. faith, charity, and gracious manners.

As a tree, each part of the tree has different role. However, they are a unit and cannot be separated to produce fruit that will be utilized for human life generally. The tree's trunk looks for food from soil through its roots as well as acting as a main support to make the tree upright. If the tree's trunk and roots are strong and steady, the tree will stay standing even when buffeted by a strong wind. Likewise, students who have good language skills - Indonesian, Arabic, and English- their inner capacity will also well develop. All their abilities are tools to explore the sources of knowledge, either in the form of written verses (*āyat qawliyyah*) and universe verses (*āyat kawniyyah*). The trunk, in this description, has the function to support shade branches in this case "approach" methodology, intuition, Arabic and other knowledge tools.

For detail descriptions, the metaphoric tree of integrative knowledges described as follows:





Note:

1. Knowledge tools to understand the Qur'an (mainly Arabic) and inner capacity sharpening and development
2. Tools to get the knowledge are five senses, reasoning, and intuition (inspiration and revelation)
3. Methodology and Approach

The Integrity Scientists

Synthesis, integrity, and knowledge interconnectivity manifested on individual famous Muslim scientists. Their works are acknowledged globally, for example Jabir bin Hayyan. The Europeans called him Gebert, who lived between the years 721-815. He was the first prominent Muslim studied and

developed Alchemy in the Islamic world. This science is now growing and now known as “chemistry”. Another field of his expertise is the field of logic, philosophy, medicine, physics, mechanics, and so forth. It is obvious that Jabir had broad knowledge. He was a sincere and devout Muslim in addition to his efforts on studying and developing of astronomy, chemistry, mechanics, physics, medicine, and so forth.

Another scientist is Abu Yusuf Ya’qub bin Ishaq al-Kindi (801/873). In the West he is known as al-Kindus; it has become a habit for the former Westerners to Latinize the names of prominent people, so sometimes people do not know whether he is Muslim or not. Al-Kindi was a Muslim scientist and philosopher in the field of philosophy, mathematics, logic, music, and medicine.

Other figures that we can point out, one of them is Muhammad bin Musa al-Khwarizmi (d. 863). The Europeans called him Algorism. His name was later used by Western people as the arithmetical (algorithm). Why? It is because His popular book *al-Jābir wa al-Muqābalah* copied by the Western people and until now the knowledge is known as *algebra* which is then now known as “Mathematics”. Also, Muhammad bin Zakariya al-Razi (865-965). His Latin name is Razès. He was the greatest clinical physician in his era. His areas of expertise are medicine and alchemy (*al-Kimiyā’*). The alchemy is what we know now as chemistry.

If Jabir, who was mentioned firstly above, in the developing of chemistry, he set up a workshop with a furnace to process and extract minerals into chemical substances, then classified them. Then, Muhammad bin Zakariya al-Razi already used special tools and conduct research that systematically recorded, so even now people could read the report of Razès in his book and they will not face difficulties to understand his report although it was written in terms of *al-kimi*. He was working on the chemical processes such as distillation, crystallization, calcinations, and so forth, and his book is the first handbook of chemical laboratory in the world.

Further, we cannot neglect Abu Nasr al-Farabi. Westerners call him al-Farabius. He lived from 870-900. He was the first Muslim expert in the field of logic. Al-Farabi developed and studied physics, mathematics, ethics, philosophy, politics, and so forth.

The most famous among them was Abu Ali al-Husayn bin Sina, whose Latin name is Avicenna. He lived between the years

980-1037. He was a great scientist and philosophers at the time, until he was given a name Shaykh al-Rais. Ibn Sina was a special person. At the age of ten, he had memorized the Qur'an and at the age of eighteen, he mastered all knowledges. His areas of expertise are physics, geology, medicine, mineralogy, and so forth. Of course he also had mastered religious knowledge long before.

Another expert is called Abu Ali Hasan bin al-Haitham. His Latin name is al-Hazen. He lived between the years 965-1039. He is a famous physicist and the first Muslim physicist. Other than physics, he also developed other sciences such as mathematics, astronomy, and medicine. His major work is in the field of optics. He studied colours, reflection issues, optical illusions and experiments on determining relationships between flat angle and reflection angle or the angle of light reflection on the flat or curve areas. Therefore, his work about lens is far ahead of the research results done in Western Europe.

Next is Abu al-Walid Muhammad bin Rushd who was famous in the West as Averroes. This prominent person was lived between 1126-1198. In the West, Ibn Rushd was recognized as a major figure in connection with the development of rationalism as well as astronomy and philosophy.

