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THE ROLE OF AL - KHWARAZIMI AND AL-FARGHANI'S IDEAS IN MODERN EDUCATION.

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Annotation: this article provides information on the contributions of the mutafakirs raised from Central Asia: Moses Al-Khwarazmi, Al-Farghans to the prosperity of World Science and their place in modern education.

Keywords: antiquity, Renaissance, Aljabr val muqobala, arithmetic, Sarandib, Miqiyos an-nil, rordantsa.

It is known that in the ancient world, the region of progress, science, and cultural development was centered around the Mediterranean: geographically, this area had the most favorable climate and conditions for human habitation. Humans have lived in these regions since their emergence. It is considered one of the earliest centers of human civilization. The culture of this region can be divided into two stages:

• Ancient Greek culture
• Ancient Roman culture

Compared to the ancient Eastern civilizations, the ancient era marked significant progress in the role of individuals in society and the perception of artistic creativity. The difference lies in the level of influence on other peoples during the ancient era, and the fact that Greek and Roman cultures were never forgotten, directly impacting the subsequent development of culture.

"The torch of science burned in Greece shone again in Central Asia in the 9th-12th centuries, a fact that during this period the 1st Renaissance era appeared on the territory of our country. And he cultivated the signs that the whole world would recognize.[1]" There was a huge cultural boom, science, philosophy, literature developed strongly, progressive humanitarian ideas occupied the thought of society, mental and creative activity roared. This period is known in World Science as the "Muslim renaissance" (a. Mets[2]) or the" morning awakening " era (N. I. Conrad[3]). In the eastern Renaissance, the main signs of the European Renaissance are embodied: an intense creative activity, the implementation of tremendous creative work, the creation of bemisl works that amaze the mind. The eastern renaissance also cultivated great allomas, people of all kinds of knowledge, famous thinkers. In the field of Exact Sciences, Muhammad al-Khwarazmi, Ahmad al-Farghani, Abu Nasr Farabi, Abu Rayhan Beruniy,Abu Ali ibn Sino, Umar Khayyam, jahanshumul made discoveries., On the initiative of khorun ar-Rashid, A Scientific Center-Academy “Beit ul-Khikma” was established in Baghdad, to which all Muslim lands, including scholars and phosils from Central Asia, were gathered. Beitul-Hikman was led by Muhammad al-Khwarazmi. Scholars such as Ahmad Farghani, Marwazi, Marwarudi, Jawhari have contributed significantly to making the Baghdad academy world famous. One of the positive aspects of establishing the rule of the arab Caliphate in movaraunnahr as well as the widespread spread of Islam is that in Khorezm, following the example of the scientific academy in Baghdad, the Ma'mun Academy also arose in the 10th century, and its members, the scholars and sages of their time, spread the wisdom of

[1] O‘zbekiston Respublikasi Prezidenti Shavkat Mirziyoyevning O‘qituvchi va murabbiylar kuniga bag‘ishlangan tantanali marosimdagi nutqi. 30.09.2020 https://president.uz/uz/lists/view/3864
[2] Metz.A, Rennesance of Islam, Punta publishing –1937.
[3] Конрад Н.И. Запад и Восток : статьи Москва : наука, 1966

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Movaraunnahr with their creations. Also, from the territory of our country, the most moderate personalities of the Islamic world, hadithologists, have grown up, whose name stands to this day at the top of both secular and mystical science. Including:

Khwarazmi, Abu Ja'far (Abu Abdullah) Muhammad ibn Musa al-Khwarazmi was born in Khiva in 783, died in Baghdad in 850. Khorezm is considered a mathematician of Turkish nationality, astronomer, geographer and one of the first qomusi scientists in the history of science. Muhammad al-Khwarazmi was the author of more than 20 scientific works, of which up to ten have reached us in full, in part, or in some fragmentary form. The works themselves show that Khwarazmi is a scientist who has made a great contribution to human civilization.

The works of khwarazimi that have come down to us .

“Aljabr val muqobala”.

The fact that Khorezm laid the foundation for the science of algebra, the term of this science is his .

It is well known that the name of the work” book Mukhtasar min account aljabr valmukobala " (a short book about the account of aljabr valmukobala) comes from. But sometimes the view is found that Khwarazmi only systems the method of solving linear and quadratic equations known before him. This idea arose due to the fact that the Khwarazmian work began with this topic. Whereas Khorezmi's book is primarily devoted to algebraic calculus. It follows that the book is named after two important algebraic practices — aljabr and almucobala. Khorezmiy went on to describe algebraic operations, first how they are used in solving equations, and then to algebraic form substitutions. Otherwise it would be difficult to understand the purpose of the book. The khwarazmian work was translated into Latin by Robert of Chester in the early 12th century, began to be called “aljebra” (in French, English) “algebra” (in German, Russian) and became a name for science.

