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The Contribution Of Muslim Scholars Towards Science, Technology And Knowledge: A Historical Perspective

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Abstract

Gone are the days when multidisciplinary scholars explored a wide range of subjects. The Islamic golden age gave birth to many polymaths, where one scholar would have a depth of knowledge in theology, philosophy, medicine, astrophysics, mathematics, music, optics, astrology, Alchemy, and other disciplines simultaneously. In our contemporary world, the practice has been replaced with fragmentation of knowledge where one scholar specializes in a tiny aspect of a particular discipline. These very scholars are expected to address the challenges of the community, yet the same problems to be addressed are inter-related. For Muslim scholars to offer guidance or legal rulings, they must be well conversant with the emerging trends in society, culture, science, and technological advancement. In this day and age, finding such a scholar in the current Muslim society is quite challenging, implying that rigorous consultations must be made with other experts in other fields before issuing verdicts and guidance to the community. In this paper, analysis is made on the contributions of classical Muslim polymaths and how they successfully juggled a variety of disciplines and were able to guide society with their broad and deep knowledge banks. In addition, in this position paper, the argument is that for contemporary Muslim scholars to solve the challenges of the 21st century, a multidisciplinary approach towards knowledge and skills acquisition as well as application must be embraced. The researcher employed a qualitative literature review design; therefore, the study was purely qualitative and desk research. Numerous issues have been identified, for instance, a decline in Islamic intellectual thought and contribution to the fabric of knowledge in the contemporary world, promotion of *taqlid* (blind following) while overlooking the relevance of logic and reasoning (*tadabbur* and *tafakkur*), knowledge fragmentation, and over-emphasizing specialization. Several recommendations have been made such as the need for the revival of Muslim polymaths through rigorous training and restructuring the education system in the Muslim world, a multidisciplinary approach to teaching and learning as well as knowledge integration; re-thinking and revival of *ijitihad* and blending it with contemporary methods of knowledge creation with modern scientific techniques such as using demonstration, testing, observation and empirical protocols of science. Merging rational and speculative thinking techniques with the established Islamic principles would produce better Muslim scholars who are competent enough to tackle the emerging issues and challenges of the contemporary Islamic world.

Keywords: Polymaths, Multidisciplinary, knowledge Integration, Islamic golden age, Islamic thought, Islamic civilization

Introduction

The contribution of both classical and medieval Muslim scholars to the fabric of knowledge in various disciplines cannot be ignored. They contributed tremendously to astronomy, alchemy, physics, philosophy, medicine, mathematics, sociology, and many other sciences.

The innovations made by Muslim scholars can be traced back as far as the Abbasid caliphate, especially during the reign of the prominent caliphs such as Haruna Rashid, Al-Ma'amun and Al-Amin in the famous golden age of Islam. During this period, the famous research laboratory known as *baitul-hikma* was constructed. This attracted many famous Muslim polymaths who conducted research and came up with numerous brilliant ideas, many of which have had a great deal of impact on humanity until the present times.

Earlier, during the Umayyad regime, Muslim scholars were trapped in intellectual debates and talks in attempts to defend their political and theological positions. Early *Kalām* laid a very strong foundation for the scholars in the golden age of Islam such as al-Kindi to study, interpret, and integrate Greek philosophy with Islamic theology. Consequently, this intellectual liberty led to a diversified understanding of Islam in such a way that all knowledge was linked to Islamic teachings. Moreover, during the Abbasid golden period, research, innovation, and knowledge integration had the political blessing and support from the caliphal authority, explaining why intellectual freedom flourished. In the previous regimes before and after the golden age of Islam, scholars did not enjoy such freedom as many were jailed, persecuted, and in some cases executed for instance Ghaylan al-Dimashqi, who was killed on heretical grounds during the Umayyad era.[1]

From the classical time up to the decline of the Islamic caliphate and sultanate regimes, Muslims lost their innovative, creative, scientific, and technological advancement to be dominated and controlled by the Western world. The Muslim world remained as consumers of Western innovations, which weakened their intellectual and political might and the ability to solve their problems.

In such a technological world and with contemporary scientific advancements, it creates such a great risk for the growth and development of Muslim communities if the Muslim scholars of the modern generation remain overly dependent on only medieval and classical *fatawa*. Furthermore, over-reliance and application of medieval and classical solutions to solve contemporary challenges and problems does not necessarily mean that the dead medieval scholars are alive, it may rather imply that the contemporary scholars are either dead or they live in a wrong generation.

Nevertheless, every civilization has underpinning philosophies and a set of values, if the Western civilization dominates discoveries, research, inventions, and innovations in the contemporary world, it may have to produce scientific products and services that are engraved with Western ideologies and value systems such as utilitarianism and materialism. Besides the same philosophy

[1] Steven C. Judd. "Ghaylan al-Dimashqi: The Isolation of a Heretic in Islamic Historiography." International Journal of Middle East Studies, Vol. 31, No. 2 (May, 1999), pp. 161-184

determines the underpinning methodology for research, terminology, axioms, and procedures.[2] Besides, it may be difficult to divorce Western beliefs, philosophies, and values from the current trends in technology. Some of these philosophies, if left unchecked, may contradict and threaten the application of values of the Qur'an, the Sunnah of the noble prophet Muhammad ﷺ, established Islamic principles and ethics. This therefore implies that Muslims have a role and responsibility to reclaim their position in knowledge creation and dissemination such that even with the growth and development of technology and science, the Islamic values are either intertwined or redefined such that Muslims enjoy the advancements within the confines of Islamic guidance.

In addition, every generation ought to have a reformer (*mujaddid*) to renew the spiritual and intellectual component within the Ummah. This revival involves some re-awakening of the hope for improving the moral fiber through knowledge creation and dissemination. It is therefore imperative for this generation to revise the approach towards knowledge creation and dissemination by considering aspects such as epistemological integration.

Moreover, from the very inception of Islam, Allah has always invited Muslims to speculate about the nature, origin and operations of the universe,[3] to contemplate about the intricate design in the anatomy of the human body, to reflect about the food that man consumes,[4] the mysteries in human reproduction,[5] to ponder upon the idea that man is a vicegerent on earth hence he has to use his wisdom and intellect to explore the universe and use the malleable resources of the planet to solve problems.

Problem statement

The idea of specialization in the modern trends of knowledge-seeking and creation has suffocated the spirit of integration of disciplines. This isolates the fact that human challenges are in some ways interconnected. This implies that the problem solvers must be equipped with tools from various fields of knowledge. Whereas Muslim scholars in the contemporary world are expected to solve the challenges of their respective communities, the training given to them may merely enable them to respond to spiritual issues. This is so because the socioeconomic dynamics of the world evolve rapidly, yet many scholars may not be willing to be unplugged from the selected old classical approaches towards solving the evolving problems of the contemporary society. The Medieval and classical scholars possessed encyclopedic knowledge in almost all disciplines that existed in their times. It therefore becomes imperative for the stakeholders to revive the spirit of knowledge integration and encourage more polymaths to emerge in our modern society.