Furthermore, Nasir al-Din al-Tusi (1201-1274), was an active "religion's expert", astronomy, mathematics and philosophy interconnectedly. He is known as one level philosopher below the rank of Ibn Sina. Also, Kutb al-Din al-Shirazi (1236-1311), in the field of optics, geometry, and philosophy.¹⁶

Factually speaking, there are more Muslim scientists appear in the history of science widely known in the West according to the Western tongue. These figures' works helped the development of knowledge and science. They showed their creativities and productivities because they were inspired by the teachings of Islam about the strength, ability, and potential of human spirit in which they explore and sharpen them continuously. This process is also an evidence of one of their sharpened inner capacity pillars.

¹⁶ For a brief review but detail information on these figures, see Sayyed Hossein Nasr, *Science and Civilization...*, 23-41. The scientist of this integration results generally had studied al-Quran since childhood and many of them had memorized the Quran from early childhood. Then he studied Greek science and other general knowledge later when they were adult.

A Muslim leading scholar, who taught at the University of London at Imperial College in the 1970s, once said “that between 750 and 1200, knowledge, especially science belongs to the Muslim”. However, since 1200, science in the Muslim world has been abandoned.

Why was the ability of Muslims who master science for nearly five centuries decreased and eventually bleak and then seized or taken over by the West? Its history originally began in 1200-1300 when Western people went to study science from Muslims at Islamic universities in Cordova and Toledo, the Spain regions. Some of them are Chester, Sacrobosco, De Toledo, De Servilla, and De Cremona who copied and rewrote the scientific books of Moslems’ scientists, such as Jabir, al-Hasan, al-Battani, al-Razi, al-Farabi, al-Kindi, and so forth. They also copied books of Apollonius, Archimedes, Euclid, Hippocrates, and others, which had been translated previously into Arabic. Therefore, the Europeans did not know the books from their original languages directly, which was in Greek but from their Arabic translation.

Those who have inherited actual scientific methods pioneered and developed by the Moslem scientists are like Giordano Bruno, lived between 1547 and 1600s and Nikolai Kopernigk, a Pole whose Latin name is Nicolai Copernicus who lived between the years of 1473 and 1543. In the Western history, Copernicus was the first person who refused Ptolemaic system of the sun and planets orbiting the earth. He then proposed a theory, which is not the sun and the planets orbiting the earth like the opinion of Ptolemy, but the earth is rotating on its axis. When at the same time as the earth orbits the sun depicted, the planetary motion can be explained in a simple way. However, because at that time, such teaching was considered contrary to religion teaching (The church teaching), then Copernicus’ book was banned. His book could not be issued because it was contrary to Christianity. This was the story of the beginning of separation between “religious knowledge (Bible) but not al-Qur’an and what may be called in the modern world with “general sciences”.¹⁷

¹⁷ *Taqaddama al-Nās fī Aurubbā li annahum tarakū dīnahum wa takkhara al-Muslimūn li annahum tarakū dīnahum (al-Qur’ān wa al-Ḥadīth bi ma’nāhumā al-kāmil; al-āyāt al-kauniyyah wa al-āyāt al-dīniyyah)*

Also, Galileo Galilei, who lived in 1564 – 1642 studied carefully two papers of Copernicus and defend the truth of Copernicus' arguments. It made him directly in conflict with church authorities. It was because he was considered supporting the idea that is contrary to religious doctrine. He was arrested, imprisoned and threatened with punishment to deny his belief.

Isaac Newton, a well-known scientist, who lived between 1642 and 1727, developed further sciences that had been achieved by Galilei. After Newton's work was spread, then sciences such as chemistry, mathematics, physics, and technology developed and created new Western people inventions such as explosive munitions. In the seventeenth century, the Western people with their technological abilities could explore the entire world.

