

MATHEMATICS IN THEOSOPHICAL PERSPECTIVE

M. Azram & Jamal I Daoud

Department of Science in Engineering, Faculty of Engineering,
International Islamic University Malaysia, 50728 Kuala Lumpur, Malaysia
e-mail: azram50@hotmail.com

ABSTRACT— *The present doldrums position and state of decadence, internal differences, external aggression (geographical and ideological), lack of self-confidence and dependence, illiteracy, political instability, economic disaster, lack of knowledge and wisdom, back benchers in science and technology, education, medicine, trade and business, banking system and defensive incapability of Muslim World prompted me to look at our principal sources of inspiration, which are, the Qur'an, Sunnah of the Prophet (SAW), and examples of the "enlightened Caliphs" and see what is Islam's view about seeking knowledge, technology and inventions in general and mathematics' education in particular. We will discuss the nature of mathematics and its scientific status. We will highlight the position of mathematics in Islamic classification of knowledge. We will also discuss the current state of mathematics and future suggestions. We have gathered together some of these impressions; these are all tentative, nothing final about them, but these are here nonetheless.*

Keywords- Islamic Mathematics, Nature of Mathematics, LOGS, Status of Mathematics, Position of Mathematics

ISLAM, KNOWLEDGE AND MATHEMATICS

Islam provides a complete way of life. It is obligatory for all Muslim, men and women to seek knowledge beneficiary for humankind. Islam has emphasized about seeking knowledge at a time when others were in ignorance. Consequently, Muslims intellect received the awakening call and soon they not only became an enlightened people but also they with the blessing of Allah (swt) surpassed other nations in all aspect of life and were known as most civilized people for many centuries. Muslims were blessed with wisdom and also they inherited the knowledge of the other civilizations and islamised it in moral framework. While Europe was in the dark ages, Muslims were aggressively advancing in the fields of medicine, mathematics, Education, physics, astronomy, geography, architecture, literature, science and technology, trade and business, banking system and defensive incapability etc. Many important discoveries were passing on to medieval European from Muslim intellect. The Arabic number system with the inclusion of zero which played a vital role in advancement of mathematics and the use of algebra, sophisticated instruments and good navigational maps etc. were also transferred from Muslim intellect. When Muslim became ignorant to their religious beliefs and obligations, they are in present doldrums position and a state of decadence. They are back benchers in science and technology, education, medicine, trade and business, banking system and defensive incapability. They failed to establish a just socio-moral and economic-political order in this world. They even became dependent to defend their ideological as well as geographical boundaries. Islam is in favour of all advance knowledge, technology and inventions provided it is not harmful to mankind otherwise It will be against the teaching of Islam. It is responsibility of an Islamic State to provide education and health facilities to all its citizens. Acquiring knowledge is a basic right for all citizens and it is an obligation for all Muslim. Upon acquiring the basic knowledge, it becomes obligatory upon qualified people to study every beneficial field of knowledge and transfer it to other fellows. Advances in science and technology are an important ingredient for future development of the Muslim Ummah. The pursuit of

knowledge and the use of reason, based on sense and observation is made obligatory on all believers.

Qur'an emphasis at many places about seeking knowledge and its importance, such as:

- إِنَّ فِي خَلْقِ السَّمَاوَاتِ وَالْأَرْضِ وَاخْتِلَافِ اللَّيْلِ وَالنَّهَارِ لَآيَاتٍ لِّأُولِي الْأَلْبَابِ
- "Indeed, in the creation of the heavens and the earth and the alternation of night and day are signs for those of understanding." [Qur'an 3:190]
 - "هل يَسْتَوِي الَّذِينَ يَعْلَمُونَ وَالَّذِينَ لَا يَعْلَمُونَ إِنَّمَا يَتَذَكَّرُ أُولُو الْأَلْبَابِ فَلَنْ نَعْلَمَونَ حَبِيرٌ"
 - "Say, 'Are those who know equal to those who do not know?'" [Qua'an 39:9]

يَا أَيُّهَا الَّذِينَ آمَنُوا إِذَا قِيلَ لَكُمْ تَسَخَّرُوا فِي الْمَجَالِسِ فَأَفْسَحُوا يَفْسَحِ اللَّهُ لَكُمْ وَإِذَا قِيلَ لَكُمْ تَعَلَّمُوا فَأَتَسَّرُوا لَكُمْ وَأَنْتُمْ أَعْلَمُونَ فَانصُرُوا يَنْصُرْ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ ۗ وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ