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[2] Abdelwahab, Elmessiri. "The Gate of Ijitihad: An introduction to the study of epistemological Bias." In Epistemological Bias In The Physical And Social Sciences, ed.Abdelwahab Elmessiri. (Herndon: IIIT, 2013).3-5

[3] Allah says, (إِنَّ فِي خَلْقِ ٱلسَّمَٰوَٰتِ وَٱلْأَرْضِ وَٱخْتِلَٰفِ ٱلَّيْلِ وَٱلنَّهَارِ لَءَايَٰتٍ لِّأُو۟لِى ٱلْأَلْبَٰبِ) Indeed, in the creation of the heavens and the earth and the alternation of the day and night there are signs for people of reason. Surat al-Imran 3:190

[4] Allah further says, (فَلْيَنظُرِ ٱلْإِنسَٰنُ إِلَىٰ طَعَامِهِۦٓ) Let people then consider their food. Surat Abasa 80: 24-(read up to verse 32)

[5] (ثُمَّ جَعَلْنَٰهُ نُطْفَةً ف قَرَارٍ مَّكِينٍ , ثُمَّ خَلَقْنَا ٱلنُّطْفَةَ عَلَقَةً فَخَلَقْنَا ٱلْعَلَقَةَ مُضْغَةً فَخَلَقْنَا ٱلْمُضْغَةَ عِظَٰمًا فَكَسَوْنَا ٱلْعِظَٰمَ لَحْمًا ثُمَّ أَنشَأْنَٰهُ خَلْقًا ءَاخَرَ ۚ فَتَبَارَكَ ٱللَّهُ أَحْسَنُ ٱلْخَٰلِقِينَ) then placed each ˹human˺ as a sperm-drop in a secure place. then We developed the drop into a clinging clot, then developed the clot into a lump ˹of flesh˺, then developed the lump into bones, then clothed the bones with flesh, then We brought it into being as a new creation.1 So Blessed is Allah, the Best of Creators. Surat al-Mu'uminuun 23:13-24

Objective

The objective of this paper is to examine the contribution of Muslim scholars to various disciplines and suggest possible ways to re-ignite the flame of Muslim intellectual growth and development.

Methodology

This paper was composed using the qualitative method of library research by reviewing the body of already existing literature in both classical and current times. This literature consists of classical manuscripts of scholars, holy books especially the Qur'an, current publications, and the experience that the author has acquired over time through lecturing and research on Islamic civilization.

Medicine

Muslim scholars produced numerous voluminous treatises on medicine. They constructed hospitals for both treating people and conducting experiments. They invented the hospital and pharmaceutical nomenclature as well as practice as we know it today; such practices evolved over time, influencing medical practice in Europe during the Renaissance and later inspiring the rest of the world.[6]

Ibn-Sīnā, who is also known as Avicenna in the West, is revered by many medics all over the world for his enormous contribution in the field of medicine. He invented a significant number of surgical tools, many of which are still used until present times. In addition, one of his monumental treatises on medicine were 'the book of healing' and 'the canon of medicine' in which he wrote about the most common illnesses of their time and the herbs that contained curative properties that could fight against such diseases.[7] He introduced the system of diagnosis by screening blood samples for possible bacteria, viruses, or other microbial life that could cause disease. By doing this, he was able to differentiate between measles and chicken pox even though they had similar symptoms.

Abū al-Qāsim Khalaf ibn al-'Abbās al-Zahrāwī is one of the Muslim scholars who influenced medicine as it is known today. He is revered as the 'the father of surgery.' He wrote many treatises on the same, for instance, *Kitab al-Tasrif*, that would later be used by future generations. He laid the foundation for organ transplants and surgeries such as kidney removals. He is arguably among the first medics to use cauterization and suturing in medical procedures.

Abū Bakr Muḥammad ibn Zakariyyā al-Rāzī is known for his contribution to medicine by way of application of chemistry in the production of medicine. He conducted empirical experiments to test the efficacy and curative properties in earthly and organic compounds. He used chemical procedures in the production of medicine, for instance, distillation, crystallization, and evaporation, and in the process, he managed to invent flasks, mortars, and pestles. Although he made significant contributions in other fields such as philosophy, chemistry, and others,[8] he is still

[6] Ahmed Essa and Othman Ali, Studies in Islamic Civilization the Muslim contribution to the Renaissance (Herndon: IIIT, 2012), 13-14

[7] Flannery, M.. "Avicenna." Encyclopedia Britannica, August 23, 2024. https://www.britannica.com/biography/Avicenna.

[8] Britannica, T. Editors of Encyclopaedia. "al-Rāzī." Encyclopedia Britannica, April 3, 2024. https://www.britannica.com/biography/al-Razi.

revered more in the pharmaceutical aspect of medicine as a physician and for paving the way for drug production as it is known today. In addition, he made a significant contribution to Physiology.[9]

Other notable Muslim polymaths that contributed enormously towards the medical field include; Ali Bin Rabban al Tabari wrote *firdaus al-hikmah* (the paradise of wisdom) and made significant contributions in pathology, pharmacology and diet; Al-Biruni wrote an encyclopedia in medicine and pharmacology *Kitab al-Saidana fi al-Tibb* in which he made outstanding contributions on description of medicine and herbs; Ibn al-Baitar wrote several treatises on medicine such as *Kitab al-Jami fi al-Adwiya al-Mufrada* and *Kitab al-Mughni fi al-Adwiya al-Mufrada;* Al-Kindī in his treatise *Aqrabadhin* (Medical Formulary) in which he elaborated on the treatment of epilepsy; Ibn Rushd wrote the *Kulliyyat* (the colligate) an encyclopedia on medicine, he made significant contributions in medicine especially in the areas of Urology; Ibn al-Jazzar's major was *Kitab al-adwiyah al-mufradah* (Treatise on Simple Drugs) and *Tibb al-fuqara ' wa al-masakin (Medicine for the Poor),* he made significant contributions in pharmacology; Ibn al-Nafis made a commentary on ibn Sīnā's canon of medicine, he wrote his own work *Al-Mujaz fi al-Tibb* and made remarkable contributions in Physiology*;* Ibn Zuhr wrote his treatise titled "The Method of Preparing Medicines and Diet.[10] Aḥmad ibn Ṭūlūn the founder of the Ṭūlūnid Dynasty as an Abbasid governor in medieval Egypt is known for his courageous leadership styles and a critical thinker in Islamic civilization especially in the field of medicine because of his great contributions such as construction of hospitals with mental departments and he is remembered for treating several mental illnesses and helping patients with mental disorders. Another notable Muslim polymath in the field of medicine was Al-Halabi Ibn Abi al-Mahasin who is revered for his groundbreaking contributions in the field of ophthalmology. He was an astute physician who treated many eye diseases such as trachoma, cataracts, conjunctivitis, and glaucoma. Additionally, he made significant innovations and inventions in the field of biomedical engineering when he invented surgical tools for treating eyes and wrote a treatise on the same *Kitab Al-Kafi fi Al-Kuhl* (The Sufficient Knowledge in Ophthalmology) in which he meticulously described several eye diseases, their causes, symptoms, and treatment.[11] His keen interest in eye care led him to make observations that were by far ahead of his time and that would aid future eye care research. He achieved this by writing procedures for eye care, he provided surgical techniques and procedures in which he emphasized precision and proficiency that still influence physicians in the contemporary world.