We mentioned above that Jabir was the first scientist who applied scientific methods of observation and experimentation in a form, which was further developed by al-Razi in the field of chemistry and by al-Hasan in the field of physics. Western scientists are now also recognizing the merits of Muslim scholars paving the way to the development of science on the right direction. Although before the Muslims there are Greece, Alexandria, and others who developed science, for example physics in Greece, Greece's progress in embracing a method was very speculative. It was because the method of the Greeks was contemplative rather than experimental. Meanwhile, Muslim scientists use tools to check, conduct experiments, and measure again, repeating, self assured, and so forth. In this way, Muslim scientists have actually sparked a scientific method for the first time, which is then further developed in a time of the next world civilization. Western scholars recognize it now as an important contribution of Muslim scientists in the field of knowledge. By inheriting the ways, scientist such as Galileo and his counterparts could develop science further after taking it over from Muslims.¹⁸

¹⁸ Achmad Baiquni, *Sumbangan Sarjana-Sarjana Islam*, (Jakarta: Youth Islamic Study Club (YISC), 1977). Also refer to W. Montgomery Watt, *The Influence of Islam on Medieval Europe*, (Edinburgh: Edinburgh University Press, 1972) and then translated into Arabic by Hussain Ahmad Amin title *Faḍl al-Islām 'alā al-Ḥaḍārat al-Gharbiyyah*, (Cairo: Maktabah Madbūli, 1983). Other books can be compared with this book is the work of Izzuddin Farraj, *Faḍl 'Ulamā' al-Muslim 'alā al-Ḥaḍārat al-Urubbiyyah*, (Cairo: Dār al-Fikr al-'Arabiyy, 2002); Bernard Lewis, *The Muslim Discovery of Europe*, (London: Phoenix Orion Books Ltd., 1994); Abdurahman Badawiy, *Dauru al-'Arab fī Takwīn al-Fikr al-'Arabiyy*,

What caused the sinking of science and the emergence of the dark ages? History records that at that time Muslims concerned themselves with religious disputes, power struggles and unexplored inner capacity which is actually “*Rūḥ*” itself. As a result, they did not have time to think, let alone to develop sciences. Muslim scholars examine the nature and develop sciences according to the commands of God. They will arrive at the truth because between the verses of God in the universe and in the Qur’an do not contradict each other.

If religion is interpreted, then it is not free from personal’s interpretation who will then become a followed leader. As an illustration, there is a verse in the Qur’an which says that human created from clay. If the interpreter is an expert of religion but do not know sciences then he/she would probably say that the God created human from clay, which is formed like a human. Then, the God said to the form: Live! Then it lives then becomes a human. This simple interpretation possibly arises from an expert of religion who does not understand stages and development of human creation.

Conversely, for a Muslim chemist, the interpretation for the same verse would be completely different. The scholar would see that God created human from chemical elements exist in the soil. The elements chained in a very complex molecular structure, interacting with surround perfectly in accordance with the natural law outlined by the God. Not a single process occurred could go wrong from these laws. From a simple form, it is evolved by the supreme God to be a creature known as human being, *fī aḥsan al-taqwīm* (QS. al-Tin [95]:4).

In the Quran itself, unlike other holy Books, there are a number of suggestions to people about the importance of conducting observations and researches to acquire knowledge about natural behaviour. It means that humans are able to master the natural knowledge or sciences, so that humans could get benefits from the nature as good as possible. For this reason, since the time

(Cairo: Dār al-Ādāb, 1978); Abdullah Nashih ‘Ulwan, *Ma’ā lim al-Ḥaḍārah fī al-Islām wa Atsaruhā fī al-Nahḍah al-Urubbiyah*, (Cairo: Dār al-Salām, 1984); SI Poeradisastra, *Sumbangan Islam kepada Ilmu dan Kebudayaan Modern*, (Jakarta: Gimukti Pusaka, 1981); and Seyyed Hossein Nasr, *Science and Civilization in Islam*, (Cambridge: Harvard Univ. Press, 1968) cited above.

of Caliph Harun al-Rashid and al-Ma'mun, Muslims have been persistent developing sciences in addition to developing their "religious knowledge". Islamic scientists will look at the verses of God in the universe, which give confidence that strengthen their faith. Therefore, it is not surprising that among the scientists, there are experts who once practiced Sufi mysticism. It is because by mastering science, these people know the Lord of all creation and His laws in the universe.

On the other hand, at the moment there are things that could not be reached by science, because they are not or could not be observed and studied, for example the holy spirit (*Ruḥ*). In circumstances where scientific observations and experiments are not or could not be conducted, sense or reason could not provide meaningful assistance. In the Qur'an, it is stated that the spirit issue is the God's own affairs and human have only little knowledge about it. Thus, in dealing with other similar issues, where we could not undertake research by conducting scientific observations and experiments, we must recognize that such problems were beyond the reach of human mind and according to the nature of Muslims, a Muslim should believe it. Only symptoms and phenomena detections will strengthen their faith. This is the importance of power and capacity of mind and thought. Because of the research about the nature, it obtained a conviction about the truth of the Qur'an verses. Therefore, someone should not only believe but also convince of the truth of the Qur'an. It is emphasized here that when Muslims studying science, there must be a balance between the use of reason and faith, otherwise they will deviate from their religion.