- O' you who have believed, when you are told, "Space yourselves" in assemblies, then make space; Allah will make space for you. And when you are told, "Arise," then arise; Allah will raise those who have believed among you and those who were given knowledge, by degrees. And Allah is acquainted with what you do. "[Qur'an 58:11]

سَنُرِيهِمْ آيَاتِنَا فِي الْأَفَاقِ وَفِي أَنْفُسِهِمْ حَتَّىٰ يَبَيِّنَ لَهُمُ أَنَّهُ الْحَقُّ ۗ أُولَٰئِكَ يَكْفُرُ بِرَبِّكَ أَنَّهُ عَلَىٰ كُلِّ شَيْءٍ شَهِيدٌ

- "We will show them Our signs in the horizons and within themselves until it becomes clear to them that it is the truth." [Qur'an 41:53]

اقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ
خَلَقَ الْإِنْسَانَ مِنْ عَلَقٍ
اقْرَأْ الَّذِي عَلَّمَ بِالْقَلَمِ وَرَبُّكَ الْأَكْرَمُ
عَلَّمَ الْإِنْسَانَ مَا لَمْ يَعْلَمْ

"Recite: In the name of thy Lord who created man from a clot. Recite: And thy Lord is the Most Generous Who taught by the pen, taught man that which he knew not." (Qur'an, 96:1-5)

وَقَالُوا لَوْ كُنَّا نَسْمَعُ أَوْ نَعْقِلُ مَا كُنَّا فِي أَصْحَابِ

"And they shall say had we but listened or used reason, we would not be among the inmates of the burning fire." (Qur'an, 67:10)

وَالَّذِي جَاءَ بِالصِّدْقِ وَصَدَّقَ بِهِ أُولَئِكَ هُمُ الْمُتَّقُونَ ﴿٣٣﴾

"And who so brings the truth and believes therein such are the dutiful." (Quran, 39:33)

وَقُلْ رَبِّ زِدْنِي عِلْمًا

And Say, "My Lord! Enrich me with knowledge.." (Qur'an, 20:114)

The following traditions of the Prophet supplement the foregoing teachings of the Qur'an in the following way:⁵

- Seek knowledge "even though it be in China."
- "The acquisition of knowledge is compulsory for every Muslim, whether male or female."
- "The ink of the scholar is more sacred than the blood of the martyr."
- "Seek knowledge from the cradle to the grave."
- "God has revealed to me, 'Whoever walks in the pursuit of knowledge I facilitate for him the way to heaven.'
- "The best form of worship is the pursuit of knowledge."
- "Scholars should endeavor to spread knowledge and provide education to people who have been deprived of it. For, where knowledge is hidden it disappears."
- "Contemplating deeply for one hour (with sincerity) is better than 70 years of (mechanical) worship."
- "To listen to the words of the learned and to instill unto others the lessons of science is better than religious exercises."
- "Acquire knowledge: it enables its possessor to distinguish right from the wrong, it lights the way to heaven; it is our friend in the desert, our society in solitude, our companion when friendless - it guides us to happiness; it sustains us in misery; it is an ornament among friends and an armor against enemies."

The following Hadith of Prophet (swt) also strengthens the above saying;

- Prophet Muhammad (swt) said, "Seeking knowledge is an obligation upon every Muslim." [Narrated by Ibn Majah]
- He also said, "For one who treads a path to knowledge, Allah (swt) will make easy the path to Paradise." [Narrated by Muslim]
- It was narrated that Anas bin Mâlik said: The Messenger of Allah said "Seeking knowledge is a duty upon every Muslim".
- It was narrated that Abu Hurairah said: "The Messenger of Allah said: "...Whoever follows a path in pursuit of knowledge, Allah will make easy for him a path to Paradise."
- It was narrated that Zirr bin Hubaish said: "I went to Safwân bin 'Assâl Al-Murâdi and he said: What brought you here?" I said: 'I am seeking knowledge.' He said: I heard the Messenger of Allah say: "There is no one who goes out of his house in order to seek knowledge, but the angels lower their wings in approval of his action." (Sunan Ibn e Majah, Book of Sunnah, Hadith no 226, Classified as Sahih By Allama Albani)

In Islam, there should not be a conflict or controversial issue between science and religion, simply because religion comes from Allah (swt) and so does His system of creation and development. The so called advance materialistic approach to science and technology provided the humankind a kind of worldly ease and pleasure but seriously failed to provide peace of mind. Objective of Islam is to establish a just socio-moral and economic-political order in this world.

