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A first version of this text was presented and discussed at a round-table of the XXIIth International Congress of Historical Sciences (Poznań 2020/2022)

Forms of Higher Education in Ancient Civilizations and beyond Europe[1]

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Abstract. This paper offers a global overview of the various forms of « higher education » which appeared in ancient civilizations and/or out of Europe, considering their particularities and their specific context, without linking them teleologically to the universities as they evolved since their emergence in medieval Europe. It describes the main types of institutions established from the Vth century BC in the major cultural areas : Chinese, Buddhist, Indian, Hellenic then Greek-Roman, Persian, Arabic-Muslim and finally in the Christian West. The main purpose is to provide a non-Eurocentric, *longue durée* background to studies on education.

Résumé. On propose un aperçu général des formes d'enseignements supérieurs apparues dans les civilisations anciennes ou hors d'Europe, en les considérant dans leurs spécificités et sans les relier téléologiquement aux universités telles qu'elles ont évolué depuis leur émergence dans l'Europe médiévale. Sont passés en revue les principaux types d'institutions créés à partir du Ve siècle avant J.-C. dans les grandes aires culturelles : chinoise, bouddhiste, indienne, grecque puis gréco-romaine, perse, arabo-musulmane et enfin dans l'Occident chrétien. L'objectif est de fournir aux études sur l'enseignement des points de repère et des questions dans une histoire longue, non « eurocentrée ».

Key words: history of higher education, China, Corea, Viet-Nam, India, Ancient Greece, Hellenistic world, Roman empire, Persia, Islamic world, cathedral schools, medieval universities

mots-clés : histoire de l'enseignement supérieur, Chine, Corée, Japon, Viet-Nam, Inde, Grèce antique, monde hellénistique, empire romain, Perse, monde islamique, écoles cathédrales, université médiévale.

1 A first version of this text was presented and discussed at a round-table of the XXIIth International Congress of Historical Sciences (Poznań 2020/2022).

Within the framework of the French National Research Agency's Geosciences programme, a group of historians, sociologists and geographers conducted a wide-ranging study of the evolution of higher education over the past four centuries.[4] This work, in turn, became an incentive to approach the subject from an even more global historical perspective, to inquire about what lied beyond, i.e. to trace the origins of higher education as they were shaped in ancient civilizations or outside modern Europe. The present paper is a synthesizing exercise, based on secondary sources that I hope to have adequately selected, with obvious limitations, and on which criticisms and further inputs by readers will be welcome.

This work inscribes itself in two movements in the history of science: one that, in recent decades, has broadened from the content of knowledge to the ways in which it is acquired, its practices and their institutional context; and a similarly long effort to "de-europeanize" our perceptions of history.

My motivation was twofold. First, a historian's curiosity can occasionally lead, beyond his main research focus, to teach the history of science and technology over an extended period; it was in this spirit that I devoted a part of my course to a longue durée history of higher education. Second, there was an issue with the vocabulary. The word university is indeed too often used anachronistically, teleologically, to designate places of knowledge that in fact pertained to other political or cognitive determinants.[5]. It would thus be preferable to designate these various organisations by the original names they were given within their specific contexts.

The scope will therefore be limited to institutional history, focusing on the major organizations and models, without attempting exhaustiveness, and resisting the temptation to expand on the knowledge content that was taught or to embark upon a universal history. Such a global approach is necessarily limited to the major written-word civilizations: we will probably never know how the Celtic druids, the learned leaders of the Inca empire or those of ancient sub-Saharan Africa were trained.

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4 The Geosciences project, entitled « Local, national, global science in a changing world. A socio-geographical approach of academic scientific activities and institutions », aimed to explore the underlying logic supporting the geographical deployment of scientific activity at different scales. The results of these studies called into question a number of preconceptions, namely that of a supposedly increasing domination of "world-class cities" (when in fact the opposite occurs) or the phenomenon of globalisation (which does not erase national contexts).

5 See for instance the Wikipedia entry on the University of Nanjing, whose official history describes its 2nd-8th century predecessors (*Taixue*) in modern American academic terms (University, campus, president, etc.). The same present-day abusive terminology applies to the ancient madrassas of Marrakech and other Muslim cities, or in India where, furthermore, nationalists have adopted a highly chauvinistic view of the history of science https://www.nature.com/articles/d41586-019-02243-x.

All these institutions originally developed as « something different, and something more » than the simple gathering of disciples around a master, or of apprentices around a renowned professional. Such groups existed everywhere in the ancient world, attracted by sages, gurus or visionaries (among whom the most famous remain Socrates, Buddha, Confucius and Jesus), Greek rhetoricians and sophists who made a living thanks to their oratorical talent and sold communication training, « philosophers » teaching how to lead a good life, whom the historian Paul Veyne compares to our modern consultants. The institutional aspects of higher education centres I wish to study extended beyond the charisma and lifespan of an individual master, and generally brought together a range of expertise and possibly antagonistic points of view on various subjects; they usually included communal facilities, beginning with a library.

In medicine, the Hippocratic oath has conserved, like an insect fossilized in a drop of amber, the spirit of the master-disciple relations which ensured the transmission of this knowledge before the foundation of vocational schools:

I swear by Apollo Healer, by Asclepius, by Hygieia, by Panacea and by all the gods and goddesses, making them my witnesses, that I will carry out, according to my ability and judgment, this oath and this indenture.

To hold my teacher in this art equal to my own parents; to make him partner in my livelihood; when he is in need of money to share mine with him; to consider his family as my own brothers, and to teach them this art, if they want to learn it, without fee or indenture; to impart precept, oral instruction, and all other instruction to my own sons, the sons of my teacher, and to indentured pupils who have taken the Healer's oath, but to nobody else[6]. »

We will not go any further at this stage in defining « higher education », precisely because the present study aims to describe how this category emerged. But if one considers that the University, created in the 13th century in Western Europe, pertains from the outset to « higher education », it is neither the first nor the only institution throughout history to qualify for the term[7]. We will come back to this problem of definition in the conclusion.

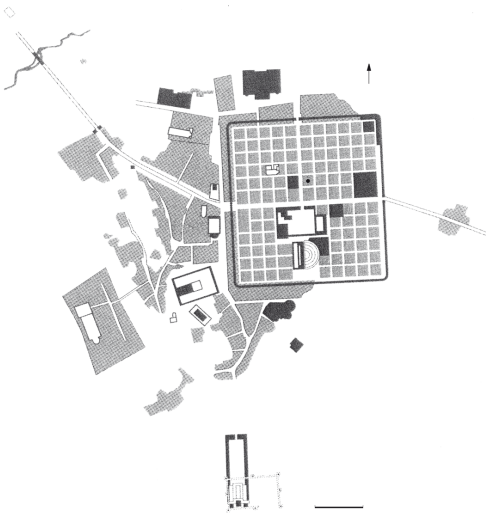
The bibliography is narrow, although growing since the past few decades. The main sources are monographies on the history of famous establishments (Alexandria library, Nisib school, etc.) and a few grand syntheses on education or science in ancient civilizations, where the organization of higher education is mentioned in scattered paragraph or footnotes, in the best cases in a few pages or a chapter (Marrou, Cribiore, Pélékidis, Djebbar, Mookerji, Scharfe, Karp & Schubring, etc.). Indirect sources, biographies sometimes mention an

6 « Hippocratic oath », translated by W.H.S. Jones, *Hippocrates of Cos* (1923). 1923). "The Oath", Loeb Classical Library. 147: 298–299. doi:10.4159/DLCL.hippocrates_cos-oath.1923.

7 For instance, William C. Harris' synthesis on « L'Education dans l'Antiquité », in Jean Leclant (ed.), *Dictionnaire de l'Antiquité*, Paris, PUF, 2005, speaks of « *l'enseignement supérieur* » (higher education) in the Greek-Roman world, in a very broad sense including Hellenistic ephebia or professionnal trainings, as well as rhetoric schools.

individual's scholarship – we know it well, for example, for Saint-Augustine who recounted it in his Confessions.

Which time frames does this long history, or rather collected histories, cover? Can creative moments, periods of development or contraction, gradual or brutal disappearances be identified? What motivated the existence of such institutions – and what do their names reveal about them? What were their relations with the political or religious authorities? Can their numbers be assessed? In what respect can they be considered as the « ancestors » of current universities? Such are the questions we will attempt to answer, when visiting in turn Indian, Chinese, Greek-Latin, Muslim and Christian cultural environments, up to the creation of Medieval universities.





One of the sources for the history of ancient higher education is archeology. Map of the Roman library of Timgad in its urban environment (Numidia, Algeria); ruins of Takshashila city (Pundjab, India).

