



Institutions of Higher Education from the Beginnings of Civilization to 600 A.D.

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Authors' contributions

This work was carried out in collaboration between all authors. Author LAG designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors AMC and CGM managed the analyses of the study and the literature searches. All authors read and approved the final manuscript.

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Review Article

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ABSTRACT

The human being tried, in one way or another, to satisfy his thirst for knowledge and look for ways to acquire, expand or generate it. In this sense, there are records of formal organizations dedicated to higher education (HE) since 1000 BC in China, and since 800 BC in India. Many of them functioned in monasteries dedicated mainly to religious studies, but without ceasing to impart knowledge about other disciplinary branches such as Medicine, Mathematics or Grammar. Other institutions, such as the Imperial Chinese Academy or the Great Taehak School in Korea, were oriented to the training of future workers in the imperial administration, with a marked pragmatic and Confucian cut. An advantage among HE centers in antiquity was the ease of allowing the migration of students and, therefore, of knowledge; because they did not yet have political or religious restrictions. Among its amazing characteristics, its organization with academic bodies, curricula,

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certificates of completion of studies and its own facilities stands out. The only distinction between HE establishments in antiquity and proper universities developed in the European Middle Ages was the legal autonomy of the latter, which allowed them to grant academic degrees.

Keywords: *Brahmanical Schools; Orthodox Christian Schools; Jundishapur Academy; Great Chinese State Academy; Pandidakterion of Constantinople.*

1. INTRODUCTION

There are ways to connect with the past that prevent you from walking forward freely. An example of this is a mistaken and recurring idea of believing that higher education (HE) began with universities, born in medieval Europe.

Throughout history, human civilization went through various ways of teaching and learning knowledge framed in what we now call HE, understanding it, according to the conceptualization of the United Nations Organization, as one that "allows individuals to expand their knowledge and skills, clearly express their thoughts both orally and in writing, understand and master abstract concepts and theories, and increase their understanding of their communities and the world" [1].

Therefore, the present review work proposes a journey on some of the HE establishments in Antiquity, emphasizing their most outstanding academic characteristics and their relationship with the socio-historical paradigm of the time. Many institutions had peculiarities shared with what would later be the medieval university model, such as:

- The students attending were both religious and secular.
- Disciplinary studies were taught on Theology, Grammar, Logic, Mathematics, Astronomy and Medicine.
- They had their own physical space.
- There was an academic body of expert professors.
- Some, such as the *Taixue Academy* in China or the *Jundishapur Academy* in the current state of Iran, granted a legal certificate upon completion and passing of studies [2,3].

On the contrary, they lacked some characteristics that the medieval university had, such as that the latter had legal autonomy (probably its main characteristic) and academic autonomy, because of the former. This did not prevent, in fact, that, in some way and in some

periods, it was subject to the government of the day, to economic control and even to censorship and eventual purges [2].

The beginnings of the institutionalization of HE establishments can be glimpsed in the monastic activity initiated during the fourth century, which promoted the reading, writing, translation, and preservation of texts in a systematized way; activity that was recommended by the Roman *Flavius Magnus Cassiodorus* or Cassiodorus (485-580 AD) in his book *De Institutione*, which outlines the scholastic curricular knowledge for the first time, organizing it in a first part with Christian theological studies, and in another second part with the 7 liberal arts: Trivium (Grammar, Logic and Rhetoric) and Quadrivium (Arithmetic, Geometry, Music and Astronomy) [2,4].

The term "University" derived from *universum* (from Latin, gathered into a whole), being first the "universitas magistrorum et scholarium" ("community of teachers and scholars"), first coined at the University of Bologna, founded in 1088 AD. Its feat as an institution can be traced back to the "Investiture Dispute", a political conflict initiated by the Pope Gregory VII and the Emperor Henry IV of Saxony, that occurred between 1075 and 1125 AD [5], which led to the reuse of Roman Law compiled by Justinian from 528 AD [6]. The *Justinian Digest* was first used by the Bologna School of Jurisprudence, thus becoming a center for learning legal knowledge that later led to its organization, by students, as the first Medieval University [2].

Thus, under the legislation of the Roman Empire, the State intervened in the HE, and a new discipline was initiated: Law, later taken as an object of study to create the University of Bologna, in its beginnings called School of Jurisprudence. Another example of systematization can be found with the Edict of Diocletian of 301 AD, which established teacher remuneration is established, with the sophists at the top of the list and the calculus teacher at the end of it [7].