Specific applications of mathematics for religious purposes were very much needed. Calculations were needed for religious observance such as determining the Qibla and the positions of the sun from pre-dawn to dusk to calculate the times for the Salah and calendrical work⁴. The well known philosopher Dr Seyyed Hossein Nasr, suggested in his essay "Principles of Islam", that the abstract nature of mathematics appealed to Muslims, who saw it as a bridge between multiplicity and unity. The subject of mathematics is so pivotal and important that scholars have to say "it is mother of all sciences". The Oxford English dictionary defines mathematics as "the abstract deductive science of number, quantity, arrangement and space". Which might itself appear to be a phrase of abstraction with too many variables? But mathematicians revel in testing those relative juxtapositions, praising aesthetic outcomes and the elegance of proof. The enhancement in mathematics as a contribution by Muslim mathematicians was extraordinary, bringing new concepts and theories which ultimately contributed to various disciplines of the science.

THE NATURE AND NEW DEFINITION OF MATHEMATICS

Muslim intellects have considered mathematics as a science that lies between metaphysical and physical sciences. Mathematics is considered as immaterial in itself but has very strong links with the physical world. Mathematics differs from physics because Physics is mostly related with material substance and movement. It also differs from metaphysics because metaphysics does not have any direct relation with physical entities. This situation raised the question "what is mathematics". Defining mathematics is simply like asking a blind person to describe the elephant. Obviously, the answer will be inconsistent, because he has never seen the real shape of an elephant. He will be just imagining, how elephant looks like. There are many definitions of mathematics in the literature on mathematics. According to the great Bertrand Russell "Mathematics may be defined as the subject in which we never know what we are talking about, nor whether what we are saying is true. Charles Steinmetz said "Mathematics is the most exact science, and its conclusions are capable of absolute proof, but this is so only because mathematics does not attempt to draw absolute conclusion. All mathematical truths are relative, conditional". Benjamin Pierce said, "Mathematics is the science, which draws necessary conclusions". According to Webster's International Encyclopedia { Micheal, D.H., 1991, The New Webster's International Encyclopedia, D.S.M.A.X., USA}, "Mathematics is a field of thoughts concerned with relationship involving concepts of quality, space and symbolism". In the next few lines we suggest a moderate answer to the same question, "what is mathematics"?

We consider mathematics as “LOGS”, virtually means knowledge³. Whereas “L” in LOGS stands for language that is mathematics is a language, which is indispensable for expressing scientific ideas. “O” stands for operation that is mathematics is a computational skill/tool to answer logical, quantitative questions. “G” stands for game that is mathematics is a game played within a domain with certain rules and regulations that is postulates/axioms determine the domain and related rules and regulations and provide foundations for further improvement. Lastly “S” stands for science that is mathematics is a science, which is in a creative process for precision, truth through logical reasoning.

SCIENTIFIC STATUS OF MATHEMATICS

The nature of mathematics as science or not is a controversial issue. According to scientific criteria for something to be science is that its nature must be empirical. Mathematics in itself is not empirical but rather immaterial. It will never meet the fundamental condition of modern scientific criteria; being empirical. Consequently, many scholars do not consider mathematics as science but they consider mathematics as instrument of science. Now, it is natural to raise this query that why a non-empirical knowledge cannot be considered as a science. The obvious answer by the scientist will be that a non-empirical object is not real. But on the other hand many scholars consider it as science and classify it as mathematical science. Some scholar argued as “science is reasoning; reasoning is mathematics; and, therefore, science is mathematics. These are people considering mathematics as “Mother of all Sciences”. Despite all, the scientific nature of mathematics is still a controversial issue.

However the Islamic scholars¹ as per their Islamic traditions consider mathematics as science, because Muslim scholars believe in the ontological reality of not only physical objects (al-mahsusat) but also non-physical objects (al-ma’qulat), such as mathematical objects. Therefore, Muslim scholars do not have reasons to deny the legitimate scientific status of the mathematics. Hence, mathematics is a science or not is a controversial issue and is still a problem within scientist community.