Therefore, Muslim polymaths during the golden age of Islam used the available resources, tools, and methods to create solutions and establish standards of procedure in the medical field that continue to inform contemporary society. They had significant influence in various branches of medicine such as pharmacology, surgery, Physiology, anatomy, and many others.

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[9] Zainab Sadiq et al., "Contribution of Muslims in the field of Medical Science," Research Journal Al-Meezan, 4, no: 2 (April - June 2022): 27-44

[10] Ibid.

[11] Mohamed N Saad. "Ophthalmological instruments of Al-Halabi fill in a gap in the biomedical engineering history." *World journal of Methodology*. Vol, 12 , No 1 (Jan 2022) 1-19

Philosophy

Imam Abū Yūsuf Ya'qūb ibn 'Isḥāq al-Kindī was the first Muslim scholar to translate Greek philosophy and contributed enormously to its articulation. He tasked himself to construct new philosophical terminologies, expressions, principles, and phrases in the Arabic language and expounded the Greek philosophical ideas paving the way for later Muslim scholars and Western philosophers to study the subject. In other words, al-Kindī laid a very strong foundation for future scholars in both the Orient and the Occident. Arguably, if al-Kindī had not lessened the burden of translating and simplifying Greek philosophical ideas, philosophy as a discipline would have probably remained among the Greeks or lost altogether. He translated works of Plato and Aristotle, both of whom he mentioned by name in his treatises numerous times.[12] Furthermore, he expounded on Aristotelian and Neoplatonic metaphysical ideas arguing for and against some of them. He for instance, upheld the Aristotelian doctrine of creation ex nihilo.[13] Moreover, it is among the expressions he created a language for in Arabic, that is to say *ta'yis-il-ayisat an laisa*. In addition, he translated other philosophical phrases and terminologies while merging them with Islamic theology for instance *al-illat al-ūlah* to mean the First Cause, ibdā' to mean creation instead of the Qur'anic term *khalq* and *jirm* was chosen for *jism* and *al-bāri'* used to mean the Creator.

He was followed by Imam Abū Naṣr Muḥammad al-Fārābī whose contribution is largely seen in logic and political philosophy. Al-Fārābī translated Plato's 'Republic' in one of his monumental works *Ara Ahl al-Madina al-Fadila* in which he elaborated the features of an ideal society. Al-Fārābī's major work on political philosophy was *al-madīnat al-Fādilah* (the Virtuous City) in which he expounds the qualities of a good leader such as oratory skills, strong physique, etcetera. He argued that a virtuous society (*al-ijtmā ' al-fādil*) is that in which whose inhabitants strive to achieve ultimate happiness (*al-sa'ādah*).[14] He also elaborated on other forms of corrupt and undesirable political dispensations such as the vile cities, democratic, tyrannical, timocratic, wicked, and errant cities. In addition, he expanded the study of logic which earned him the honorific title *'al-Mu'allim al-thānī',* meaning the second teacher of logic after Aristotle himself.

Imam Al-Ghazālī could not escape the influence of philosophy in his scholarly career. His teacher Imam Haramin al-Juwaiyni drew his inspiration from the philosophical teachings of Ibn-Sīnā and was himself a strong advocate of philosophical application in the interpretation and application of Islamic knowledge. Therefore, for Al-Ghazālī, philosophy was a subject worth exploration and an object of his own learning. He studied the fundamental principles of the foundation of philosophy composing *Maqāsid al-Falāsifa* (the intentions of the philosophers) and later wrote *Tahāfut al-Falāsifa* (the incoherence of the philosophers). Al-Ghazālī wrote these treatises not because he was against philosophy as sometimes mistakenly perceived, but because he was trying to merge philosophy with Islamic knowledge, especially theology and mysticism. Hence in *Tahāfut al-Falāsifa,* he highlighted twenty philosophical points he felt should be Islamized. In addition, Al-Ghazālī did not use Islamic texts to counter-argue philosophy but rather he used philosophy to

[12] Al-Kindi. On first Philosophy

[13] Nur, Hadi Ihsan, Elit Ave Hidayatullah, and Sofyan Atstsauri. "Critical Realism of Al-Kindî on Aristotle's Theory of Creation." Journal of Critical Realism in Socio-Economics 1, no. 3 (2023): 307-329.

[14] Günther Sebastian, "Education," in the Princeton Encyclopedia of Islamic Political Thought, ed. Gerhard Böwering (New Jersey: Princeton University Press, 2013), 144-146

refute and Islamize certain philosophical ideas. By so doing, he was integrating Islamic knowledge with philosophy. As a rigorous polymath, Al-Ghazālī composed many other treatises in theology, mysticism (*tasawwuf*), and other various fields. He for instance, composed *Iḥyā' 'ulūm ad-dīn* (The Revival of the Religious Sciences) his magnum opus, the deliverance from error (المنقذ من الضلال *al-Munqidh min al-Dalal*), the Jerusalem epistle (*risālat al-Qudsiyah)* written at the climax of his spiritual skepticism phase, and many other works. No wonder, Al-Ghazālī's collection of works and legacy earned him the title of *'Hujjat al-Islam',* the proof of Islam.[15]

Ibn Rushd came after Al-Ghazālī as another philosophical brain who responded to *Tahāfut al-Falāsifa* by writing *Tahāfut al-Tahāfut* (the incoherence of the incoherence) highlighting issues that Al-Ghazālī may have overlooked. Moreover, Ibn-Rushd wrote an extensive commentary on the logic of Aristotle called *'Sharh al-Burhan li-Aristu'*.[16] In addition, Ibn-Sīnā is one of the most prolific commentators of both Muslim and Greek philosophy. His monumental masterpieces *Kitab al-shifa* and *Kitab al-isharat wa-l-tanbihat* were his major detailed philosophical commentaries on the philosophical ideas of Aristotle, Plotinus, Al-Fārābī, and other philosophers.[17] The magnificent works of Muslim scholars on the subject of philosophy laid a firm foundation for future Western philosophers to study the noble discipline. Had Muslim scholars such as Al-Kindi, Al-Fārābī, Al-Ghazālī, Ibn Sīnā, Ibn-Rushd, and others abandoned philosophy and only specialized or focused on theology, perhaps the discipline of philosophy wouldn't be as it is today and even then it would completely be antagonistic with Islamic theology.