One would be tempted, given wider documentation, to begin this review with Mesopotamia or Egypt. As early as the 2nd millennium BCE, Babylonian and, later, Assyrian kings possessed a rich library (that of Assurbanipal is kept in the British Museum); the king was assisted by a class of civil servants who were « experts » in medicine, divination, astrology and mathematics (I use modern categories here; at the time, these were known as diviners, exorcists and lamentators), who were taught in schools where they learned literature, numeracy, contract writing, as well as a dead language, i.e. Sumerian[8]. However, the notion of « school » may be seen as a contemporary substitute applied to archaeological finds that can be interpreted differently: in fact, teaching appears to have rather been provided in scholars' homes where apprentices were trained. A publication by Dominique Charpin, Reading and Writing in Babylon[9], offers both an elegant summary and a warning against projecting modern categories on ancient Mesopotamian cultures.

During the time of the New Kingdom in Pharaonic Egypt, the royal children of the Kep were trained in the homonymous school, and the « Houses of life » linked to the major religious centres were destined to train children of the elite; yet there is no indication that these were attended beyond adolescence[10]. Overall, studies conducted by Egyptologists and Assyriologists show that it is difficult to find traces of institutionalized « higher education » among those ancient civilizations prior to the 5th century BCE.

To what extent can the initiatory Pythagorean brotherhood, established in the 6th century BCE in Southern Italy to train the elite in philosophy and mathematical research, be considered as a « first » institute of higher education? The answer is far from straightforward, as the texts describing it date from a much later period and may be considered legend as much as history.

8 James Ritter, « Babylone 1800 », in Michel Serres (ed.*), Éléments d'Histoire des sciences*, Paris, p. 17-37.

9 Dominique Charpin, *Reading and Writing in Babylon*, Harvard University Press; Translation edition (January 3, 2011).

10 Amandine Marshall, *Être un enfant en Égypte ancienne*, Paris, Éditions du Rocher, 2014.

The Indian cultural scene[11]

The most ancient known example appears to have been situated in Northern India, in Gandhara (current Penjab in Pakistan): Takṣaśilā (Taxila in Greek), a regional capital and trade hub towards central Asia, became a major centre of higher education as early as the 5th century BCE[12]. As far as can be known, given the current sources available, scholars were attracted there thanks to the city's prosperity and the protection offered by its rulers. From various standpoints, it is a case of an emerging configuration. First, because the period indicates that these learned societies appeared prior to the use of Brahmi script (itself a subject of controversy[13]) and would imply that teaching was initially oral. Second, because Takṣaśilā seems to have hosted a concentration of masters and disciples, not a common educational institution, with the exception of local Hindu and Buddhist monasteries: each teacher (guru) taught from home. There were no diplomas, nor were tuition fees systematically required, knowledge being considered as an end in itself. Students were admitted around the age of 16 if their level was considered acceptable, to learn Sanskrit grammar, Vedic and later Buddhist classics, law, medicine, astronomy/astrology, divination and martial arts. Among the famous scholars that the Indian tradition links to Takṣaśilā, Pāṇini, the « father of linguistics », probably taught there. This far-ranging centre, considered as the first intellectual capital of India, operated during a thousand years, under alternately Indian, Persian and Greek rule, until the city was destroyed by the Huns around 500 CE. One would wish to know more about the way its practices, institutions and numbers evolved, as well as its role in intellectual interaction between India and the Western world.

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11 Agathe Keller and Alexei Volkov, "Mathematics Education in Oriental Antiquity and Middle Ages", in Alexander Karp & Gert Schubring (eds.), *Handbook on the History of Mathematics Education*, New York, Springer, 2014.

12 Bridget & Raymond Allchin, *The Rise of Civilization in India and Pakistan*, Cambridge University Press, 1982. Radha Kumud Mookerji, *Ancient Indian education: Brahmanical and Buddhist* (2nd ed.). Delhi, Motilal Banarsidass, 1989. Ancient Takṣaśilā is well known by archeologists thanks to research conducted by Sir John Marshall, but unfortunately it is difficult to find studies of its history as a centre of learning that are not tainted with nationalism or legend. Strabo is a worthy source of information: on the basis of his critical examination of sources available in his time in Greek, he describes what he knows of Taxila, « a large city, and governed by good laws », http://www.perseus.tufts.edu/hopper/text?doc=Perseus:text:1999.01.0239:book=15:chapter=1&highlight=taxila and of the interesting mores and beliefs of the « Brachmans » or of the gymnosophists, the fakir-philosphers encountered by Alexander's companions.

http://www.perseus.tufts.edu/hopper/text?doc=Perseus:text:1999.01.0239:book=15:chapter=1&highlight=brachmanes.

13 For a concluding demonstration on this controversy, see Hartmut Scharfe, *Education in Ancient India*, Leyde, Brill, 2002, p. 9-13.

Later and further East, in the current state of Bihar, the Buddhist monastery of Nālandā, founded during the 2nd century CE, expanded thanks to donations from the successive royal dynasties[14]. Its history is much better documented[15]. Boasting a library and an observatory, it was home to some four thousand students when the Chinese monk Xuanzang stayed there in the 7th century. According to this famous witness, access was limited by a series of difficult tests which two thirds of the candidates failed. Subjects included grammar, linguistics and Buddhist texts, but also the sources of Hinduism (Vedas and Upanishads) taught by Brahmans, and logic, medicine, pharmacy and surgery, as well as physics and cosmology. As in Western Christian monasteries, young monks were required to copy manuscripts. To graduate, students had to defend a kind of thesis.

With up to 10,000 monks at its peak, the « great monastery » (*mahāvihāra*) of Nālandā became in turn a major centre of Indian thought, its influence spreading over a large part of Southeast Asia, attracting student monks from all the Buddhist countries. Nālandā was a model for other scholarly monasteries founded by rājas, such as Odantapura or Vikramaśīla which attracted about a hundred teachers and a thousand students, essentially focusing on Buddhist philosophy and Sanskrit studies. Most of these monasteries would be eventually destroyed in circa 1200 CE by Muslim invaders, and their reconstruction prevented by Brahmans, thus contributing to eliminate Buddhism from its country of origin[16].

During the same period, the Cambodian capital Angkor was at its height with a large monastery comprising a school and a library which also attracted student-monks from all the Buddhist world. Angkor would eventually be looted by Siamese troops in the 15th century and relinquished to the jungle.

Yet the main direct European witness, Onesicritos, hardly described more than the "gymnosophists" whose explanations he could only understand through two interpreters (Paul Pédech, *Historiens compagnons d'Alexandre*, Paris, CNRS-Les Belles Lettres, 1984, p. 104-118).

The best source on the history of education in ancient India, revisiting Mookerji's work, is Hartmut Scharfe, *Education in Ancient India*, Leyde, Brill, 2002, which analyzes with unusual attention the institutions and techniques of learning. Taxila is presented pp. 140-142, with the necessary distance regarding its legendary parts.

14 Max Deeg, « Nalanda : la plus vieille université du monde », *Pour la science*, n° 480, octobre 2017, p. 62-66. https://nalandauniv.edu.in/news/entre-nous-max-deeg-lifting-the-fog-on-nalanda/ And Philippe Cornu, *Dictionnaire encyclopédique du Bouddhisme*, Seuil, 2006. The ruins of an even older monastery, Pshpagiri, were discovered in 1995 and are studied by Indian archeologists.

15 See particularly Hartmut Scharfe, *Education in Ancient India*, Leyde, Brill, 2002, pp. 143-145 and 159-162,

16 Scott, David (May 1995). « Buddhism and Islam: Past to Present Encounters and Interfaith Lessons ». *Numen*. 42 (2): 141–155.

The Chinese cultural scene

Long before the Christian era, China possessed a network of schools in prefectures and large towns[17]. The Han dynasty enriched this educational system by creating imperial chairs for scholars who taught the Five Confucian Classics, and, in -124, the Imperial Academy (Taixue) to train high-level administrators[18]. Official Chinese history states that it counted 30,000 students, teachers and employees in the 2nd century CE. Its location changed according to successive dynasties' choice of imperial capital: Chang'an (today Xi'an), Nanjing from 258 CE, Peking from 1403 – these three cities now claiming the institution as the direct ancestor of their universities.[19] Over a four-year period, students would study philosophy, literature, history and the six fundamental Arts, i.e. Confucian rituals, music, archery, charioteering, calligraphy and. At the end of the 5th century training was divided between specialized schools: literature, history, Yi Jing[20] (Yin/Yang) and Tao philosophies, etc.