The Roman Law then guaranteed, long after having emerged in ancient times, the establishment of a corporate university structure as non-human legal entities were recognized that could issue certificates or diplomas with legal value, thus giving birth to an instrument that would produce a cultural and social change soon [8]. This legal guarantee allowed the birth of the university as a corporation, based on a sense of belonging that in turn was enhanced by the associative rise of the first guilds [9]. Thus, the first universities emerged to develop the main objects of study of the time: Canon and Roman Law, Medicine, Theology and Philosophy [9].

Therefore, the medieval university was born as an institution with certain characteristics: a corporate structure with an independent intention of self-government, with a common purpose, with a physical location, founded by structures of political or religious power, and within the Christian culture product of medieval Europe. With it, the HE was institutionalized, granting the student a diploma that transcended his academic body [2].

By the time Roman law was coined, the world's population was estimated to be 200 million people by 400 A.D., distributed at 70 million in the Roman Empire and 70 million in China; it amounted to 400 million by 1200 A.D. As we will see below, both in the Roman Empire and in China, there was already a fertile mass of population that, without a doubt, began its first attempts to expand, transmit and generate new knowledge.

HE establishments in Antiquity sprouted for several reasons:

- As a social need for knowledge on the part of man,
- As a means for knowledge to function as an instrument of civilization,
- As an opportunity for social mobility,
- As a trainer of state, elite or upper caste officials,
- To favor economies directly and indirectly
- To serve power structures such as the church and empires, where knowledge is clearly positioned at the service of power.

This mini review was made based on searches of articles, doctoral theses and academic compilation works in indexed search engines. A brief description of each institution will be

developed below, ordering them chronologically according to the year of their foundation.

2. INSTITUTIONS OF HIGHER EDUCATION FROM THE BEGINNINGS OF CIVILIZATION TO 600 A.D.

The "Houses of Life" or *Per-Ankh* of Ancient Egypt (2200 - 30 BC): In Ancient Egypt, a civilization that began in 3050 BC with the first line of kings, there are references to establishments called "Houses of Life" or *Per-Ankh* around 2200 BC, during the Old Kingdom, although without references to their meaning. Later, during the Middle Kingdom (1850-1700 BC) and the New Kingdom of Ancient Egypt (1550-1070 BC), the so-called "Houses of Life" were already associated with the transmission of knowledge and located near temples [10].

During this historical period coexisted a magical-religious medicine, exercised by priests of Sekhmet (goddess of war and health) who were trained in the temples, and an empirical medicine, exercised by doctors called *swnw* (many of whom were also priests), who began to specialize in different branches of medicine such as, for example, ophthalmology and reconstructive plastic surgery, circa 400-500 BC [11]. This dual aspect of medicine occurred because disease was seen as the result of a combination of natural and supernatural agents. Medicine, astronomy, mathematics, religion, and foreign languages were taught.

The houses of life were addressed to children of the upper castes and located in the vicinity of religious temples [7]. Although it is still doubtful whether these institutions functioned as educational establishments for future doctors, their role as a library and papyrus archive is confirmed [12,13].

Brahmanical Taksasilā School (800 BC – 500 AD): Ancient India emerged as a civilization around 3300 BC and coexisted alongside the Mesopotamian and Ancient Egyptian civilizations. During the Vedic period, beginning in 1500 BC and ending around 600 BC, the Vedas were composed, religious hymns written by *Rishis* (priests), which gave rise to Hinduism. In that Ancient India the Brahmanical schools emerged, from the priestly caste (the Brahmins), during the Vedic period. There were an enormous number of such schools of HE spread

far and wide, of which the oldest excavated to date was Taksasilā (Fig. 1). These schools offered studies lasting up to 16 years [14] and were part of six auxiliary disciplines (*vedāngam* or *Vedāngas*) that dealt with the teaching of the Vedas.

The Taksasilā School (also known as Taxila or Taksasila), located in present-day Pakistan in the Punjab district, functioned from 800 BC or earlier, as an HE center with disciplinary learning. It was formed by multiple monasteries (viharas), in which Grammar, Metric, Music, Poetry, Etymology, Medicine, Astronomy, military sciences and spiritual knowledge were taught, in small groups of students with the teacher, and using Buddhist and Hindu texts. In it were formed the renowned physician Charaka, considered the father of Indian Medicine, which greatly influenced Ayurveda, and the grammarian Sanskrit, who codified the rules that defined the classical Sanskrit language. It ceased its activity around 500 AD when the city was destroyed by the Huns [7,15].