On the work “Arithmetic”:

It is clear how numbers and arithmetic operations occupy a place in the development of civilization, without which the progress of society cannot be imagined. Today, the rules for writing numbers in the decimal system, which have become the simplest element of universal culture, and performing arithmetic operations on them, were introduced thanks to Khwarazmi's work “arithmetic”. The fact is that the method of writing the numbers discovered by Indian scientists using ten numbers was known to Middle Eastern scientists even before Khorezm. But despite this, the Indian account is not widely distributed. Khwarazmi's great service was that he was the first to notice the importance of the decimal number system, stating it in a simple and succinct style. Thanks to this, both Khwarazmi's book and the decimal system soon spread to the Muslim world in the region from Eastern Turkestan to Spain, and from the 12th century to Europe. Therefore, Khwarazmi can be considered a mentor who taught all of humanity the arithmetic decimal counting system. Among the books of hundreds of scientists written in the field of mathematics, astronomy and other sciences in the Middle Ages, it is the Khwarazmian works that are most prevalent in both the East and the West and contribute the most to universal progress. This was due to the original narrative style that Khwarazmi used extensively. At the bottom of this style lies the idea of the algorithm. This idea of khwarazmi is gaining more importance over time and has become one of the most important factors in the development of society today — digital information processing,digital technology is based on this.

The work "Zij":

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Another work by Al-Khwarizmi that made a deep impact on the development of science is his "Zij." It consists of theoretical astronomy and astronomical tables, and although the Arabic manuscripts have not survived, versions revised by Maslama al-Majriti (10th century) and translations into Latin and Hebrew have reached us. Al-Khwarizmi's "Zij" is one of the earliest works on astronomy in medieval science, consisting of 37 chapters and containing 116 tables. It includes information on various calendars, chronology, the motion of the Sun, Moon, planets, zodiac signs, and more. Specifically, it provides equations for the motion of the Sun and Moon, rules for determining the durations of solar and lunar eclipses, sine tables, and methods for determining geographical locations. For the first time in "Zij," the tangent function was introduced. Al-Khwarizmi's "Zij" also served as a model for the further development of astronomy and trigonometry.

The work "Kitob amal bilasturlobot" (The Book of Operations with Astrolabes):

In Al-Khwarizmi's work "Kitob amal bilasturlobot" (The Book of Operations with Astrolabes), the making and use of the astrolabe (Arabic: asturlob), the main observational instrument of ancient and medieval astronomy, is discussed. It provides clear and concise rules (in an algorithmic style) for determining the altitude of celestial bodies, the times of entry into the zodiac signs, daily motions, ecliptic coordinates, coordinates of geographical objects, the dates of the new moon, and more. Additionally, the book mentions the determination of the time for the Asr prayer and discusses instruments called "sinusquadrants." This indicates that Al-Khwarizmi also engaged in the field of scientific instrumentation.

The work "Surat al-Arz":

Al-Khwarizmi is considered one of the greatest geographers to have lived after the Greek scholar Ptolemy. His work "Surat al-Arz" (also known as "Al-Khwarazm Geography," and the full title "The Geography of Ptolemy as Revised by Abu Ja'far Muhammad ibn Musa Al-Khwarizmi: A Book on the Earth's Map — Cities, Mountains, Seas, Islands, and Rivers") is one of the important sources in the history of science. Although the book was based on Ptolemy’s "Geography," it is not merely a commentary but an independent work. It introduces for the first time a scientific approach to dividing the Earth's surface into seven climates, based on the geographical dimensions of the climates. The book contains information about 2402 geographical objects, specifically their latitudes and longitudes, many of which were not provided in Ptolemy's "Geography." Notably, for the first time in geographical history, Al-Khwarizmi mentions the Pacific Ocean. He accurately describes the locations of objects far from his homeland, including islands in the Atlantic and Indian Oceans, such as Great Britain, Ireland, and Sarandib (Sri Lanka). The maps depicted in the book hold a significant place in the history of cartography. This work was translated into Latin as early as the 12th century and made a great contribution to the development of the field of geography.