Now the problem is that if mathematics is not a science then what is its status in scientific world? One version of mathematics is that it is instrument for science, because we used it to understand and study physical entities. In astronomy, mathematics has been used by Muslim scientists as scientific method together with demonstrative methods¹. Mathematics was also very often applied to help scientific research in geology and geography etc. Mathematics was used by Muslim scientists as indispensable instrument for understanding physical matters¹, same is the case with modern physicists. Mathematics has also been considered as methodological instrument for understanding philosophy, without which philosophy, according to Abu Yusuf Yaqub Ibn Ishaq Al-Khindi (801–873 CE), will never be understood properly. Even he wrote a book entitled Philosophy cannot be understood without Mathematics to show us how important mathematics is for understanding philosophy. He also says that scientific method can be demonstrated clearly only in mathematics. So according to Muslim scholars,

mathematics is a legitimate theoretical science, with its clear theoretical status. Its instrumental role in philosophy can be understood by the fact that mathematics is situated between physics and metaphysics.

POSITION OF MATHEMATICS IN THE ISLAMIC CLASSIFICATION OF KNOWLEDGE

Muslim scientists considered mathematics as a rational science. Further they classified rational science as theoretical science and practical science. They placed mathematics theoretical science. Theoretical sciences, in turn, were sub-divided as: physics, mathematics and metaphysics, while practical sciences into ethics, economics and politics. Obviously mathematics has a middle position between physics and metaphysics. Although it is immaterial, but it still have very strong link to the physical world. Metaphysics on the other hand, has no direct relation to the physical world. There are four main branches of mathematics that is **quadrivium**; which consist of arithmetic, geometry, astronomy and music. Second one is **Arithmetic** which deals with numbers; **Geometry** with spatial dimension and geometric forms; **Astronomy** with the observation, measuring and mapping of the stars, planets and spheres, and **Music** with melody, tones, and harmony. **Algebra** is a sub-branch of arithmetic

MATHEMATICS IN CRISES

To me the following are the main reasons for crises in mathematics in general and in pure mathematics in particular;

- Marketability
- Insufficient funds for research and development.
- Lack of inspiration by problems of real world.
- Poor and weak teacher ignorant of importance and relevance of mathematics.
- Non-mathematics departments such as Engineering, Economics and Business, ICT etc. prefer that their own staff member should teach mathematics rather than asking the relevant mathematics department to delegate mathematicians to teach. There are always positive, negative arguments but consequently, many mathematics departments are in crises.
- Unfortunately mathematics is usually applied by engineers and/or industrial scientists, and not by mathematicians. In other words, mathematicians even applied mathematicians do not apply mathematics; the engineers or scientists do it. Their invented tools are utilized and enjoyed by others. In consequence, mathematicians are losing inspiration by problems of the real world, living in their own imaginary world.
- Mathematicians especially people in pure mathematics ignore the applied science, industries, financial world etc.. Consequently no research fund, no sponsored students for supervision, no consultancy from the real World and some time at a risk of losing job.
- This is a fact that mathematics describes only some aspects of the real world. With the advancement of technology, machines such as computers have become mathematical machines to compete with mathematicians in numerical and symbolic calculations. End result is obvious.

- Each mathematics department should establish a “mathematical clinic”, inviting people to come for mathematical solutions and this is how mathematics can be connected to external world.
- Most of mathematicians are spending their time trying to prove properties of objects that do not correspond to anything in the real world, while many phenomena of the real world remain unexplained, they are poorly modeled, or their features are not explored. Mathematician should link themselves with activities aimed toward our survival and wellbeing such as manufacture, agriculture, medicine etc.

REFERENCES

1. <http://i-epistemology.net/mulyadhi-kartanegara/608-mathematics-in-the-islamic-scientific-tradition.html>
2. Micheal, D.H., 1991, The New Webster’s International Encyclopedia, D.S.M.A.X., USA.
3. **M. Azram**, 2000. Metrazibility Via Separation Axioms, *J. Sc. & Tech.* (ISSN 0250-5339) Uni. Pesh, Vol.24 (1 & 2) pp:59-63
4. http://vision.ae/en/life/articles/pure_math algebra_and_islam
5. <http://www.islamicity.com/articles/articles.asp?ref=ic0601-2883>