Athenian schools of philosophy (387 BC – 529 AD): As primitive antecedents, there are the Pythagorean Schools during the pre-Socratic period, although they were not open to the public or institutionalized [2]. These, led in their beginnings by Pythagoras (572-497 BC), admitted men and women of various ages [16].

The main exponents of the Athenian schools of philosophy were:

- The Academy¹ of Athens: was founded by Plato in 386-387 BC, who had written the book *The Republic (Politeia)*, in 370 BC, composed of 10 books, referring specifically to the importance of the SE in society in the third [17]. The Academy functioned in different ways for 900 years, until the Roman Emperor Justinian in 529 AD closed it because he considered that it provided pagan knowledge that was not under Christian doctrine. Both men and women were admitted to this Academy, and teaching was exercised through the dialectical method (thesis-antithesis-synthesis). Dialectics, Arithmetic, Planimetry, Trigonometry, Astronomy, Music, Mathematics and Geometry were

¹ Academy refers to a locality, around the mausoleum of the hero of Greek mythology, Akademos, where Plato had a property.

studied; with special emphasis on the last two as a requirement to study philosophy and understand the world of ideas [14].

- The School of Oratory of Isocrates, founded in 392 BC, where Oratory and Ethics were taught [7]. Isocrates (436-338 BC) considered that the learning of speech should be harmonized with education for life and in his works *Against the Sophists* (391 BC) and *Antidosis* (351 BC), he defended the value of the word. Rhetoric was a major subject in the curriculum for training politicians and for education.
- Aristotle (384-322 BC), disciple of Plato for 20 years, and tutor of Alexander the Great, founded the Lyceum in 335 BC, which functioned until 86 BC. In its beginnings, it had an economic sponsorship by Alexander the Great. Aristotle's Lyceum² (Fig. 2), also called Peripatos (hence the name Peripatetics for his disciples, for the "art of walking thinking"), organized its teachings with complex morning readings, and with evening readings easier to understand.
- Two other Athenian schools, later, were The Garden of Epicurus (306 or 307 BC), where respect for nature was promoted, and the Stoic School (301 BC), where Philosophy, Logic and Ethics were taught [2]. Epicurus, at the age of thirty-two, together with his brothers, opens a school in Mytilene. The following year he settled in Lampsaco, an important center for philosophy and mathematics studies, but after 5 years he settled in Athens, where he set up his school in the garden of his house [18]. There were women studying philosophy.
- The Stoic School, founded by Zeno of Citium in the fourth century BC; it consisted of exercising virtue through science, resulting in practice in a philosophy of life.

Finally, the closure of Athenian schools promoted that HE teaching was moved to monasteries, cathedrals, and the Jundishapur Academy [14].

² Lyceum comes from its proximity to the temple of Apollo Lukeios.



Fig. 1. Ruins of the Taxila Buddhist Monastery, present-day Pakistan. Wikimedia Commons



Fig. 2. Ruins of Aristotle's Lyceum, Athens

School of Alexandria (288 BC – 391 AD): Founded by Alexander the Great (356-323 BC) in 331 BC, the Egyptian city of Alexandria was the center of Greek culture in the Hellenistic era and the birthplace of numerous intellectuals such as Aristarchus of Samos, Hipparchus of Nicaea, Eratosthenes, Euclid, Praxágoras, Heron, and Hypatia. The Macedonian Empire managed to gather knowledge from East and West. There lived together Coptic Egyptians, Greeks and Jews who achieved a great cultural exchange [19].

Both the School and its famous library were part of the *Museion*, the largest scientific establishment in the world until then, created by the ruler of Egypt Ptolemy I Soter (323-283 BC). It is estimated that his library once housed 700,000 papyrus scrolls equivalent to 100,000 printed books [20]. There, philosophy acquired importance in relation to Hellenic, Jewish, and later Christian theology [19].

Some characteristics of the School of Alexandria were that: it was the cradle of numerous intellectuals thanks to the existing intellectual freedom, academic research was carried out, the first chair of Anatomy in history was created there (founded by Herophilus with his disciple Erasítrato around 300 BC), and there were women teachers [21]. Claudius Galen (129-216 AD), a great Greek physician and philosopher, was one of his famous students [20].