The work "Kitob attarix":

In Al-Khwarizmi's work "Kitob attarix" (The History of Khwarazm), dates related to the life of Prophet Muhammad (PBUH), battles in Islamic history, solar eclipses, the devastating earthquake in Antioch on March 10, 713, and political events in the caliphate are recorded. Unfortunately, this work has not survived to the present day. However, many historians (such as Al-Biruni, Yaqut al-Hamawi, Ya'qubi, Elias Bar Shinnoy, Hamza Isfahani, At-Tabari, Al-Mas'udi, and others) reference excerpts from it in their own books. This indicates that Al-Khwarizmi's "History" was widely known and circulated in its time. The work stands out from other historians' books of the period due to its precise recording of events. Ahmad al-Fargani mentions Al-Khwarizmi’s work on the geometry of the sphere in his treatise on the astrolabe,

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though it has not been found to this day. Al-Khwarizmi, having enriched more than five fields of science with his fundamental innovations, is rightfully considered one of the first encyclopedic scholars in the history of science. The tradition he initiated was later continued by scholars such as Ibn Sina, Al-Biruni, Leonardo da Vinci, Leibniz, Lomonosov, and Franklin.

Abul Abbas Ahmad ibn Muhammad ibn Kasir Al-Farg'oni:

Al-Farg'oniy, taxminan 797 yilda Farg'onada tug'ilgan va 865 yilda Misrda vafot etgan, astronomiya, matematika, geografiya va boshqa ilmiy sohalarda katta hissa qo'shgan taniqli o'zbek polimati edi. Sharqda u Al-Farg'oniy nomi bilan tanilgan, Evropada esa Alfraganus nomi bilan mashhur bo'lgan. Bugungi kunda uning sakkizta asari ma'lum, ularning barchasi astronomiya bilan bog'liq. Bularga " Astronomiya asoslari "va" Astrolabalar yasash haqidagi kitob " kiradi."Uning qo'lyozmalari dunyoning deyarli barcha yirik kutubxonalarida saqlanadi. Afsuski, uning hayoti va ilmiy faoliyati haqida juda kam ma'lumot saqlanib qolgan, aksariyat tafsilotlar parchalangan.

Al-Farg'oniy Bag'dod va Damashqda rasadxonalar qurilishida qatnashgan va shu vaqt ichida Ptolomeyning "Almagest" sini tanqidiy ko'rib chiqqan. Al-Farg'oniy o'zining "Astronomiya asoslari" asarida astronomik bilimlarni tizimlashtirdi va uni yangi topilmalar bilan boyitdi. O'sha davr an'analariga ko'ra, u dunyoni etti iqlimga ajratdi, quyosh soatlarini ishlab chiqdi va astronomik asboblarni yaratdi. Uning ishi Kopernik davriga qadar Evropada astronomiya uchun asosiy ma'lumot bo'lib xizmat qildi.

Al-Farg'oniy hayotidagi eng muhim bosqichlardan biri 861 yilda u Abbosiylar xalifasi Al-Mutavakkil tomonidan Nil daryosining suv sathini o'lchash uchun buyurtma qilingan loyihada ishtirok etganida sodir bo'lgan. Ushbu loyiha "Miqyas al-Nil" (Nileometr) qurilishiga olib keldi, bu nafaqat Nil suvi sathini o'lchagan, balki noyob me'moriy yodgorlik sifatida ham harakat qilgan muhandislik mo'jizasi. Nileometr Nil vodiysida yashovchi odamlar uchun juda muhim edi, chunki u qishloq xo'jaligi, chorvachilik va umuman omon qolish uchun muhim bo'lgan toshqinlarni bashorat qilishga yordam berdi.

Nil daryosi, dunyodagi eng uzun, Janubiy Afrika shimolga oqadi, o'rta ichiga bo'shatish. Bu Misr xalqi va uning atrofidagi xalqlarni hayot bilan ta'minladi, chunki bu mintaqadagi yagona asosiy suv manbai edi. Nilni suv bosishi tuproqni oziqlantiradigan boy, unumdor loyni olib keldi, chekinayotgan suvlar esa fermerlarga ekin ekishga imkon berdi. Nileometr bu suv sathini bashorat qilishga yordam berdi va odamlarga oldindan tayyorgarlik ko'rishga imkon berdi. Suv qachon ko'tarilishini yoki tushishini bilib, fermerlar suv toshqinidan oldin hosilni yig'ib olishlari yoki unga oldindan tayyorgarlik ko'rishlari mumkin edi.

Shunday qilib, Nileometr Nil bo'yida yashovchi odamlar uchun katta ahamiyatga ega edi. Ushbu vosita orqali ular daryoning xatti-harakatlarini yaxshiroq bashorat qilishlari mumkin edi, bu esa qishloq xo'jaligi amaliyotlarining o'z vaqtida bo'lishini, vodiy aholisi uchun oziq-ovqat xavfsizligi va farovonligini ta'minladi.