Shihāb ad-Dīn Suhrawardī the master of *ishrāqi* (illuminative philosophy) contributed to the definition of man as being above the physical manifestations contrary to the description of the peripatetic philosophers. That is to say that as far as peripatetic logic is concerned, man can only be defined by two distinct predicable universals and that is differentia (*al-fasl*) and proximate genus (*al jins al-qarib*). Suhrawardī differs by arguing that man can only be perceived synthetically.[18] This is one of the many philosophical ideas expounded by Suhrawardī in his illuminationist ideas. In one of his major books, *Hikmat al-Ishraq* (The Philosophy of illumination) in which he expressed his points of difference from the Peripatetic doctrines while emphasizing his system of metaphysics of light.[19]

Ibn-Sīnā made remarkable contributions to philosophy as much as he did in the field of medicine. He for instance, expounded on metaphysics and ontology. He explained the nature and various kinds of souls comparing the philosophical explanations with the teachings in the primary texts of Islam. Moreover, Ibn-Sīnā had a significant influence on Western thinkers and philosophers for

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[15] Moosa Ebrahim, "Ghazali, Al- (C. 1059–1111)" in the Encyclopedia of Islam and the Muslim world, ed. Richard C. Martin, vol. 1 (New York: Macmillan, 2004), 274-275

[16] Mourad Sulaiman, "Science and Philosophy," in the Medieval Islamic Civilization, An Encyclopedia, ed. Joseph W. Meri, vol.1 (New York: Routledge Taylor and Francis Group, 2006), 167

[17] Ibid, 167

[18] Bilal, Kuspinar. Isma'il Anis:Aravi on the Illuminative Philosophy His Izahu L-Hikem : Its Edition and Analysis in Comparison with Dawwani's Shawakil Al-Hur, Together with the Translation of Suhrawardi's Hayakil Al-Nur. Kuala Lumpur: ISTAC, 1996. Pp 97-99. From here will be cited as 'Isma'il Anis:Aravi on the Illuminative Philosophy'

[19] Walbridge John, "Suhrawardi, Al-(C.1154-1191)" in the Encyclopedia of Islam and the Muslim world, ed. Richard C. Martin, vol. 1 (New York: Macmillan, 2004), 656-657

instance, his doctrine of floating man influenced Rene Descartes' idea of *cognito ergo sum* 'I think therefore I am'.[20]

The Muslim polymaths therefore translated and expounded on Greek philosophy in the Abbasid *bait al-hikmah.* They contributed to translating and adding commentary on philosophical areas such as logic, metaphysics, ontology, ethics, political philosophy, axiology, aesthetics, epistemology etcetera.

Astronomy

In this section, I discuss the contribution of Muslim polymaths in the fields of Astronomy, aviation, and geography. It is important to note that since the medieval and classical times to date, whoever has adequate knowledge of the skies can literally and technically control almost everything. Knowledge of the skies implies efficiency in navigation and accuracy in maneuvering the globe.

During the golden age of Islam, Muslim scholars built observatories to gaze at and observe the universe beyond Earth. Almost two-thirds of the stars visible in the night sky were named by Muslim scholars in the Abbasid regime. Some of the stars are named in the Qur'an for instance, the Sirius.[21] The field of astronomy developed because of the Muslims' curiosity to understand nature as Allah guides in the Qur'an. In addition, the Muslims wanted to perfect their calendar since the lunar calculation of time is based primarily on the phases of the moon. The seasonal foggy atmosphere compelled Muslim thinkers to adopt means that would help to avert the challenge by inventing telescopes that would scan through the skies, by so doing, they discovered planets, stars, asteroids, galaxies, and other extra-terrestrial bodies that they later had to mark and name.

Furthermore, they also developed astronomy because the knowledge and position of the stars in the night sky was used as a powerful tool for navigation to find locations of places. Both medieval and classical travelers used astronomical knowledge, especially about constellations, to establish routes and calculate time.[22] Moreover, their curiosity was driven by the numerous verses in the Qur'an that categorically mention the orbits and movements of stars. In the modern world today, there are people in the population who still think that the world is flat, meanwhile, as early as the 7th century, Muslims were aware of the Earth's curvature and the fact that the Earth and other celestial bodies especially planets are spherical, and this knowledge was inspired by the revelations in the Qur'an.[23]

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[20] Bilal, Kuspinar. Isma'il Anis:Aravi on the Illuminative Philosophy. pp 108-109

[21] Qur'an 53:49 "And that He is the Lord of Ash-Shi`ra" وَأَنَّهُۥ هُوَ رَبُّ ٱلشِّعۡرَىٰ translation by Tafsir Ibn Kathir. The chapter itself is named 'Al-Najm' meaning 'star'. In the commentary of the Qur'an by Al-Ghazhali, he added the Lord of Sirias (the mighty star). Al-Ghazālī. A Thematic Commentary On The Qur'an, trans. Ashur A. Shamis. IIIT, 1421AH/2000AC.p 597

[22] Ahmed Essa and Othman Ali, Studies in Islamic Civilization the Muslim contribution to the Renaissance (Herndon: IIIT, 2012), 13

[23] Allah says (وَٱلسَّمَآءِ ذَاتِ ٱلۡحُبُكِ) "By the heaven full of paths" surat adh-Dhariyat 51:7; Also,

(لَا ٱلشَّمۡسُ يَنۢبَغِي لَهَآ أَن تُدۡرِكَ ٱلۡقَمَرَ وَلَا ٱلَّيۡلُ سَابِقُ ٱلنَّهَارِۚ وَكُلّٞ فِي فَلَكٖ يَسۡبَحُونَ) "It is not for the sun to overtake the moon, nor does the night outstrip the day. They all float, each in an orbit." Surat Ya-Sin 36: 40

Abū al-Ḥusayn ʿAbd al-Raḥmān ibn ʿUmar al-Ṣūfī (Azophi) is one of the most well-known Muslim scholars revered both in the East and the West for his great contributions in the field of Astronomy.[24] He is arguably the first person to discover the Andromeda galaxy. He published his monumental work *Kitāb Ṣuwar al-Kawākib al-Thābitah* (book of fixed stars) which was a masterpiece on stellar astronomy.[25] In his book of fixed stars, he made illustrations and detailed descriptions of at least forty-eight constellations, some of which differed significantly from Ptolemy's work. Moreover, he translated and expounded on Ptolemy's Alma jest. Furthermore, he made significant observations in the skies assigning many stars Arabic names some of which are still used to date. He also discovered the Magellan cloud. No wonder, it is because of his relentless efforts towards deepening the understanding of stars, planets, and constellations that he had the lunar crater "Azophi" and the minor planet "12621 Alsufi" named after him.