The school was active until 300 AD, although it fell into oblivion after the destruction and Christian fire instigated by Theodosius I in 391 AD [22].

The *Dà xué* or Great State Academy, during the Han Chinese Imperial Dynasty (141 BC - 1898 AD): HE in China began long before the *Keju*, the Chinese Imperial Examination, whose aim was not to impart knowledge but to train students for public service in imperial China, to recruit senior state officials. Established in 606 A.D. and abolished in 1905 A.D., it represented the only opportunity for social mobility and legitimized, in turn, Confucian doctrine in Imperial China [23,24].

The beginnings of the Chinese HE was influenced by Buddhist and Taoist texts, and by the theory of the five elements, a philosophical theory that considers the five fundamental elements of the universe (wood, fire, earth, metal, and water) to describe the interaction between living beings and their environment. This theory dates to the Xia Dynasty (2070-1600 BC). Later, during the Western Zhou Dynasty (1046-771 BC), the five public schools (*Oh Hak*) were founded around 1000 BC for the SE of young and male aristocrats, who studied there for 9 years. They were: Piyong, Dongxu, Guzong, Chengjun and Shangxiang [24,25].

Then, during the Eastern Zhou Dynasty (770-476 BC), the *Jixia* Academy of HS was founded, with private management, and some intellectual

autonomy that promoted philosophical debates, which only existed for 200 years [23,24].

Confucius (551-479 BC) was a Chinese thinker, educator and politician who supported public education and equal opportunities. He created a tradition based on moral values and rituals supported by the State to maintain a social order, where respect for the rules and authority of the elderly constituted the backbone of his doctrine. He himself taught in his private school the "6 arts" or skills: Confucian rites, music, archery, horseback riding, calligraphy, and arithmetic [26].

Emperor Wu Di (141-87 BC) of the Han Dynasty unified the educational system and founded the first public institution of HS, called the Great State Academy or *Dà xué*. He was part of the *Taixue* Regime (tai "supreme" xue "education"), which consisted of founding an orthodox state academy to train state officials, in the capital Chang'an (present-day Xi'an), based on Confucian doctrine as a strategy to promote this ideology.

The full adoption of this doctrine ensured the basis for political, educational, geographical, cultural, and ideological unification in China.

Their teachers were called *Boshi* (Doctors), and the students, *Boshidizi*, who were recruited by the professors themselves or recommended by local official workers. All *Boshidizi* were to be over 18 years of age, dignified and healthy, knowledgeable about literature, and live by moral values. In turn, students were exempt from paying taxes and doing military service.

The five classical Confucian texts, chosen by Emperor Wu and his family, were studied, namely:

- The book of changes or mutations.
- The book of documents or history.
- The book of poetry.
- The book of rites.
- Spring and summer annals, containing historical accounts.

The duration of the training provided was one year for each classical text and ended with an examination that determined their future work. Upon completion and passing of studies, they were awarded a legal certificate called *jinshi* [2].

During the Sui Dynasty (581-618 AD), six HE institutions already coexisted in China [24]:

- The Grand Academy or *Dà xué*.
- The Directorate (*Guozijian*), aimed at educating the aristocracy.
- The School of the Four Gates (*simen xiaoxue*), where the Confucian classics were studied as in the first two.
- The School of Law.
- The School of Calligraphy.
- The School of Arithmetic.

Finally, the Great State Academy or *Dà xué* was replaced by Peking University in 1898 [26].

Roman Athenaeum (*Athenaeum*) for higher studies of youth (123 AD - fourth century):

It was built by the Roman Emperor Hadrian (*Publius Aelius Hadrianus*) (76-138 AD) who was a cultured man, admirer of Greek knowledge, and who had chosen to travel as a form of government to know the Empire. According to Royo Sanz (30), it can be inferred that travel influenced his assessment by the knowledge they provided both East and West. Hadrian had finished knowledge in arithmetic, geometry, painting, poetry, literature, philosophy, music, mathematics, and astronomy. He spoke and read in Latin and Greek and was the one who installed Greek culture in Latin society through architecture, among other aspects [27,28]. In addition, he was a great benefactor of Athens, improving its urbanization and building many monuments.