Subsequent Sui (581-618), Tang (618-907) and Song (960–1279) dynasties gradually established a system of imperial examinations to recruit high level administrators. By replacing co-optation with a competitive examination, the imperial power could better control its administration, facilitate national cultural unity and draw on a wider pool of skills than solely among the nobility. The examination was extraordinarily formalized to prevent fraud and favouritism. Selection was mainly based on literary skills: first, mastery of thousands of

17 Only a few reference points are given here, and the following paragraphs provide a considerably simplified view of the complex history of Chinese higher education. It is a protracted history punctuated by destructions, re-locations, reforms and revolutions, but where continuity can be witnessed by innumerable local efforts to save and revive the cultural heritage after each disaster and by the recurrent assertion of this continuity. This is obvious on the sites of the main Chinese universities, where the official discourse, however, remains discreet on the consequences of the maoist « cultural revolution ». For the record, higher ducation was radically suppressed by the maoist regime between 1966 and 1978, so that China lost a generation of teachers and students, with enduring consequences. (Cong Cao, « La Chine puissance technoscientifique », in Dominique Pestre (ed.), *Histoire des sciences et des savoirs*, t. 3 : le siècle des technosciences, Paris, Seuil, 2015, p. 449-450).

18 The term *Taixue* / *Dàxué* (大學) means both High level institution and Higher learning, the latter being a canonical text attributed to Confucius, completed by a ten chapter commentary written by one of his disciples. The term *Nánjīng Dàxué* is still used to designate the university of Nanjing. Historian Anne Cheng stresses that « *Confucianism* » is a foreign category, copied from *Christianism* or *Buddhism* and applied to Chinese culture.

19 Today bearing the name Xi'an, Chang'an was the capital of the Qin dynasty (221-210 BCE), the Han (202 BCE - 220) and the Tang (618-907). Under the Tang rulers, Chang'an may have been the largest city in the world (two million inhabitants).

20 *The Book of Changes* : the first and oldest of the five classics.

ideograms, second, exact recall of Chinese classics and ability to write a poem, a philosophical dissertation and a decree[21].

Mathematics and physics were originally part of the curriculum (we have lists of problems given for examinations), but gradually became marginalized in this system under the Ming dynasty, in favor of botanic and pharmacology. They were often left to practitioners or enlightened amateurs, as was the case in the West. However, in the 17th century, Kanxi, a leraned emperor, educated by Jesuits, established a College of mathematics to train young Manchu army officers. In 1723, this institution employed sixteen teachers for over 200 students[22].

Probably with a view to adapt to the recruitment system via examinations, the *Taixue* was replaced by the *Guozijian* (« School for the sons of the State »), while 400 private schools are said to have been established under the Song dynasty, some of them attracting up to a thousand disciples. Research was also encouraged, with imperial institutes of astronomy and medicine appearing in the region of Nanjing. The *Nánjīng Dàxué*, like the school of Peking, owned a highly active printing workshop prior to Gutenberg's time. At the start of the 15th century, it directed a vast project gathering several thousand contributors in view of creating an encyclopaedia (The Great Canon or Vast Documents of the Yongle era). The Nanjing Dàxué became the « first modern Chinese university » in the early 1920s, a quarter of a century after the ancient Peking *Guozijian* was converted into an imperial university (1898). Meanwhile, the Jesuits created institutions in Nanjing and Peking which were to become an integral part of Chinese higher education[23].

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21 Étienne Balazs, *La Bureaucratie céleste (recherches sur l'économie et la société de la Chine traditionnelle)*, Paris, Gallimard, 1968. Jacques Gernet, *L'Intelligence de la Chine*, (ch. « Éducation », p. 98-132). I am less convinced by Joseph Needham's work conducted in the mid-20th century, although he deserves credit for having delved into the history of science and technology in China and to « de-Europeanize the perspective», but who through political and cultural fervour, became a Chinese ultra-nationalist ! His work is thus somewhat biased – he attributes almost all inventions to China, and only considers modern Europe through a British lens. Contemporary Chinese historians eye him with sympathy but consider him outdated : « Beyond Needham » was the title of a session during the meeting of the Society for the History of Technology in Singapore in 2016. A close criticism of Needham's assertions can be found in Jean-Claude Martzloff's *History of Chinese Mathematics*.
https://books.google.com/books?hl=fr&lr=&id=ACK1jreKgCoC&oi=fnd&pg=PR7&dq=history+of+Chinese+mathematics&ots=ggOGBLCtZ3&sig=m_lk-ruvFAuRQjSL44AknV26WCI#v=onepage&q=history%20of%20Chinese%20mathematics&f=false .

22 Jean-Claude Martzloff, *History of Chinese Mathematics* (Foreword by Jacques Gernet and Jean Dhombres), Springer, 2007, pp. 26 and 82. The author highlights the major difficulty of translating the formal axiomatic reasoning inherited from the Greeks into the Chinese mathematical approach.

23 Peter Tze Ming Ng, « Paradigm Shift and the State of the Field in the Study of Christian Higher Education in China », *Cahiers d'Extrême-Asie*, 2001, n° 12, p. 127-140.

A similar type of institute of higher learning could be found in Vietnam, which was then within the range of Chinese cultural and political influence: the « temple of literature », a Confucian academy, built in 1070 CE, trained civilian or military high ranking administrators; a similar school was later established in Hué, the new capital. The system had sufficiently taken root in the 15th century to allow over 4 000 students on certain years to take part in the national or provincial competitions.[24].

In parallel, the main Buddhist monasteries generally included a school to train monks not only in literature and philosophy but also often in medicine and other forms of knowledge: a part of the curriculum was the Yi Jing, a venerable treatise containing an elaborate system of binary signs which was used to represent the states and changes of the world, in other words as a means of divination. Students whose interest lay in science had a vast corpus of treaties on astronomy, mechanics or chemistry at their disposal – but these were not essential for a classical education.

In Korea, aristocrats sent their sons to complete their education at the Sungkyunkwan. Established as an institute of higher learning in the 4th century CE under a different name (*Taehak*) in what was then the capital, Gaegyeong, and later moved to Seoul, this institution trained students in view of sitting civil service entrance examinations during the Joseon dynasty (1392-1897): literature (particularly Confucian classics), poetry, law, medicine, foreign languages, accountancy, mathematics, but also music, archery and court etiquette were included in the curriculum. It hosted 150 to 200 students living in luxury accommodation but subjected to strict discipline and frequent examinations. The *Sungkyunkwan* became a modern university in 1895, offering a 3-year curriculum[25].

Located North of Tokyo, the *Ashikaga gakkō* (Ashikaga school) was one of the oldest schools of higher learning in Japan. The date of its foundation, between the 9th and 13th century CE, remains controversial. We know that, in 1432, Shogun Uesugi Norizane endowed it with a large collection of classical Chinese books, a number of which are still kept in the place. Students came from all provinces of Japan to study Confucian literature, Chinese medicine and the Yi Jing. In the 16th Century, the school hosted 3 000 students. The Jesuit missionary François-Xavier described it as the largest university in Japan. It later underwent periods of ruin and prosperity, before disappearing in the 19th century.

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24 Nguyên Tùng, « Langues, écritures et littératures au Viêt-nam », *Aséanie, Sciences humaines en Asie du Sud-Est*, 2000, n° 5, p. 135-149.

25 Pan Suk Kim, « A historical overview of Korean public administration: discipline, education, association, international cooperation and beyond indigenization », *International Review of Administrative Sciences*, 2012, 78(2) 217–238. Et notice Wikipedia « Sungkyunkwan ».

Founded in the XVIIIth century in Edo (nowadays Tokyo), the *Shoheiko* (or Shoheizakagakumonjo) delivered prestigious diplomas, with a double purpose: training cadres for the shogunal government and teachers for secondary education. Note that Japan had organized a considerable school systeme during the Edo period (1603-1867), so that the alphabetization rate in the mid-XIXth century reached some 40 % of the population[26].

Greek-Roman civilization

Within the Ancient Greek cultural arena, the reference models are the two schools established in Athens in the early 4th century by Plato and Isocrates. The latter was a master rhetorician who directed his own private school for 50-odd years, making a fortune in the process[27]: students payed a flat fee for a complete training course lasting three to four years. They acquired general knowledge in literature and politics, along with the oratory skills required to participate in the city's democratic debates. His influence and fame remained strong up to the time of Cicero, within this Greek-Roman civilization where rhetoric was a major discipline.

Plato's Academy, founded in -387, had a very different purpose. Its judicial status was that of a religious brotherhood – where Muses were (uncompromisingly) venerated – and it partly drew its inspiration from the initiatory Pythagorean sect born two centuries before in Magna Grecia, in Southern Italy. The Pythagorean community aimed to train an elite of leaders through the quest for Beauty, Truth and the Good, i.e. through mathematical and philosophical research. Plato developed a similar programme over forty years and his Academy became so active that it soon developed into a breeding ground for scholars and state councillors (one is reminded of Aristoteles tutoring Alexander), surviving him by several centuries. The term *Academy* is simply that of a specific site near the mausoleum of the athlete Akademos, where Plato owned land: it does not originally evoke knowledge. One also spoke of the *Museion*, i.e. the house of the Muses[28].