Al-Battānī full names Abū ʿabd Allāh Muḥammad Ibn Jābir Ibn Sinān Al-Battānī Al-Harrānī As-ṣābiʾ, also known as Albatenius, Albategnus, or Albategni in the west was a medieval Muslim polymath in the fields of astronomy, mathematics, and others. He lived in the 9th century, but he revolutionized the understanding of the cosmos. He made precise observations and calculations, he for instance, estimated the length of a solar year and was so close with a slight difference of minutes compared to modern measurements. In addition, he studied the motion of the sun and the moon, predicting both solar and lunar eclipses with stunning accuracy, and determined seasons and equinoxes.[26] He attempted to correct errors in early Ptolemaic planetary motion. He helped to lay the foundation for modern trigonometry, he was among the first people to use sine and tangent functions to make astronomical calculations more precise and spot-on. He composed his major treatise and monumental work *Kitāb az-Zīj* (Book of Astronomical Tables) which contained astronomical tables which were used by both scholars in the Muslim world and later influenced European astronomers even centuries after his death. For instance, Copernicus used Al-Battānī's works as a foundation for his discoveries, Galileo Galilei, Christopher Clavius, Edmund Halley, and many others have used Al-Battānī's works either to make more research or to improve on their understanding of the operations of the universe. Al-Battānī bridged the gap between ancient astronomy and the Renaissance, paving the way for modern science to thrive.

Abbas ibn Firnas was a Muslim polymath who lived in Muslim Spain (Cordoba) in the 9th century during the Muslim golden age. He is known for his outstanding contribution to the field of aviation. He made several attempts to fly, he invented an ingenious apparatus that enabled him to glide from a tower. Even though his attempts were futile, especially having a successful landing, he is still revered in modern aviation for laying the foundation for modern aviation. His groundbreaking inventions inspired future geniuses such as Leonardo da Vinci. Moreover, his idea on the structure of the ornithopter is still used in modern aircraft to ensure stability and smooth flights.[27] In

[24] Paul Kunitzsch, "Ṣūfī: Abū al-Ḥusayn 'Abd-al-Raḥmān ibn 'Umar al-Ṣūfī", in: Th. Hockey (ed.), The Biographical Encyclopedia of Astronomers: Second Edition (New York: Springer, 2014), vol. 4, pp. 2104-2105

[25] Blair S. Sheila, Bloom M. Jonathan, "Art" in the Encyclopedia of Islam and the Muslim world, ed. Richard C. Martin, vol. 1 (New York: Macmillan, 2004), p.79

[26] Britannica, T. Editors of Encyclopaedia. "al-Battānī." Encyclopedia Britannica, February 15, 2024. https://www.britannica.com/biography/al-Battani.

[27] Ezad A. J et al., "Ibn Firnas and His Contribution to the Aviation Technology of the World." *Advances in Natural and Applied Sciences* 7, No.1 (2013): 77

addition, Ibn Firnas invented planetariums, water clocks, glassmaking, and many other innovations that still inspire the astronomical field. His mind was far ahead of his time, no wonder, in 1976 the International Astronomical Union named one of the craters of the moon on the far side after Ibn al-Firnas in honor of his legacy in astronomy.

Al-Idrīsī, full names; Abū ʿAbd Allāh Muḥammad ibn Muḥammad ibn ʿAbd Allāh ibn Idrīs al-Ḥammūdī al-Ḥasanī al-Idrīsī, also known as al-Sharīf al-Idrīsī was a notable Muslim Geographer and cartographer who lived in the 12th century. His major treatise was *Kitāb nuzhat al-mushtāq fī ikhtirāq al-āfāq (*The Pleasure Excursion of One Who Is Eager to Traverse the Regions of the World).[28] He was a close friend to King Roger II of Sicily who commissioned him to draw the map of the world. He came up with the Tabula Rogeriana, a comprehensive and revolutionary map indicating Europe, Africa, and significant parts of Asia in incredible detail showing seven different regions highlighting important towns, cities, rivers, oceans, lakes, and mountains. It was arguably the most accurate world map of the time. His major treatise was a guide containing relevant geographical information and cultural insights which influenced many travelers, scholars, and explorers for many centuries. For instance, Christopher Columbus referenced Al-Idrīsī's maps in his voyages. His works laid a significant foundation for modern geography and cartography.

Ibn Baṭṭūṭah, full names; Abū ʿAbd Allāh Muḥammad ibn ʿAbd Allāh al-Lawātī al-Ṭanjī ibn Baṭṭūṭah is known as the greatest Muslim traveler and explorer of the medieval period. His prolific treatise *Rihla* elaborates extensive details of some of the most famous and significant landmarks in Africa and Asia. In addition, in his works, he describes a detailed account of the political, cultural, spiritual, and socioeconomic dispensations of the greater parts of the Muslim world in medieval times.[29] He is believed to have traveled 75,000 miles without modern technology from Africa, Asia, and some parts of Europe. He was born in Tangier, Morocco, he set out to go and perform hajj in Mecca, little did he know that this would turn out to be a 30-year-old adventurous journey of exploring diverse Muslim communities across the globe. He crossed the Sahara Desert, and navigated through Egypt, Syria, and Persia. He circumnavigated the Indian Ocean and managed to venture as far as China. In the process, he encountered African chiefs, Mongol emperors in China, Indian and Persian Sultans. In addition, he interacted with many Muslim cultures including the Turkic, Arabic, and Persian, which he documented in his magnum opus *Rihla,* giving deep insights into his detailed observations about the medieval world. He described the architecture of various civilizations and the challenges he encountered in his journeys as he interacted with various races and tribes. Ibn Baṭṭūṭah's epic travels remain one of the most significant explorations ever recorded in human history.

Mathematics

As the population of Muslims grew larger because of Islamic civilizational influence, there was a need to calculate the large sums of zakat and understand the monetary dynamics as well as the geographical locations of Muslim territories using mathematical calculations. At this time, the

[28] Wadie, Jwaideh. "Muḥammad al-Idrīsī". Encyclopedia Britannica, 14 Mar. 2024, https://www.britannica.com/biography/Muhammad-al-Idrisi. Accessed 21 October 2024.
[29] Hrbek, Ivan. "Ibn Battuta". Encyclopedia Britannica, 16 Aug. 2024, https://www.britannica.com/biography/Ibn-Battuta. Accessed 23 October 2024.

major numerals used were Roman numerals, which made these tasks very difficult. Muslim scholars had to invent new user-friendly numerals leading to the introduction of the Arabic numerals. They also invented *sifur* / zero which eased the work of calculation as it would give any number the power of ten once added on the right side. This reduced the burden of calculating bulky figures.

Al-Khwārizmī was a Muslim polymath in the fields of Mathematics, astronomy, and other sciences during the golden age of Islam. He is popularly known for his great contribution to mathematics especially for inventing the Hindu-Arabic numerals and for his works on algebra. He wrote a book on Algebra called *Al-Kitāb al-mukhtaṣar fī ḥisāb al-jabr waʾl-muqābala* (The Compendious Book on Calculation by Completion and Balancing) which would later be translated into Latin in the 12th century and the very foundations he laid down still being applied.[30] The word 'algorithm' which is common among the computer science community is a corruption of his name 'Al-Khwārizmī'.