Hadrian's *Athenaeum*, built between 123 and 125 AD, and located near present-day Piazza Venezia in Rome, was the center of culture in the capital of the Roman Empire. As a study establishment it was intended for the upper classes of society, both young and old, for learning Greek literature, philosophy, rhetoric, and poetry; It had spaces, which functioned as classrooms or auditoriums. He remained in office until the end of the fourth century or the beginning of the fifth century A.D., and towards his end he had a chair of philosophy [28]. There came poets and orators from Greece and Asia Minor, who encouraged the exchange of knowledge. Hadrian himself prioritized the incorporation of educated and wise people for government positions [29,30].

The *Athenaeum* was modeled after the Athenian higher schools, of which Hadrian was a great admirer. Although it functioned as an institution dedicated to teaching, its auditorium also held

Senate meetings and cultural conferences open to the public [28].

The closure of Athenian schools promoted the transfer of HE teaching to monasteries, cathedrals, and the Academy of Jundishapur.

Urhay and Nisibis Orthodox Christian Schools (fourth century – 489 AD): These schools, like the Academy of Jundishapur, were promoters of a fusion between Greco-Roman and Eastern culture.

The Syriac Nestorian Christians (named after Nestorius (381-451), patriarch of Constantinople from 428 to 431) were Christians who preached a distinction between the human and divine nature of Christ, for which they were persecuted and exiled after the Council of Ephesus in A.D. 431 [31]. Through them, the encounter of Western and Eastern knowledge of Alexandria migrated to the theological school of Antioch, founded between the third and fourth centuries [32].

Later, during the century, the Urhay School was founded in Edessa (present-day Sanliurfa, Turkey), where they taught, in addition to theological studies, medicine, Aristotelian philosophy, history, and astronomy. But Greek influence contributed to the translation of texts into Aramaic, and translation developed as a discipline; among others, Aristotle's *Analytica* and Porphyry's *Isagoge* were translated. This school competed with that of Alexandria for some time, until it was closed in 489 AD, due to the persecution of the Nestorians after the Councils of Ephesus and Chalcedon [3,33].

Heir to the School of Urhay was the School of Nisibis, in the homonymous city (present-day Nusaybin, Turkey), founded in 425 AD [21]. This city shared with Urhay that its population was of Babylonian Assyrian origin, and in both Aramaic was spoken.

After the closures of their schools due to the persecution of the Byzantine Church, the Nestorian intellectuals found refuge in the Academy of Jundishapur.

Great Taehak School or National Confucian Academy in Korea (372 AD – 682 AD): Between 57 BC and 668 AD, the "Three Kingdoms Period" (Koguro, Baekje and Silla) took place, from which began a political and

social Confucian tradition that extended to the educational field. The educational tradition of the time had a great influence on the part of China, a more culturally advanced society and from which Korea took the model of ES [34,25].

The Great Taehak School, built in 372 AD during the second year of the reign of King Sosurim of Koguro (25), was the first formal HE institution for the disciplinary training of the elites or aristocratic classes of Korean society who, in the future, would work for the Imperial administration [35]. The Academy was established under the influence of the Chinese Eastern Jin Dynasty, which maintained close relations with the Kingdom of Koguro, also known as the Kingdom of Goguryeo [36].

Only men were admitted [25], and the Confucian classics, Poetry, Law, History, Medicine, Foreign Languages, Accounting, Mathematics, Archery, Music, and Rules of Court etiquette were taught [36].

Chinese influence on education also manifested itself in the teaching of classical Chinese texts on literature and history [34,35].

In 682 AD, under the Kingdom of Silla, the national educational system was unified, establishing the National Confucian College (*Gukhak*), with courses lasting up to nine years [36].

Schools in Buddhist Monastery (Mahāvihāra) of Nālandā (425 AD – 1205 AD): Buddhism is a philosophical current that follows the teachings of The Buddha (Siddhartha Gautama), who lived approximately between 563 and 483 BC in India.