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26 Jun Oba, *L'organisation du système éducatif japonais* (2018), février 2019, https://home.hiroshima-u.ac.jp/oba/index-f.html.

27 On Isocrates and his philosophy of the logos for the intellectual and political formation of citizen, read Monique Trédé's excellent entry in Jean Leclant (ed.), *Dictionnaire de l'Antiquité*, Paris, PUF, 2005 – a book which was a mine of informations for this part of our paper. See particularly W. C. Harris' long text on « L'Education dans l'Antiquité », which offered a short bibliography.

28 For a general view of the subject, see *Greek Thought: A Guide to Classical Knowledge* (Harvard University Press Reference Library)

Aristotle enjoyed the support of Alexander the Great, his former pupil, to found his «*Lyceum*» (a name referring to the nearby temple of Apollo Lukeios and not specifically referring to knowledge either). This royal patronage was exceptional, even unique at the time. Aristotle thus received the means to employ assistants and to gather in Athens manuscripts and collections, notably botanical and zoological samples, which enabled him to carry out his encyclopaedic work[29].

The radiance of Athens must not obscure the appearance of scholarly circles, then of higher schools in other Greek cities around the Mediterranean: Miletus, Samos, Rhodes, Cos and Cnide for medicine, etc. The purpose was always training leaders, administrators, magistrates, doctors – and of course teachers who would pass on and improve knowledge.

The ephebeia, a more widely distributed institution within the Greek cultural environment, was initially intended as a venue for young Athenian citizens to socialize, alongside their military training. With its integration within Alexander's empire, the ephebeia spread and developed under new forms across all the Greek communities of the Hellenistic world, from Marseilles to Pergamon and the Fayum. Within the local gymnasium, which contained an auditorium for visiting lecturers as well as for the local faculty, ephebes engaged in various sports and arts while acquiring proficiency in letters and eloquence. H.I Marrou, a historian of education in antiquity, compared the atmosphere prevailing in the ephebeiae to that of the university clubs of the English elite, which are both sports clubs and debating societies[30]. He also highlights the fact that girls could also now have access to education – they were no longer confined to the *gynaeceum*: the example of 4th century CE mathematician Hypatia of Alexandria is not unique.

At the highest level, the Museion in Alexandria was established in -288 by Ptolemy the 1st Soter at the instigation of a disciple of Aristoteles who became an Athenian politician subsequently exiled in Egypt. The term *Museion* confirms the intellectual filiation link with Plato's Academy. Its situation in the Nile delta illustrates its determination to bring together the knowledge and methods developed in Greece with the prestigious heritage of ancient Egyptian civilization, in accordance with Alexander the Great's syncretic ambition. In a

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29 Maurice Daumas (dir.), *Histoire de la Science*, Encyclopédie de la Pléïade, Gallimard, 1957, p. 10.

30 Henri-Irénée Marrou, *A History of Education in Antiquity*, University of Wisconsin Press 1982. Like most historians of his time, Marrou believed that the ephebeia had originally been a compulsory military service for young Athenian citizens, and that following the integration of the cities within Alexander's empire, the insititution would have lost its justification. According to current opinion, military training is thought to have been practiced mainly within the family circle. Pour une bonne actualisation, voir Jean-Marie Pailler & Pascal Payen (éd.), *Que reste-t-il de l'éducation classique ? Relire « le Marrou », Histoire de l'éducation dans l'Antiquité*, Toulouse, Presses Universitaires du Mirail, 2004.

similar approach, the Serapeum, which was built later, is a temple to the god Serapis, a divinity invented ex nihilo by a Greek pharaoh and given a name that sounded Egyptian, 2 200 years before the French comic book artist Goscinny and author Uderzo invented their characters[31]… In fact, Alexandria was a Greek cultural enclave in Egypt, contributing to the spread of new forms of knowledge and expression, as witnessed by the concomitant disappearance of hieroglyphic writing.

The Museion was a centre of higher academic research, attracting through royal favour scholars and erudites from all over the Greek world. They were exempted from taxes and expenses, and, as "Museion residents", were offered free board and lodging in lavish accommodation where they lived as a community, with numerous servants. They could freely conduct their studies using the instruments, collections, zoological and botanical gardens made available to them.

The contents of the library, to which must be added that of the Serapeum, was the result of a systematic policy of acquisition and translation: it is believed to have included several hundred thousand volumes at the time of Caesar, two centuries after its creation.[32]. Greek translations of texts written in « Barbarian languages » (including, circa – 281, the Hebrew Pentateuch, the Septuagint) was a colossal enterprise that involved hundreds of scholars who could not only master Greek and the original language but also perform critical editing, namely when there were several versions of an ancient text – as is the case for Homer's works, for example.

While its primary purpose was research, the Museion gradually developed training courses. At the end of the 3rd century, Alexandria, like Athens, possessed academic chairs for each of the schools of philosophy and became a major centre for medical training. Technical experiments were also developed, as illustrated, namely, by Ctesibios' and Hero of Alexandria's engines[33]. A good indication of the development and diversification of

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31 Paul Veyne, *When our World became Christian (312-394)*, Polity Press, 2010.

32 The figure of 400,000 volumes attributed to the Great Library is given by Jacques Brunschwig and Geoffrey Lloyd, in *Greek Thought: A Guide to Classical Knowledge* (Harvard University Press Reference Library) https://www.hup.harvard.edu/catalog.php?isbn=9780674002616 For a thorough clarification on this mythical institution, see Luciano Canfora, *The Vanished Library: A Wonder of the Ancient World. Hellenistic Culture and Society*. University of California Press, 1990.

33 Bertrand Gille, *Les Mécaniciens grecs. La naissance de la technologie*, Paris, Seuil, 1980, p. 54-145.

knowledge, a growing number of scholars no longer considered themselves "philosophers", and devoted themselves mainly to science, even to engineering as Hero or Archimedes[34].

Located close to the royal palaces, this complex was meant to bring together universal knowledge to serve a learned community, so that Alexandria would become a rival of Athens in terms of intellectual glory. This may be the first example of a long-term scientific policy conducted by a State.

Other cities then created their own « academies », more or less following the Athenian or Alexandrian models. This was the case in the Hellenized cities of the Middle East : Pergamon, Antioch, Edessa, Smyrna, Rhodes and Ephesus for medicine

Beirut [*Berytos*] later became a major law school for political reasons: from the time of Augustus, this recent Roman colony was the place where imperial edicts were translated from Latin into Greek for distribution throughout the Eastern part of the empire. The history of this school is known well enough to enable us to trace the process of institutionalizing in higher education. Imperial legislative texts were initially deposited in a temple, while masters taught law at home. This changed in the third century, when a large school was built with a library and large auditoria[35].

> « Translating had implications beyond the sole linguistic aspect, because one had to understand and interpret. A class of jurists, as skilled in Roman law as in the various Greek and indigenous rights, thus made themselves indispensable. It was the primitive nucleus of what would not properly become a law school until the end of the third century. People came from all over to receive the best legal training of the Empire[36]. »

For example, Severus of Antioch (465-538), the future patriarch in this Syrian city, brilliantly studied rhetoric in Alexandria, then completed his training at the Beirut school of Roman law – a typical journey of a career-conscious son from a good family.

The Roman civilization invented a discipline: Law. If all ancient civilizations had courts and legal rules (Hammourabi code, Solon laws, etc.), it is in Rome that we can observe the development of a real discipline: reflection on the philosophical and political foundations of law, classifications (public, civil, etc.), drafting of the first treaties (Q. Mucius Scaevola the Pontiff, Cicero), institutionalizing the training of young jurists in consulting offices located near temples, then in higher schools, adopting forms of teaching borrowed from pre-existing disciplines, including text commentary. This process unfolded over three centuries.

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34 To my knowledge, the first Greek mathematician who ever declared that he was « no longer doing philosophy » was the character of Theodor in Plato's *Theaitetos* dialog, written a century earlier.

35 Frédéric Alpi, « À la recherche de l'École de droit de Beyrouth », in *Actualités des études anciennes*, ISSN electronic form : 2492.864X, 13/07/2021, https://reainfo.hypotheses.org/22858.

36 Maurice Sartre, *D'Alexandre à Zénobie*, Fayard, p. 876. M. Sartre quotes and uses here the work of P. Collinet, *L'École de droit de Beyrouth*, Paris, 1923. It was in Beirut that lawyers wrote the Justinian Code (533), which would become the basis of all legal codes in the West after the XIth century.