Other notable Muslim polymaths that contributed tremendously to mathematics include Abūʾl-Wafāʾ, Abū Naṣr Manṣur, and al-Bīrūnī who expounded on theorems of plane and spherical geometry, added on the principles of sine and tangents which would later be applied by future astronomers and geographers.[31] These ideas were used to determine the distances between different cities and geographical locations, longitudes, and latitudes, and solve other mathematical problems until the Renaissance.

Omar Khayyam, full names; Ghiyāth al-Dīn Abū al-Fatḥ ʿUmar ibn Ibrāhīm al-Nīsābūrī al-Khayyāmī is one of the Muslim Persian polymaths in the fields of mathematics, an astronomer and a poet. He solved cubic equations in algebra and classified geometric shapes in his treatise, *Risālah fiʾl-barāhīn ʿalā masāʾil al-jabr waʾl-muqābalah* (Treatise on Demonstration of Problems of Algebra). He was commissioned by the Seljuq sultan Malik-Shāh and he helped to shape the *Jalālī* calendar that was so accurate and surpassed the Gregorian calendar in precision.[32]

Physics

Muslims had a desire to understand the nature of matter in space and on earth. This led to the curiosity of Muslim scholars to research and understand the various dimensions of both matter and space.

In the discipline of physics, both Ibn-Sina and Shihāb ad-Dīn" Yahya ibn Habash Suhrawardī contributed tremendously by defining the very components that make up the subject. They defined

[30] Corry, L.. "algebra." Encyclopedia Britannica, August 12, 2024. https://www.britannica.com/science/algebra. Accessed on 10th October, 2024

[31] Knorr, W. R. , Folkerts, . Menso , Berggren, . John L. , Gray, . Jeremy John and Fraser, . Craig G.. "mathematics." Encyclopedia Britannica, August 29, 2024. https://www.britannica.com/science/mathematics.

[32] Britannica, The Editors of Encyclopaedia. "Omar Khayyam". Encyclopedia Britannica, 9 Oct. 2024, https://www.britannica.com/biography/Omar-Khayyam-Persian-poet-and-astronomer. Accessed 27 October 2024.

time, space, and matter. For instance, Suhrawardī elaborated on the possibility of infinitive divisibility of matter in imagination rather than in reality.[33]

Ibn al-Hytham a 10th-century Muslim polymath, gave a new understanding of optics. Meanwhile, the Greeks believed that light came from our eyes, Ibn Hytham proposed a revolutionary understanding that light enters the eyes and not the other way around. He carefully conducted rigorous, meticulous experiments whose procedures and findings he documented in his monumental works. By understanding how light works, his ideas gave birth to inventions such as microscopes and telescopes, enabling humans to observe and study the universe that exists beyond the reach of our eyes. His ideas influenced Western thinkers like Roger Bacon and Johannes Kepler.

Alchemy

Etymologically, the term alchemy originates from the term *kīmiyā* in Arabic and *chymeia* in Greek and deals with the study of celestial elements such as metals and compounds.[34] As early as the Umayyad period, Muslims had developed a desire to produce dye for fabrics and ceramics. They had to ensure that they studied metallurgy, especially of precious stones, glasses, and gems to mix desired colors. By so doing they were giving birth to a very powerful discipline Alchemy which later came to be known as chemistry.

Some of the Muslim polymaths that have contributed remarkably to the great discipline include Jabir ibn Hayyan, Muhammad Ibn Zakariyya al-Razi (Rhazes), ibn Umayl a-Tamimi, Maslam al Majiriti and many others.[35]

During the Islamic golden age, Muslim scholars conducted many experiments with a variety of chemical elements. They conducted distillation, discovering ethanol and other chemical properties. The world 'alcohol' itself is a corruption of an Arabic word *al-kuhul* or *al-kohl,* which by then meant a process of manufacturing or production.[36] Moreover, Muslim chemists discovered the process of distillation.[37]

Humanities

In this section, the discussion revolves around the contribution of Muslim polymaths in the fields such as education, psychology, history, historiography, sociology, political science, and economics.

In all the above-mentioned areas, I wish to elaborate first on the profound contributions made by Ibn-Khaldun. He is revered as the father of sociology and historiography. In his magnum opus '*al-Muqaddima'* Latinized as prolegomena or the introduction, a three-volume masterpiece where he

[33] Bilal, Kuspinar. Isma'il Anis:Aravi on the Illuminative Philosophy. Kuala Lumpur: ISTAC, 1996. Pp 73-75
[34] Carusi Paola, "Alchemy," in the Medieval Islamic Civilization, An Encyclopedia, ed. Joseph W. Meri, vol.1 (New York: Routledge Taylor and Francis Group, 2006), 25-26
[35] Ibid, 25.
[36] Johanna, Mayer. The Origin Of The Word 'Alcohol'. October 2, 2018. https://www.sciencefriday.com/articles/the-origin-of-the-word-alcohol/ (accessed September 30, 2024).
[37] Firestone Reuven, "Alcohol," in the Medieval Islamic Civilization, An Encyclopedia, ed. Joseph W. Meri, vol.1 (New York: Routledge Taylor and Francis Group, 2006), 26-27

expounds on how societies emerge, flourish, and decline. He advanced the concept of *asabiyya* (group solidarity) in which a civilization continues to thrive for as long as it holds tightly onto a set of shared beliefs and values. However, it is difficult to arrive at a clear definition or translation of the word since Ibn-Khaldun gave it a multitude of meanings and different layers at both the theoretical and practical levels.[38] He is arguably the father of modern sociology and historiography who contributed enormously to the disciplines, and his influence is still felt to date.[39] Moreover, his genius mind influenced the modern understanding of history, political and economic theory. He for instance, argued that labor was the ultimate source of prosperity.[40]

In education, Al-Ghazālī contributed significantly, especially as the head of the *nizamiyyah* colleges, and also laid down the curriculum and method of instruction to be followed. Moreover, he wrote relevant treatises such as *ayyuhal walad* on the etiquette of teaching and learning that would later come to influence the next generations in the field of pedagogy.[41]

Al-Zarnūjī, who lived in the 13th century, is credited for his monumental work in the field of pedagogy *Ta'līm al-Muta'allim-Ṭarīq at-Ta'-allum* (Instruction of the Student: The Method of Learning). In this masterpiece, he laid down the foundation for professional teaching and the most appropriate methods of teaching and instruction, emphasizing critical thinking and problem solving abilities from learners.[42] He illustrated the roles of a teacher and those of a learner in an instructional environment. And he suggested the ideal practices to ensure the efficiency of teaching and learning.