The monasteries, located in present-day India, began their activity around 400 BC. They taught from Buddhist and Hindu texts, Philosophy, Sanskrit, Grammar, Logic, Physics, Cosmology, Medicine, Pharmacy and Surgery [14]. The best known is that of Nālandā, but there were many others, including Valabhi (Gujarat), Jagaddla (Bangladesh), Pushpagiri (Odisha), Varanasi (Uttar Pradesh), Odantapuri (Bihar) [15]

The Buddhist Monastery of Nālandā (Figs. 3, 4 and 5), in Bihar, northern India, was built in 425 AD and ceased its activities in 1205 AD; It had a library and an observatory. It received mainly Chinese students and was related to

other monasteries (Vikramashila, Jaggadala, Somapura and Odantapura), with which it constituted an educational network within which the exchange of knowledge, academic and student was facilitated [9,26]. Students entered around the age of 20, and there was even a

network of schools that helped students to enter Nālandā [15].

Excavations conducted around Nālandā Monastery in 2018 revealed an area of at least 7.25 square kilometers [37].

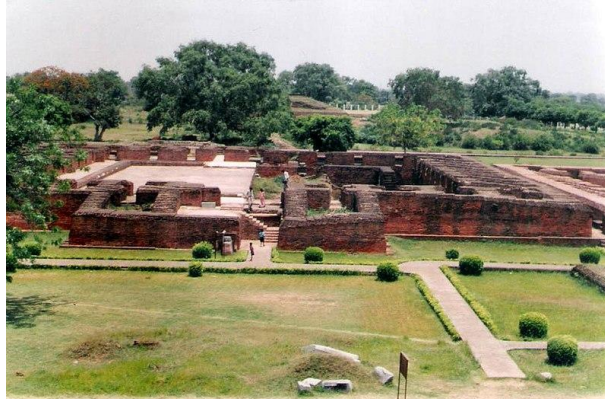


Fig. 3. Ruins of the Buddhist Monastery of Nālandā, present-day India. Wikimedia Commons



Fig. 4. Ruins of the Buddhist Monastery of Nālandā, present-day India. Wikimedia Commons



Fig. 5. Ruins of Nālandā Monastery. Wikimedia Commons

The Pandakterion of Constantinople (425 AD - 1453 AD): This great Byzantine settlement, also known as the Imperial University of Constantinople, was started by Constantine II in 340 AD, and founded in 425 AD by Roman Emperor Theodosius II (408-450 AD) in the capital of the Eastern Roman Empire or Byzantine Empire, to train officials to serve the State and the Church [38].

In its beginnings it had an academic body composed of 31 professors who taught Law, Philosophy, Arithmetic, Geometry, Astronomy, Music, and Rhetoric. Priority was given to the teaching of literature and oratory through Greco-Byzantine texts [39].

Later, the seven liberal arts began to be taught: the Trivium with *Grammar, Rhetoric and Dialectics*; and the Quadrivium with Arithmetic, Geometry, Music, and Astronomy. Law, Medicine, and Philosophy were also taught, the latter as a synthesis of all knowledge [4,9]. It had a community of students since 849 AD [7].

It functioned until the Ottoman occupation in 1453 when, after 1213 years of history, it was replaced by an Arab madrasa [38].

Academy of Jundishapur or Gondishapur (550 to 560 AD – 1100 to 1200 AD): The Sassanid Dynasty ruled the Persian Empire from 224 to 651 AD, when the Muslim conquest began.

The city of Jundishapur was created in 260 AD by the Sassanid king Shapur I in present-day Iran to locate Greco-Roman prisoners captured after the triumph over the Roman Emperor Valerius at the Battle of Edessa (present-day Sanliurfa, Turkey) [3].

The Persian behavior, tolerant with the prisoners and open to the reception of new knowledge from other cultures, fostered the growth of the city. There irrigation canals were built to promote the cultivation of sugar, fruit trees, olives, dates, cotton, honey, and various components of the future herbal pharmaceutical formulas used in the Great Pharmacopoeia of Jundishapur [40].

Its citizens were mainly Greco-Roman and Nestorian Christians, and there was also an Indian community towards the late period.

During the founding of the city, Shapur I summoned Greek, Indian and, later, exiled

Nestorian Syriac Christian doctors, who already had an HE establishment in Edessa (present-day Sanliurfa, Turkey) and in Nisibis (present-day Nusaybin, Turkey) [21]. However, this antecedent of fusion between Greek, Indian and Persian medicine did not begin with the Sassanids but with the earlier Persian Zoroastrians, followers of Zoroaster (also called Zarathustra, between 1500 and 1000 BC [40].