These institutional models also spread in Western Europe. According to the geographer Strabo, since the reign of Augustus, Marseille had become "the great school" which hellenized the Gaulish elites, even succeeding in "persuading the young patricians of Rome to give up the trip to Athens to come to perfect their studies" in the Phocaean city[39]. Schools of higher education then appeared in Autun and Bordeaux, whose sumptuous buildings bear witness of the policy of Romanization through education[41]. On the other side of the Mediterranean, Carthage and Madaure played an identical role for North Africa.

It is noteworthy that republican Rome had no interest in education and despised, or even drove away philosophers from Greece whom they considered as vectors of moral decadence (let us recall that all Southern Italy, the "Greater Greece", was until the end of the Republic in the Greek cultural area: the Romans did not have to cross the sea to meet Greek cities controlled by Rome). Only later did imperial Rome gradually become an intellectual capital[42].

At every level, whether primary, secondary or higher, according to current categories, education in the Hellenistic and, later, Roman world rested mainly on municipal or private resources. Alexandria was an exception. Patrons and alumni offered equipment or books for the library. The State initially only intervened to remind municipalities of their educational duties; and, occasionally, with donations. During the Roman Empire, these became systematic with increasingly direct State intervention in the organisation of higher education.

The trend began during the first century when emperor Vespasian created two chairs of rhetoric in Rome and bestowed fiscal privileges on the teachers. Following his example, Marcus Aurelius established four imperial chairs in 176 CE, each one provided with a stipend of 10,000 drachmae, for the most famous philosophical schools of Athens: Plato's Academy, the Aristotelian Lycaeum, the Stoic Portico, and the Epicurian garden – which was even open

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39 Strabo, *Geographie* (trad. Amédée Tardieu), Paris, Hachette, 1867, p. 298.

41 On Autun [Augustodunum] and its vast Menian schools of Law and Letters, see Antony Hostein, *La Cité et l'empereur. Les Éduens dans l'Empire romain d'après les Panégyriques latins*, Paris, Publications de la Sorbonne, 2012. And « Le bâtiment des écoles méniennes dans la topographie d'Augustodunum /Autun », in M. Kasprzyk & G. Kunhle (éd.), *Actualité de l'Antiquité tardive dans l'Est de la Gaule. Actes de la table-ronde organisée à Strasbourg*, Dijon, 2011, p. 9-18.

Henri-Irénée Marrou, *A History of Education in Antiquity*, University of Wisconsin Press 1982. Southern Italy, « Magna Grecia » was then part of the Greek cultural arena: the Romans did not need to go overseas to come into contact with Greek cities.

to slaves [43] He also founded several schools for five thousand of the Empire's deprived girls. The imperial state, which then became Christian, pursued this investment policy, meeting the increasing needs of the Roman administration for qualified managers. For similar reasons, it favoured applied disciplines rather than philosophy.

A precise idea of the different school levels is revealed through the hierarchy of teacher salaries in the edict of Emperor Diocletian (301 AD), which set maximum prices for a thousand of goods and services throughout the Empire [44] :
- elementary teacher: 50 *denarii* / pupil / month,
- master of reckoning: 75 denarii / pupil / month,
- professor of architecture: 100 denarii / student / month,
- professor of Greek or Latin literature, or of geometry: 200 denarii / student / month,
- professor of rhetoric, sophist: 250 denarii / student / month,

As soon as the new capital was established in Constantinople in the 4th century, higher education was developed, competing with Athens and Alexandria. Constantine was soon to create a public library which eventually contained 120,000 volumes in the 5th century; his successor Julian added another. Renowned teachers were attracted and sponsored by the emperor. However, around 400 CE, the Athenian and Alexandrian institutions professing the ancient philosophy were abolished (some of their members emigrated to Persia). In 425, the emperor Theodosius II established the *Pandidakterion* with a corpus of 31 professors whom he settled in the Capitol, the Christianized temple of Jupiter, and endowed with an auditorium. They held a monopoly over public education in the city and abstained from any form of private tuition; they were nominated by the Senate and the most eminent were admitted in the nobility. The predominance of letters and rhetoric is confirmed by the curriculum: there were ten Greek grammarians, ten Latin grammarians, five Greek and three Latin rhetoricians, two Roman law jurists and a philosopher. The Auditorium of the Capitol was still operating in the mid-6th century but appears to have subsequently reduced its activity as a result of various assaults (earthquakes, Nika revolt, and Barbarian attacks). However, following the destruction of Beirut by an earthquake in 551, the law school was transferred to the capital where it was probably re-settled within the imperial Basilica. The overall aim of this complex remained the same, i.e. to train state administrators. Religious scholars were trained elsewhere, in the high school of theology founded by the Patriarchy. The Pandidakterion kept up its activity throughout the tribulations of Byzantine history, up to the Ottoman onslaught in 1453. Its

43 by Jacques Brunschwig and Geoffrey Lloyd, in *Greek Thought: A Guide to Classical Knowledg*e (Harvard University Press Reference Library) https://www.hup.harvard.edu/catalog.php?isbn=9780674002616

44 Kropff, Antony, 2016: New English translation of the Price Edict of Diocletianus, at https://www.academia.edu/23644199/New_English_translation_of_the_Price_Edict_of_Diocletianus.

name and composition make it an institution comparable to what is now known as a university, the more so as a students' guild was established as early as 849; but it differs from the Medieval University in its direct dependence on the State and the absence of theology in its programmes.

Marginally, the Jewish communities scattered across the Empire had their own higher education institutions, which transmitted essentially religious knowledge. They relied on a dense network of schools generally attached to synagogues, developed since the IIth century B.C.; they endeavoured to train Jewish debaters able to face "pagan" rhetoricians educated in Greek gymnasiums, by adopting some of their methods[45]. After the destruction of the second Jerusalem temple by the Romans in 70 A.D., a rabbi obtained from those that the Sanhedrin be moved to Yavné (Iamnia). Several yeshivot bloomed in this town, constituting the "Yavné school" at the roots of rabbinic judaism.

In contrast with the prevailing values of the Greco-Roman civilization or that of ancient China, one could be both a learned rabbi and exert a manual occupation. Centuries later in Troyes, under the protection of the counts of Champagne, rabbi Chlomo ben Itshak, occasionally a vine grower, would establish a famous Talmudic school. A European academic institution now bears his nickname, Rachi, and carries on this tradition. In the late XVth century an Italian rabbi, Ovadia ben Abraham de Bertinoro, emigrated to Jerusalem where he restored a yechiva, a veritable talmudic academy, supported by Jews expelled from Spain.

On the borders of the Persian and Roman empires, three research and higher learning centres appeared between the 3rd and 5th centuries, as a result of (often forced) population displacements. In Persia, the city of Gundishapur developed with the arrival of successive populations of Greek, Christian and later of pagan culture, who had been deported by the Roman Empire or had emigrated. Nestorian or neo-platonist scholars and philosophers established an Academy, which rapidly became the intellectual hub of the Sassanid empire with the sovereign's blessing. Students could take philosophy, theology, medicine, mathematics and astronomy. It included a library, an observatory and the oldest known teaching hospital. Aside from the Zoroastrian and Persian traditions, the faculty was conversant in Greek and Sanskrit, as well as in Syriac into which were translated Galien's works, a large part of those of Hippocrates', Aristoteles' logic, treatises of astronomy,

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45 Maurice Sartre, *D'Alexandre à Zénobie. Histoire du Levant antique*, Paris, Fayard, 2001, p. 319.

mathematics and agriculture.

In 489, the Byzantine emperor ordered the great theological and scientific Nestorian centre of Edessa, in Mesopotamia, to be closed. Nestorian savants transferred it to the Nisibis school, under Persian rule. Nisibis became the main learning centre of the Eastern Church, with a permanent headcount of over a thousand students at its height. Studies were free and lasted three years, in an exclusively masculine, monastic environment; poor students were authorized to earn a living during the three-month holidays[46]. The resources came mainly from the vast estates owned by the school, which enjoyed privileges and possessed its own tribunal/ justice court. We ignore whether a hierarchy of diplomas existed, or a less formal selection process of students by the school's Council; yet the hierarchy of the teaching staff in three levels of competences, inherited from ancient models, is certain[47]. While most of the teaching and written production was of religious nature and aimed at training clergymen (the school's teachers held the title of rabban), one could also study medicine. A Nestorian bishop, Severos Sebokht, translated Aristoteles' Analytics and introduced Indian numbers in Iran, i.e. our "Arab numbers"[48].

Caught up within the widening Hellenistic influence, these three cities, Gondishapur, Edessa and Nisibis were at the crossroads of knowledge circulation between Greek-Roman, Near-Eastern and Indian cultures. The Muslim civilization eventually inherited them[49].

The Muslim Empire

Following its emergence in the 7th century, the Muslim Empire soon conquered the Middle East and North Africa, before spreading to Southern Europe, India and beyond. The conquest wrought havoc (while we do not know when and how the Alexandrian library was destroyed, we do know that other centres were devastated, such as the vast libraries in the Persian capital Ctesiphon which were burnt down) and led a number of Christian scholars to

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46 Jean-Baptiste Chabot, « L'École de Nisibe, son histoire ses statuts », *Journal asiatique*, 1896, II, 55 p.