Aesthetics, Art and Literature

The Islamic golden age witnessed significant developments in terms of infrastructure. Canals, bridges, roads, and several architectural marvels were constructed both in Baghdad, the capital of the Islamic caliphate by then, and in other Islamic cities. The buildings were covered with Arabic inscriptions in the highest form of cursive script calligraphy that added to the beauty of the cities. In addition, the irrigation tunnels and the greenery added to the beauty of the cities.

The mosques, especially in the late Abbasid and Ottoman regimes, were built with ingenuity and intricate geometric patterns and designs. Moreover, the mosques had minarets with curvilinear spiral steps following deliberate artistic principles and meticulous designs. These minarets were not just for beauty but were used for other purposes such as making *adhan* (Muslim call for prayers)[43], as observatories to gaze at the stars, and for security to see beyond the fortresses of

[38] Douglas H. Garrison. Ibn Khaldun And The Modern Social Sciences: A Comparative Theoretical Inquiry Into Society, The State, And Revolution. UMI, 2012. Pp34-43
[39] Salah Zaimeche; Farouk, Bajwa and Ahmed, Salem. " A review on Early Muslim Historians." Foundation for Science, Technology and Civilization (November, 2001): pp 1-12
[40] Ibid, 7-8
[41] AbdulSwamad, Gyagenda. "The Relevance of Al-Ghazali's Educational Views to the Contemporary System of Muslim Education: Focus on Islamic Education in Uganda". Interdisciplinary Journal of Education 4, no. 1 (May 31, 2021): 1–12.
[42] Nabihah, Husna Razali & Arifin, Mamat. "Al-Zarnuji's Educational Concept and Its Relevance to the Teaching of Islamic Education in Malaysia". Journal Of Educational Studies, 12 no.2 (2024) 135-144.
[43] Santhi Kavuri-Bauer, "Architecture" in the Encyclopedia of Islam and the Muslim world, ed. Richard C. Martin, vol. 1 (New York: Macmillan, 2004), 69-75

cities in times of danger and attacks. The arabesques with symmetrical patterns, floral motifs, and abstract designs enhanced the beauty of the cities in the Islamic civilization significantly.

The buildings were adorned with impressive visual color patterns and artistic designs. The interiors of the buildings were furnished with Islamic religious art, the minibars made of artistic wood, and the windows in glass, marble, and other glittering shiny gems and stones. [44] The mosques were covered with carpets woven in intricate designs, patterns, and colors.[45]

The Islamic civilization is characterized by its deep love for literature in the form of poems, music, tales, and legends in a variety of genres. Some would be inspired by realistic events mirrored by the society, fantasy, comical characters, spiritual, political, and philosophical. The poetry and Music in Islamic civilization are mainly Arabic and Persian. The tales, folklore, and poems often depict important aspects of their respective cultural values and are used to preserve their traditions as well as the stories of important historical figures and events orally from generation to generation.[46]

Rumi Jalaluddin is a Muslim scholar and critical thinker who played a significant role in literature and poetry. His eloquence, and mystical and philosophical depth engraved in his poetry works inspired both his contemporaries and poets of current times. His major works include *masnavi-ye ma'anavi* (spiritual couplets or couplets of true meaning), a mystical and didactic poem that has 25,000 lines.[47] In this six-volume masterpiece, Rumi expresses his mystical interpretation of the Islamic text, both the Qur'an and the Sunnah, highlighting the major ethos and theological cruxes of Islam. He also composed the *Divan-e Kabir or Kolliyat-e shams-e tabrizi*. In this collection, Rumi uses the highest level of lyricism, rhythm, and philosophical points being expressed musically.[48] The intensity of his poetic works inspired Western thinkers such as Georg Wilhem, and Friedrich Hegel, and after the translation of his works by Reynold Nicholson, he is revered in the West as an icon of Islamic spiritual tolerance.

As earlier noted, Omar Khayyam was not only a mathematician and an astronomer but he was also a prolific poet with inexhaustible ideas. In one of his major works the *Rubáiyát,* his philosophical rhymes and verses explore deep questions about life, fate, purpose, and the universe.[49] He blends both arts and sciences in his works which makes his works relevant even after a millennium of his demise.

Conclusions

Muslim scholars in both medieval and classical times contributed enormously towards the fabric of knowledge. They studied and expounded on various disciplines ranging from theology,

[44] Blair S. Sheila, Bloom M. Jonathan, "Art" in the Encyclopedia of Islam and the Muslim world, ed. Richard C. Martin, vol. 1 (New York: Macmillan, 2004), 75-82
[45] Ibid
[46] Ahmed Essa and Othman Ali, Studies in Islamic Civilization the Muslim contribution to the Renaissance (Herndon: IIIT, 2012), 15-18
[47] Lewis D. Frankline, "Rumi, Jalaluddin (1207-1273)" in the Encyclopedia of Islam and the Muslim world, ed. Richard C. Martin, vol. 1 (New York: Macmillan, 2004), 601-602
[48] Ibid, 602
[49] Britannica, The Editors of Encyclopaedia. "Omar Khayyam". Encyclopedia Britannica, 9 Oct. 2024, https://www.britannica.com/biography/Omar-Khayyam-Persian-poet-and-astronomer. Accessed 27 October 2024.

philosophy, medicine, Alchemy, Physics, Music, art, Astronomy, and many others. Most of these scholars were polymaths who embodied a combination of multiple disciplines rather than specializing in one. They wrote many books that helped to usher in the Renaissance and contributed tremendously to science and technology as we know it today.

However, the growth and development in the intellectual growth of Muslim scholars have suffered serious blows and setbacks such as wars, invasions, revolutions, paradigm shifts in Islamic ideological orientation, and internal Muslim wrangles among others. For instance, the Mongol invasion of 1258 C.E was characterized by pillaging and destruction of both life and property which did not spare libraries especially the *baitul hikma* where major works from the previous centuries had been kept. It is alleged that they threw so many works in the river Tigris until the water turned black because of the ink in the books. Unimaginable volumes of knowledge were lost and will never be recovered. The second setback is the dissolution of the caliphate by Mustapha Kemal which was patronizing among other things the growth of Muslim intellectual growth globally.

The rise and growth of fundamentalist tendencies and fanaticism campaigns from the 19th and 20th centuries have suffocated the development of Islamic intellectual growth as the doors for innovation, free-thinking, and research have been painted the image of being evil and considered as Western approaches aiming towards contaminating the Islamic faith. In addition, the fundamentalists have reduced Islam to only dogmatism and rituals, perceiving any other alternative interpretation of the text as alien to the Islamic belief system. Moreover, the promotion of *taqlid* (blind following) has thus hindered the emergence of more Islamic polymaths in this generation as knowledge is being dichotomized leading to the demonization of humanities and scientific studies in favor of Islamic theology.

Knowledge fragmentation and specialization have hindered the progress of polymaths amongst Muslim scholars. Knowledge has been dichotomized where revealed knowledge has been divorced from sciences, for instance, physics, astronomy, biology, chemistry, mathematics, and other humanities such as social studies, and philosophy among others.