Al-Khwarizmi's place in modern education:

Al-Khwarizmi is rightfully considered one of the first encyclopedic scholars in the history of science due to his contributions to more than five fields of knowledge. His approach to science was systematic and logical. The tradition Al-Khwarizmi began was continued by scholars such as Ibn Sina, Al-Biruni, Leonardo da Vinci, Leibniz, Lomonosov, and Franklin.

Al-Khwarizmi’s work "Al-Kitab al-Mukhtasar fi Hisab al-Jabr wal-Muqabala" (The Compendious Book on Calculation by Completion and Balancing) was translated into Latin in the early 12th century by Robert of Chester, and its name was shortened to "algebra" in

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European languages (French and English) and "algebra" in German and Russian. Today, Al-Khwarizmi is recognized as the founder of the modern field of algebra.
In his "Zij," Al-Khwarizmi introduced the tangent function for the first time. In his work "Arithmetic," he developed a unique presentation style, which laid the foundation for the idea of algorithms. Over time, this idea has grown in importance and, in the present day, has become one of the most crucial factors in societal development—digital information processing and digital technology are based on Al-Khwarizmi's ideas.
Al-Khwarizmi's formula for human values remains relevant throughout the ages. If a person is of good character, they are equal to one (1). If they are also beautiful, add a zero (0) to the one, making the value 10. If the person is wealthy, add another zero, making the value 100. If their ancestry is pure, add one more zero, resulting in a value of 1000. However, if the factor of character (1) is removed from the equation, the person's value disappears, and any remaining zeros are worthless.
The American historian of science, George Sarton, described Al-Khwarizmi as "the greatest mathematician of his time and, if all factors are considered, one of the greatest mathematicians of all time." This assessment reflects Al-Khwarizmi's unmatched position in the development of world civilization.

Al-Fargani's Place in Modern Education:
Currently, eight works of Al-Fargani are known, all of which are related to astronomy. However, when studying Al-Fargani's scientific heritage, we realize that, in addition to astronomy, he was also a great expert in other fields, including hydrology, hydrometry, engineering hydrology, and waterworks engineering. These fields began to develop as distinct scientific disciplines in the mid-20th century, and Al-Fargani's contribution to their formation and development is undeniable. He also possessed deep knowledge in the field of optics, which is related to the physics of light. These fields began to evolve as separate sciences in the 20th century. Through his design and construction of the "Miqyas al-Nil" (Nile Meter) to measure the water level of the Nile River, Al-Fargani demonstrated knowledge of these modern sciences over 1100 years ago, long before they were established as formal disciplines. Without understanding the intricacies of these sciences, it would have been impossible to construct such a sophisticated water level measurement device.
The Nileometer was of great importance for the inhabitants of the Nile Valley, as it allowed them to predict whether the river's water levels would be high (indicating prosperity) or low (indicating famine). Scientifically, technically, and architecturally, the Nileometer was a remarkable device. It remained functional until 1946 in the Sayyolat al-Rod region of the Nile and remains the only device in world history that measured water consumption with such high accuracy for over 1100 years. This proves Al-Fargani's possession of highly advanced universal knowledge and his status as a brilliant scholar who far exceeded his time.
The centimeter-level precision for measuring water levels, which Al-Fargani proposed, is still used today on a global scale. It is also worth noting that modern devices used to measure sea and ocean water levels, such as the "Valday" and "Rordantsa" systems, are based on the principles of Al-Fargani's "Miqyas al-Nil." These modern devices are built on ideas that are approximately 1150 years old, and no better theory has been developed since then. In this regard, Al-Fargani was well ahead of his time in the 12th century.
Eastern scholars translated and commented on the works of Greek scientists into Arabic and other languages. Later, European scholars used these works. One such scholar, S. Friedrich,

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describes the period of Eastern Renaissance, stating: "Between 800-1200, Central Asia led the world in trade and economic development, the size and elegance of its cities, the refinement of its arts, and, above all, the rise in knowledge across many fields." Indeed, he did not say this for no reason. During this time, the East witnessed unparalleled scientific discoveries and the emergence of theoretical knowledge that had never been known before, particularly in the field of medicine, which continues to amaze us today.

"Islamic physicians and scholars, strongly influenced by Galen, Hippocrates, and the Greek scientists of Alexandria (Egypt), translated many of their works from Greek into Arabic and then developed new medical knowledge based on these texts." In fact, the scientific theories that Europeans today take pride in were, in many ways, derived from the knowledge created by Eastern scholars. The Renaissance in the West was based on the works and scientific heritage of thinkers from Central Asia.

According to the Orientalist scholar I.Yu. Krachkovskiy, "The current civilization's scientific and intellectual traditions grew up in the cradle of the East."

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