47 Adam H. Becker, *Fear of God and the Beginning of Wisdom : The School of Nisibis and the Development of Scholastic Culture in Late Antique Mesopotamia*, Philadelphie, University of Pennsylvania Press, 2006, p. 87. The author asserts that « Certainly the school of Nisibis was something new: it is by far the earliest attested institution of higher learning with formalized rules and a hierarchy of teachers. » (p. 79). Note the expression « higher learning » applied to this institution.

48 François Nau, « Severus Sebokht, Des Constellations », *Revue de l'Orient Chrétien*, 1929, n° 77-78, p. 327-338. Severus Sebokht was an important transmitter of Greek philosophy and science, while asserting the priority of Babylonian science – as well as a vocal critic of astrology.

49 Alain Touwaide, « Le paradigme culturel et épistémologique grec dans la science arabe à la lumière de l'histoire de la matière médicale », *Revue des mondes musulmans et de la Méditerranée*, 1995, n° 77-78, p. 247-273.

emigrate to Europe. However, these areas remained focal points for science and scholarship with a significant network of schools[50]. Up to the 8th century, most scholars were still Jews or Christians and continued to write in Syriac, Greek or Persian. Later, Arabic prevailed and the other languages were marginalized, as Muslims embraced science or philosophy, and simultaneously undertook the task of translating the major works inherited from Antiquity into Arabic.

While the history of ideas and discoveries in this empire is well known, information is scarce regarding the organisation of education. Up to the 11th century, higher education was mainly provided thanks to private resources and sponsors – donations could be obtained from private individuals or from statesmen. Scholars taught from their home, in a rich sponsor's palace, or in public or private libraries that started flourishing once more. Whether mathematics, physics or astronomy were taught in specific locations remains unknown, but these subjects were definitely granted a privileged position. Students learnt medicine in the professor's home or in hospitals.

Baghdad, the capital of the new Empire, founded in 762, underwent spectacular development and became one of the largest cities in the world. An expanding population of dignitaries, clerics, legal experts and merchants required higher levels of training and constituted a market for books and conferences. The « House of Wisdom » in Baghdad (*Bayt al-Hikma*) was initially the library for the collections of the Caliph Harun al Rashid. It became a meeting place for theologians, astronomers, mathematicians and scholars who translated many works from Greek or Persian to Syriac or Arabic, and remained active for at least two hundred years, perhaps even up to the destruction of Baghdad by the Mongols in 1258. Similar Houses of Wisdom were established on this model in the Empire's new capitals, as in Cordoba, in the 10th century, where the Caliph founded a library with a network of copyist librarians. These institutions were funded by sovereigns seeking prestige, but do not appear to have offered tuition[51].

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50 Most of the following paragraphs are based on Ahmed Djebbar, *Une histoire de la science arabe*, Seuil, 2001, particularly pp. 50 and 78-88. Good overviews can be found in Paul Benoit & Françoise Micheau, « L'intermédiaire arabe ? », in Michel Serres (ed.), *Éléments d'Histoire des sciences*, p. 151-176. Also in Danielle Jacquart & Françoise Micheau. *La Médecine arabe et l'Occident médiéval*, Paris, Maisonneuve et Larose, 1990. And in Alain Touwaide, « Le paradigme culturel et épistémologique grec dans la science arabe à la lumière de l'histoire de la matière médicale », *Revue des mondes musulmans et de la Méditerranée*, 1995, n° 77-78, p. 247-273.

51 Marie-Geneviève Balty-Guesdon, « Bayt al-Hikmah et politique culturelle du calife al-Ma'mûn », in *Medicina nei Secoli*, 1994, n° 6, p. 275-291.

In places where medicine and pharmacy were practiced, another type of documentary resource appeared, i.e. the botanical garden – in Muslim countries (in Cordoba in the 8th century for example) as in Christian monasteries and hospitals (Hotel-Dieu / God's houses).

Religious subjects were taught in the main mosques, funded by pious foundations. They covered not only theology, but also law as this draws directly from the Coran, and even some linguistics to interpret the Coran and translate it faithfully into local languages.

It was the case in the great Mosque of Kairouan which in the 9th century became one of the most prominent centres of Muslim civilisation, both as a place of worship and of higher learning. Students could study secular subjects such as mathematics, astronomy, medicine and botany, in addition to religious thought and Malikite jurisprudence[52]. Five centuries later, Ibn Khaldun would develop a « science of civilization and human society », whose rational approach challenged the mainstream religious tradition of the Kairouan school.

The Al-Azhar mosque, founded in Cairo at the end of the 10th century by the califate and private donors, was soon endowed with an institute of higher learning (madrassa). Aside from religious subjects based on the hadiths and the Coran, one could study Arab grammar, law and theology. Soon after, it was provided with a large library by the Caliph, and became a House of Wisdom, extending its courses to include chemistry, astronomy, philosophy, literature and history. The institution was then at the service of Shi'i Islam. When the Shi'a Fatimid dynasty was overthrown, Al-Azhar was ruined and was later revived as a major intellectual centre for Sunni Islam. It was officially re-organized as a university in 1961.

Many mosques included a primary school. An example of the gradual extension from primary to secondary education is described for the Al Qarawiyyin mosque, founded in Fez by a wealthy sponsor in the 9th century as a « House of knowledge and wisdom », and which claims today to be "one of the first universities in the world". The same is likely to have occurred six centuries later in Timbuctu.

A second phase began with the conquest of the Middle East by the Seljuks, a Turko-Persian dynasty who conquered Baghdad in 1055. The new rulers established *madrassas*, institutions of higher learning exclusively funded by the State who appointed the teachers and oversaw the curriculum, with the aim of preserving Sunni religious orthodoxy against other Islamic beliefs. Dozens of such schools would be established over the following three centuries. The vast religious complex of the *Sulemaniye* in Istanbul, built in 1588, included a large mosque, four madrassas, an institution specialized in the study of the Prophet's sayings,

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52 Rachida Smine, « L'École de Kairouan », *Rue Descartes*, no 61, mars 2008, p. 16-23.

a medical school, a hospital and other services[53]. To what extent these institutions were innovative or were the successors of Byzantine or Arab forms of higher education remains to be investigated.

Astronomy was especially important in Muslim countries for reasons both political (astrology) and religious (calculation of prayer times and direction of Mecca). It gave rise to a wide-ranging industry of observation instruments and employment opportunities for astronomers in regional capitals, and, from the 13th century in the Middle East, to the construction of astronomical observatories (Maragheh and Samarkand were the first) where teams of scholars worked according to genuine research programmes (the "sultanian tables" for example), perfecting the Ptolemaic cosmology model.

All over the Muslim world, as in Christendom, the acquisition of technical skills, even the most scholarly such as architecture, remained organized within a professional framework, namely within guilds. Much later, towards the end of the 18th century, under the modernizing reign of Selim the 3rd, who also adopted the printing press, the Ottoman Empire created higher technical institutions based on the French model, particularly aimed at developing shipbuilding and military skills, to catch up with those of Western powers[54].

Western Europe: collapse and revival in the Middle Ages

In Western Europe, cultural life collapsed with the Barbarian invasions and their consequences, epidemics and famine, which reduced the population by over a third during the 7th century[55] ; this continued until the 9th century, with raids by the Vikings, the Hungarians and the « Saracens ». Shrunken cities lost a large part of their school network and imperial administration which had ensured a « market » for education and books (it would take eight centuries to recover a similar schooling system). The knowledge that survived was passed on thanks to the remaining books, but venues for scholarly debate had vanished.

In a controversial book, Sylvain Gouguenheim questions the myth of an Arab-Islamic civilization as the sole purveyor of the « Greek heritage » to Christendom, then immersed in the dark ages, having mapped all the active places of knowledge during the high Middle Ages

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53 Stéphane Yerasimos, *Constantinople: Istanbul's Historical Heritage*, Konemann, 2006.

54 Hasan Umut, *İsmail Gelenbevi at the Engineering School: The Ottoman Experience of European Science Through Logarithms*, Master of Arts thesis in History, İstanbul Bilgi University, Institute of Social Sciences, 2011.