Muslim scholars from the medieval and classical times used the challenges of the society to become innovative, creative, and by so doing, they made tremendous discoveries that have positively impacted on human civilization until the contemporary times.

Muslim scholars have to participate in the growth and advancement of knowledge creation and dissemination in the contemporary world. This will enable them to address the philosophical, value, and ethical challenges whilst they also identify opportunities inherent in the technological as well as the scientific innovations, especially those that might be alien and at crossroads with Islamic values or have benefits to the community respectively. However, the forces of *taqlid* seem to be prevalent amongst Muslim scholars and followers.

Recommendations

Muslim scholars in the contemporary world need to develop a deep sense of curiosity about quantum realities as well as cosmic structures. In addition, there is a need for Muslim scholars and thinkers to marvel at the symmetry of nature and the organized chaos embedded in the creation of

the universe. This may enhance spirituality and improve the levels of critical thinking and problem-solving abilities amongst Muslim scholars. Besides, from numerous verses of the Qur'an, Allah invites people to think deeply, contemplate, and ponder His message.[50] Therefore, for Muslim scholars to tackle the challenges of the 21st century, they must strike a balance between the depth and breadth of knowledge by appreciating other related disciplines in science and humanities through knowledge integration. This may improve analytical skills, and enhance innovation and creativity amongst contemporary Muslim scholars, hence addressing the challenges of their times such as global warming, poverty, climate change, geo-political issues, and other problems of the modern world.

The idea of polymaths should be revived, where a scholar appreciates more than one discipline. The Muslim polymaths are needed to be torch bearers cultivating the spirit of innovation, research, knowledge creation, integration, and dissemination. In addition, knowledge fragmentation should be avoided. Furthermore, a Muslim scholar in this century needs a grasp of the current and emerging trends in society, science, and technological advancements in order to provide diverse solutions amidst a multitude of contemporary challenges. This therefore implies that Islamic education has to be merged with the current trends in technology such as media usage, artificial intelligence (AI) and other platforms that may aid creativity, research and innovation.[51]

Islamic education should be revamped and tailored to address contemporary issues. Blind following (*taqlid*) should be abolished, dogmatism minimized, and instead promote critical thinking and problem solving. Additionally, Islamic education should be integrated with modern instructional techniques to facilitate adequate training of competent Muslim polymaths.[52] This implies, therefore, that the idea of creating Muslim scholars who are multi-faceted could be achieved by reviving the education system. Decolonization of education by creating curricula that enable learners to explore a variety of disciplines and appreciate the interconnectedness of knowledge. The Muslim clerics and scholars should not only be given revealed knowledge but also be exposed to philosophy, political education, medicine, physics, sociology, astrophysics, mathematics, and other relevant subjects.[53]

Islamic knowledge has to evolve in line with the emerging trends in other disciplines and developments in the world. Muslim scholars should always be scratching their heads to ensure that Islamic knowledge is relevant and should never be perceived as obsolete because of scientific

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[50] Allah says, (أَفَلَا يَتَدَبَّرُونَ ٱلْقُرْءَانَ أَمْ عَلَىٰ قُلُوبٍ أَقْفَالُهَآ) "Do they not then think deeply in the Qur'an, or are their hearts locked up (from understanding it)?" Surat Muhammad - 47:24; In addition, Allah says (لَّعَلَّكُمْ تَعْقِلُونَ) "… in order that you may understand"- Surat Yusuf 12:2; Also, (لَعَلَّكُمْ تَتَفَكَّرُونَ) "…in order that you may give thought" –Surat al Baqarat 2:219, furthermore, Allah says, (كِتَٰبٌ أَنزَلْنَٰهُ إِلَيْكَ مُبَٰرَكٌ لِّيَدَّبَّرُوٓاْ ءَايَٰتِهِۦ وَلِيَتَذَكَّرَ أُوْلُواْ ٱلْأَلْبَٰبِ) "This is a Book (the Qur'an) which We have sent down to you, full of blessings, that they may ponder over its Verses, and that men of understanding may remember." -Surat Sad 38:29

[51]AbdulSwamad, Gyagenda. "Culture and Educational Policy in Uganda". Interdisciplinary Journal of Education 7, no. 1 (May 31, 2024): 56–70. Accessed November 15, 2024. https://journals.iuiu.ac.ug/index.php/ije/article/view/371.

[52]AbdulSwamad, Gyagenda. "Application of Bloom's Taxonomy in the Instruction of Islamic Education". Interdisciplinary Journal of Education 6, no. 1 (May 31, 2023): 29–39. Accessed November 28, 2024. http://www.journals.iuiu.ac.ug/index.php/ije/article/view/222.

[53] AbdulSwamad Gyagenda "Exploring The Teaching and Learning Experiences Of Traditional Islamic Institutes In Uganda" (PhD Diss. Islamic University In Uganda, 2024), 190-196

innovations and technological advancements. At every stage of global civilization, Islamic values must be integrated into the developments and should always be prioritized. This therefore implies that there is a need for more interdisciplinary scholars and Muslim polymaths in this and future generations to come to address such issues.

Furthermore, there is a need to re-imagine *ijtihad* approaches and methodology in such a way that it is revamped along the lines of contemporary methods of using demonstrable, observable, experimentation, testable, and empirical protocols of science. This will ensure not only the integration of knowledge but also the amalgamation of various approaches to interpret and practice the Islamic text so that its relevance remains intact in this generation and future generations to come. This implies that there is a need to revamp the methodology and approach towards Islamic thought, in order for Islam to provide answers and solutions to the continuous emerging challenges of the 21st century.

In addition, Fundamentalist ideas and fanatic approaches should be discouraged in the propagation and spread of Islamic culture and heritage. Fanaticism tends to stagnate critical thinking and impedes the ability to accommodate alternative views. Therefore, it should be eradicated from the Islamic institutes and replaced with more holistic and flexible approaches in knowledge acquisition and dissemination. Furthermore, fanaticism and extremism may be associated with religious intolerance and acts of terrorism. A more inclusive contemporary global approach should be adhered to and Muslim scholars must adopt a global consciousness in the interpretation and practicing of Islam.

There is a need to revive the spirit of Islamic art and folklore such as poetry, calligraphy, and fashion, and revamp classical architectural designs, aligning it with contemporary technology. This may help to preserve the roots of Islamic culture whilst addressing the emerging trends and challenges of the 21st century. In addition, there is a need to establish Islamic museums and art galleries with exhibits that emphasize the richness and depth of Islamic culture and tradition.

More scientific and empirical studies should be conducted in this area to establish various strategies, which will enable the Muslim scholarly world to reclaim its position in the contribution towards knowledge and solving global challenges. Additionally, future empirical studies may help come up with models, designs, theories, and policies on how to integrate knowledge using a multidisciplinary approach, which will enable the creation of contemporary polymaths.

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