While academic activities can be traced back to the very foundation of the city, it was the Sassanid king Shapur II (309-379 AD) who created the medical school, while the Academy of Jundishapur was formally established by the Sassanid king Khosrau I (501-579 AD). He specialized in the teaching of medicine, and his influence on science and culture lasted four centuries [31].

Greek influence over the Academy was predominant after the School of Athens was closed in 529 AD by Emperor Justinian. One of the philosophers exiled in Jundishapur was Diogenes [3].

At the Jundishapur Academy, annual international meetings were held to discuss medical and philosophical issues (the first was held in 550 AD in the city of Ctesiphon). Texts were also compiled and written, examinations were taken to obtain qualifying licenses, and a curriculum believed to have lasted three years for medical studies was used. After going through the curricular courses, the student had to pass an exam to obtain his certificate. The texts used were mostly Zoroastrian, Greek and Hindu [26].

Teachers chose their students; and Philosophy, Logic, Theology, Medicine, Mathematics, Geometry and Astronomy were taught.

During the time, there was still no clear division between Philosophy and Medicine; In fact, every physician had to have philosophical knowledge [32,41].

The Academy had a policy of tolerance, peace, religious and academic freedom, and operated with a great sense of ethics. It was a cosmopolitan, international, and multilingual center (mainly, Greek and Syriac and, to a lesser extent, Pahlavi were spoken and written) that received students of various nationalities and religions; mostly from China, Greece, Arabia, Syria, Egypt, India, and Rome. Many of them were Nestorians, Jews, Christians, pagans

deported by the Roman Empire, Zoroastrians, Hindus and, later, Muslims [42,43].

It was the most important medical school in the ancient world during the 600s and 700s AD. In this medical school were also annexed:

- The first teaching hospital in the world (*Bimaristan*, in Persian for "place for the sick"), in whose vicinity the students were housed.
- A library.
- A pharmacological laboratory.
- A text translation cabinet.
- An observatory, with teaching and research activities.

There Ethnomedicine was taught, considering the patient's community; and Music, to treat psychiatric pathologies. His teaching was theoretical-practical, with medical specialties and clinical athenaeums. The students resided in the hospital to assist their teachers [3].

The city of Jundishapur surrendered to the Muslim invasion in 636 AD. Although the Hospital continued to function, the Abbasid Caliph al-Mansur in 762 AD moved the capital to Baghdad [44], then began a gradual and definitive migration of doctors there, where a new Hospital (*Bimaristan*,) was established between 786 and 809 AD. This is how the Jundishapur Hospital ended up closing its doors between 1100-1200 AD. In Baghdad, the "House of Wisdom" (*Bayt al-Hikma*) begun in 830 AD succeeded in some knowledge to the Academy of Jundishapur [40]. It is then evident how the Academy of Jundishapur had great influence on the Islamic medical HE. Its ruins are located at an archaeological site near the city of Dezful, Iran.

3. CONCLUSION

During this journey of almost 1600 years of history it was evident that many of the qualities of HE establishments in antiquity were shared centuries later by the European medieval university model. Some of those qualities, not necessarily shared by all HE establishments in antiquity, were that:

- Religious, secular, and students from different territories attended.
- Disciplinary studies such as Theology, Literature, Art, Grammar, Logic, Mathematics, Astronomy and Medicine were taught.

- They had their own physical spaces.
- There was an academic body.
- Final exams were taken.
- Some awarded a certificate upon completion and passing of studies.

Many of these institutions were avant-garde establishments that enjoyed intellectual and religious freedom, as could be observed in the Athenian Schools of Philosophy, the School of Alexandria, and the Academy of Jundishapur. Surely, this characteristic promoted the creation of knowledge, and, at this point, they were institutions that were better adapted than medieval universities to the current concept of academic freedom.

The migration of students since, according to the time, they did not yet have strong restrictions of a political or religious nature, facilitated the exchange of knowledge between HE centers in antiquity.

The most significant distinction between HE establishments in antiquity and the universities proper of the Middle Ages was the legal autonomy of the latter, which allowed them to grant academic degrees as institutions with legal personality. However, it is difficult to imagine the creation of knowledge as a promoter of social progress in the absence of true academic freedom. And, in this sense, although medieval universities had a milestone: being carriers of a legal autonomy that allowed them to grant academic degrees (bachelor, licentiate, magister and doctorate), they were repeatedly subjected by academic limits of political, religious, and economic origin.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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