55 See for instance Josiah C. Russell, « Population in Europe », in Carlo M. Cipolla, (dir.), *The Fontana Economic History of Europe*, vol. I : *The Middle Ages*, Glasgow, Collins/Fontana, 1972, p. 25-71.

in the West, and the panorama he offers is one of devastation. Indeed, a few scholars still read Aristoteles at Mont Saint Michel and in other monasteries. And copies of Greek books arrived regularly from Christian Africa, later from Byzantium – especially in Italy – without transiting exclusively through Muslim countries. The main monasteries copied, kept, studied and translated what they could into Latin, but a « large library » such as that of the Benedictine monastery in Bobbio, in Lombardia, only housed six hundred books among which one hundred and fifty ancient ones[56]. The Vivarium monastery, founded around 550 in Northern Italy by Cassiodorus, vaguely inspired by the Nisibis school, delivered a comprehensive curriculum (trivium and quadrivium) and carried a collective translation program of Greek texts into Latin; but it was a pioneer exception and would eventually be destroyed in a war, less than a century later. The new centre of knowledge in the West, Ireland, had never been Romanised and only sent theologians – often bright Latinists - to the continent, such as Colomban, the founder of Bobbio. At the end of the 1st millenium, in France, the two major monasteries of Fleury-sur-Loire (a continuation of Monte-Cassino) and Cluny would comprise a school, a scriptorium and a library, yet the latter had less than a thousand books. If some monks elaborated a theory and an ideal of social organization on a christian and neo-platonician basis altogether[57], knowledge was mainly dominated by tradition and transmitted through repetition. Overall, monastic schools were dedicated to training monks and wary of secular knowledge.

However, the Church and Charlemagne recommended that each Cathedral open a school, initially for young men intending to join the clergy, and later for all « escholiers », i.e. scholars. This model had appeared in Spain a hundred years before. There were about twenty of them in Gaul at the end of the 7th century[58]. The episcopal school of Notre Dame in Paris was a school of theology where law, medicine and liberal arts were also taught. It would train Guillaume de Champeaux and his disciple Pierre Abélard, among others; similarly, Gerbert d'Aurillac was educated in mathematics by a catalan bishop, then in logic at the episcopal school of Reims (Champagne) where he taught. This type of institution was clearly inherited from the Hellenistic-Roman model which it attempted to revive: professoral chairs organized

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56 Sylvain Gouguenheim, *Aristote au Mont Saint-Michel*, Paris, Seuil, 2008, p. 59 & 64. The author emphasizes the poor quality of many of the translations from the Greek, whether into Latin or into Arabic, that motivated later, new translations

57 Dominique Iogna-Prat, « Entre anges et hommes : les 'moines doctrinaires' de l'an Mil », dans Robert Delort (dir.), *La France de l'an Mil*, Paris, Seuil, 1990, p. 246-263.

58 Pierre Riché, *Écoles et enseignement dans le haut Moyen Âge*, Picard, 2000. https://books.google.com/books/about/Education_and_Culture_in_the_Barbarian_W.html?id=FLJUPQAACAAJ (est-ce bien le même ouvrage ?)

by government authorities, liberal arts categories derived from Greek philosophy and subdivided by Cassiodorus and Boethius into the trivium and the quadrivium. The latter however introduced a major innovation by making science part of the compulsory curriculum of higher education

While « Carolingian Renaissance » progressively reconstructed a school network in the IXth-Xth centuries, it remained a modest endeavor. Most schools created by the luminaries of Western thought, like Gerbert d'Aurillac or Abbon de Saint-Benoît and their disciples, employed « only one professor, the *écolâtre*. Hence their fragility. Was the master to disappear or to leave, and if he had no renowned successor, the light soon vanished[59]. » To put it bluntly, the West had regressed by a long millenium, to the stage of master-disciples groupuscules – or even worse, as pre-socratic philosophers did not content themselves with compiling established knowledge. And among these professors, very few covered the whole trivium and quadrivium: most limited their teaching to grammar.

Did Charlemagne create in Aix-la-Chapelle a "palatine school", on the roman-byzantine model, gathering the kingdom's most notorious savants around the Englishman Alcuin? This seems to be a pious legend, invented by the author of the Gesta Caroli Magni to deliver stimulating examples to the emperor's successors[60]. In 825 indeed his son Lothar followed this example in Pavia, the capital of the Lombard kingdom, establishing a school of rhetoric, theology and law which radiated all over Italy throughout the Middle Ages; it eventually became a university in 1361, obtaining the same privileged status as the universities of Bologne and of Paris. Meanwhile, monastic and episcopal schools, between whom masters and scholars circulated, contributed decisively to the cultural unity of medieval Europe.

As a reminder, in ancient and Medieval higher education, the seven liberal arts were divided into two levels : the Trivium and Quadrivium. The Trivium (« three paths ») aimed at mastering language and included grammar, dialectics and rhetoric – learning how to build and analyse sentences, how to convince in a discussion, how to make a persuasive speech ; it mainly resulted from the formal framework developed by the sophists and by Aristoteles. The Quadrivium taught students to master the « power of numbers » and included arithmetic, geometry, music and astronomy ; it proceeded from the Pythagorean school which had discovered in mathematics the key to all true knowledge, a creed adopted by St Augustine and Medieval theologians for whom the beauty of mathematical form reflected the spirit of the Creator.

These curricula led to a diploma called to this day a Bachelor of Arts. They were the foundation courses required for studying more scholarly subjects, theology, philosophy, law and medicine. Note that the metaphor paths or *ways* to knowledge can be found in the vocabulary relating to traditional oriental teaching.

59 Ferdinant Lot, *Naissance de la France*, Paris, Fayard, 1970, p. 657.

60 Ferdinant Lot, *Naissance de la France*, Paris, Fayard, 1970, p. 619. On teaching in the early Middle-Age, see Pierre Riché, *Écoles et enseignement dans le haut Moyen Âge*, Picard, 2000 (where P. Riché continued the work of his master H.-I. Marrou). On the Carolingian effort to reconstitute the Roman education system, see Émile Durkheim's beautiful, classic text, « La Renaissance carolingienne », in *L'Évolution pédagogique en France*, Librairie Félix Alcan, 1938.

From the 11th century onwards, urban expansion resumed, while the Gregorian reform put an emphasis on Law and stimulated discussions on political power. This context favoured the development of cathedral schools and the creation of colleges or student guilds as in Pavia, Bologna or Paris[62]. Other towns created medical schools: Salerno, Montpellier, etc…[63]. Alfonso X of Castile, an enlightened ruler, encouraged collaboration between Jewish, Christian and Muslim scholars and translators in various fields of learning, from history to law and astronomy (preparation of the Alfonsine tables), mainly in Toledo where, through a truly collective undertaking, Arab and Greek manuscripts were translated into Latin, under the guidance of Gerard of Cremona, thus reproducing for the Christian world what had been the « House of Wisdom » in Baghdad four centuries earlier[64]. Learned clerics came from all over Europe to further their education in Southern regions where they could encounter Arab-Islamic and Greek culture: Spain, Sicily and Italy, and sometimes even Byzantium, in spite of the religious conflict.

The Medieval University was born of the confluence of the quest for knowledge arising from these (re)discoveries, the local school organisations or the need for higher education, and the presence of professional guilds (the original meaning of *universitas magistrorum et scholarium*)[65]. Sometimes also from conflicts with the local bishop, as in Paris where teachers and students of liberal arts migrated from the Cathedral school to the left bank of the river Seine which offered space and intellectual freedom, near to two exceptional centres of monastic scholarship, Saint-Victor and Sainte-Geneviève[66]. Already at the time, it seemed simpler to create a new institution than to transform existing ones…

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62 Th.-André Audet, « Origines de l'université dans les institutions médiévales », *Revue de la Société historique du Canada*, 1951, vol. 30(1), p. 22–25. doi:10.7202/290030ar. The author criticizes an economic determinism inspired by Henri Pirenne and Augustin Thierry, emphasizing that the emergence of universities is not correlated with the communal movement nor the industrial wealth of Italian republics or Flemish towns. He identifies the « historical rift » between the monastic schools which « will die of their conservatism » and the cathedral schools which he describes as the direct predecessors of universities. He mainly refers to the Parisian model, which starkly differs from those of Bologna or Montpellier.

63 See particularly Danielle Jacquart & Françoise Micheau. *La Médecine arabe et l'Occident médiéval*, Paris, Maisonneuve et Larose, 1990.

64 D. Jacquart, « L'école des traducteurs », in L. Cardaillac (dir.), *Tolède XIIe – XIIIe siècle. Musulmans, chrétiens et juifs*, Paris, Autrement, 1991, p. 177-191.

65 Nathalie Gorochov, *Naissance de l'Université. Les Écoles de Paris d'Innocent III à Thomas d'Aquin, (v. 1200 - v. 1245)*, Paris, Honoré Champion, 2012.

66 Paul Benoit, « La théologie au XIIIe siècle : une science pas comme les autres », dans Michel Serres (dir.), *Éléments d'Histoire des sciences*, p. 180. Paul Benoit emphasizes the diversity of the creation process of the universities and the difficulty in accurately determining when they began to operate. There were about fifty in activity in Europe around 1500..