In fact, knowledge could help strengthen the faith or belief. On the contrary, religion provides guidance when humans' reason cannot reach the conclusion about the science. Heart's or ruh potential and capacity that could make this happened. When the history of Muslim scientists during the golden age of Islam researched, it will be found that they really understand their religion. Even among them, there are figures in the field of Islamic law, but at the same time, they also developed mathematics, medicine, geography, astronomy, and others. Moreover, it is found in the literature that Jabir bin Hayyan is referred to as the first who developed and established area of Chemistry, as described above. He is also a Sufi practicing Islamic mysticism. In addition to Jabir,

Abu Nasr al-Farabi, and Qutb al-Din al-Shirazi are experts on Sufism, as well as scientist figures.

The Integrity Samples

Let's look at just an example of cell synthesis between science and religion in a simple way at intermediate and basic education, as follows: QS. al-Rum verse 22, which means: "And among His Signs is the creation of the heavens (Astronomy) and the earth (geodesy), and the variations in your languages (Linguistics) and your colours (Anthropology): verily in that are Signs for those who know."¹⁹

Furthermore, we see a presentation occurs in the classroom where the synthesis of science with religious knowledge described as follows:

"So far, you have learned a lot about living things and their variety of circumstances. Now you will learn other parts of God's creations. Because they are the God's creations, then they are also called the God's creatures. However, what you will learn now is not about living creatures."

Now, lend your mother's scissors. Then put a small nail on the table. Hold the scissors in hand and gently move the scissors' tip to the nail. Well, what happened? Apparently, when the tip of the scissors moves closer to the nail, it suddenly jumps up and sticks to the tip of the scissors. The nail still attaches. Why does the nail jump and stick on the end of the scissors? It is because the scissors' tip has a magnet. Magnets are able to attract iron and steel objects. This is what you will learn more in this lesson.

However, before you learn it further, firstly you need to know that indeed God has given certain characteristics to each of His creatures. Water is wet and fire is burning are examples of the God-given characteristics to His creatures. Similarly, the iron contains

¹⁹ The balance and the regular order of linguistics discovered by linguists such as Noam Chomsky of MIT and others. The invention of the regularity form of language will be reviewed when a scientific study Phonology is done. For example, in English, if there are three consonants, then the first consonant must be the "S" sound, the latter must be "P" if not "T". If it was not T, then the "K", and the third consonant is "R", "L" or "W" and so on. This is also similar to all local languages in Indonesia for example. The nature of these aspects are descriptive and not prescriptive. It is because these evidences only discovered by humans not invented. The regular order concept has been created into a chip by the God long time before.

magnets. In the QS. al-Hadid verse 25, God says: "And We (Allah) sent down Iron, in which is (material for) mighty war, as well as many benefits for mankind."

With the guidance of the above verse, now you will understand more that the characteristics of iron are gifts from the God that have been set. One of the interesting characteristics is the nature of the magnetic elements to the other iron. In addition, the verse expresses variety of benefits to humans. What are the benefits contained in the magnet? This is what you need to learn more through a lesson on magnets".²⁰

Conclusion

Islamic epistemology is different from western epistemology. Islam does not separate the religion from knowledge and science in general, but the Western did and still do it. Contrary to Western scientists, as can be seen further, Muslim scientists recognize that the legitimacy of science is not based only on the observation method, but also rational and intuitive methods. In other words, the science does not only recognize the sensory perception in the process of knowledge, but also the sense and perception of the voice of the heart. In the Quran and hadith, there are a number of suggestions to people about the importance of conducting observations and researches to acquire knowledge about natural behaviour. It means that humans are able to master the natural knowledge or sciences, so that humans could get benefits from the nature as good as possible.

Thus, what has been mentioned above is just a bit overview about the integration and the interconnection of natural science (*ṭābi'iy*) or Social and Humanities and what was mentioned by many scholars as "*naqli*". The nature of Islamic teaching always describes a balance (*tawāzun*) among His creations' elements. Humans themselves consist of two main elements: spirit and body. There are many good expressions in the holy Quran and the prophetic tradition (the hadith) which explained the necessity of the balance, the integration, and the interconnection.[]

²⁰ Fuad Rumi, *Ilmu Pengetahuan Alam*, (Ujung Pandang: Yayasan Bina Kariman, 1991).

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