Jacques Le Goff analysed, through the highly diverse aspects of the rising university community, the specific features of medieval universities up to the mid-15th century[67] :

- institutions devoted to learning, organised on the model of professional guilds, and asserting their autonomy vis à vis political or religious authorities;
- a highly diversified student recruitment, from young noblemen (e.g. Abelard) to peasants' sons who obtained scholarship grants (as Robert de Sorbon); it is estimated that the university of Paris comprised some 10 000 escholiers toward 1400 – figures, unprecise as they are, vary between 4 000 and 20 000… ;;
- a status for masters, clerics, secular or religious, asserting their corporation / community as a new type of nobility with its privileges, its prerogatives, and its dignities (the title of philosopher appeared once again to qualify this supreme condition within the human kind);
- an array of specialized chairs covering various disciplines as they were envisaged at the time, with locally specific distributions, but possibly extending to all academic fields, a *studium generale*;
- generally good relations with civilian authorities – the more so as these partly funded the University, mainly as patrons, due to the prestige attributed to learning, and increasingly to train high level administrators[68];
- more strained relationships with the Church which provided its own teachings in theology, as with monasteries where whiffs of paganism were readily perceived in the philosophy taught in universities (a good illustration of such opposition appears in the film *The Name of the Rose*, for which Jacques Le Goff was the historical advisor);
- the creation of a hierarchy of diplomas (baccalaureate, Bachelor's, Master's, doctorate) that would mainly persist to this day and spread worldwide while adapting to local contexts.69.

How this system evolved, how it was influenced by the introduction of ancient languages by the humanists of the Renaissance, what determined the reorganisation of the

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67 Jacques Le Goff, « Les Universités et les pouvoirs publics au Moyen-Âge et à la Renaissance », *Pour un autre Moyen-Âge*, Gallimard, 1977, p. 199-219. Georges Duby views the University more brutally as a means of direct ideological control subjected to the papacy (*The Age of the Cathedrals: Art and Society, 980-1420)*, University of Chicago Press, 1983), but he mainly mentions the university of Paris. For a general overview, see for example Hilde De Ridder-Symoens (ed.), *A History of the University in Europe. T. I, Universities in the Middle Ages*, Cambridge, Cambridge University Press, 1992.

68 For an update on this point and a longue durée vision, see Florence Bourillon, Nathalie Gorochov, Boris Noguès & Loïc Vadelorge (eds.), *L'Université et la ville : les espaces universitaires et leurs usages en Europe du XIIIe au XXIe siècle*, Presses Universitaires de Rennes, 2018.

69 Mina Kleiche-Dray (dir.), *Les Ancrages nationaux de la science mondiale, XVIIIe-XXIe siècles*, Paris, Éditions des archives contemporaines & IRD Éditions, 2017.

curricula from the 17th century on (emergence of mechanics and optics, to start with), the increasing demand for high-level administrators in economy and government, the development of research70; how did it coexist with other forms of higher education, either traditional (episcopal schools and monasteries[71]) or new (Jesuit collèges, engineer schools) ; how training in technical skills gradually shifted from families or guilds to schools: these issues have been studied elsewhere by respectable authors and some would benefit from further investigation72. They are beyond the scope of this paper.

It is noteworthy that most of the ancient institutions – Chinese and Indian schools, madrassa, cathedral schools, universities, etc. – were only accessible to men. A small number of girls could reach a high level of schooling either at home with a tutor (the most famous example being Heloise and Abelard), or in convents, also possibly in private copyist workshops, such as the one directed in the 15th century by Christine de Pisan. Learned women were a minority but were « part of the social landscape » among the higher classes. Learned women making professional use of their scholarship outside the convent was very rare[73]. Exceptionally, some women were admitted as students and even as professors since the Middle-Age in a few Italian universities like Bologne or the Salerne medicine school.

Overall, one can venture the hypothesis that the institution of higher educatio has constituted, up to the early XXth century, a factor that was unfavourable to the accession of women to power positions.

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70 Claude Jolly & Bruno Neveu (dir.), *Éléments pour une histoire de la thèse*, Paris, Aux Amateurs de livres, diff. Klincksieck, 1993.

71 Thus the Saint-Hydulphe abbey, in Lorraine, established around year 1000 Europe's first grammar school for monks. Repeatedly destroyed, it became in the late XVIIth century a true science academy, the academy of Moyenmoutier, gathering the learned elite savante of the benedictine order: non only theologians, but also monks working as historians, naturalists, archeologists, entomologists, medical doctors, etc.

72 For a worthwhile overview of apprenticeship in guilds in modern times, see Steven L. Kaplan, « L'apprentissage au XVIIIe siècle : le cas de Paris », *Revue d'Histoire Moderne & Contemporaine*, 1993, vol. 40, n° 3, p. 436-479 (n° thématique « Apprentissages XVIe-XXe siècles »). An adolescent would undertake an apprenticeship that would generally last 4 to 6 years according to the profession. The term of institutionalized « higher education » cannot apply in the context of a guild, regardless of the high level of qualification that masters and companions could eventually achieve. This even applied to pharmacists who were expected to know Latin, while there was no pharmacy faculty. But what was their relationship with the schools (design, engineering etc.) that flourished in the 18th century. The same goes for merchants, for example in Antverp where the Saint-Ambroise Guild « employed » in the XVIth century 33 masters of « bookkeeping », among whom were the authors of important accounting treatises (Eddy Felix, « La Guilde de Saint-Ambroise à Anvers - Centre mondial de l'enseignement de la comptabilité au XVIe siècle », *Revue de l'Ordre des experts comptables et comptables brevetés de Belgique*, 2015, n° 1, p. 55-60).

On their relation with schools (of drawing, of engineering, etc.) which blossomed in the XVIIIth century, see Liliane Hilaire-Perez, *L'Invention technique au siècle des Lumières* (préf. de Daniel Roche), Paris, Albin Michel, 2000, p. 146-188 : a common concern then was to combine the apprenticeship through practice in professional environments with more theoretical technical teaching in schools.

73 Adeline Gargam (ed.), *Femmes de sciences de l'Antiquité au XIXe siècle. Réalités et représentations*, (preface by Judith Zinsser), Éditions universitaires de Dijon, 2014.

Elements of a conclusion

The history of pre-existing forms of higher learning, which I have attempted to summarize with inevitable approximations that I trust the reader will consider benign, would gain from an in-depth analysis and comparative studies, beginning with a recension of relevant publications, more complete than the references consulted for this paper.

A common thread stands out, if only because of its recurrence throughout this paper, across the various cultural contexts: the central position of rhetoric, the major importance of training in rational discussion and expressing oneself convincingly. Then come law and philosophy, the dominant representations of the universe, of the principles and forces that govern it, and of the human community; this function was later complemented by theology in the Christian and Moslem worlds. By contrast, the natural sciences were often more marginal even when they were included in philosophy, with two exceptions: medicine and astronomy – the latter a branch of mathematics in the Western world since the Greeks, and linked to a practical activity, i.e. astrology.

Beside the speculations which occupied philosophers and mathematicians, most higher education institutions had practical purposes and *raisons d'être*; even their theoretical formalization aimed as much at efficiency as at the intellectual elevation of students: rhetoric, law and medicine were to train professionals and to improve high-level techniques. It was in the same spirit that martial arts were included in the Far-East, sports and wrestling in Greek gymnasiums, meant to form complete, balanced men. In most civilizations, law and medicine became specific disciplines (early in the Roman empire; when and under what forms in India and in China?). And, while other disciplines would over time go through profound mutations, including their very names, these two have remained until today well identified in institutions and curricula: let us recall that, contrary to the "academic ivory tower" cliché, universities have always offered vocational, professional training.

These disciplines could only be approached by students who had already a serious background, acquired during a protracted training, not only in basic skills (reading, writing, calculation), but also in wide-ranging literary and even scientific knowledge, often in live or dead foreign languages, as well as in elitist socialisation. Such a level of training, and the very name of some of the institutions described above – the Chinese « Great School » and its derivatives in neighbouring countries, the chairs endowed by imperial authorities in the Roman Empire or the Byzantine Pandidakterion – characterize what can be designated as « high level education ».

They generally aimed at forming men to superior positions in the direction of public affairs, in the administration, the justice or the clergy, and evidently in education itself.

These institutions were also superior, compared with the mass of other schools, by their high socio-political status. Athens' philosophy schools attracted students and savants from all around the Mediterranean, and were later endowed with chairs by Roman emperors. The Alexandria Library and the Serapeum were supported by the Ptolemy sovereigns, whose power they illustrated and reinforced. Nisibis was a kind of grand monastery enjoying a strong economic and judiciary autonomy, much like its Indian or European equivalents, such as Nālandā or Monte Cassino. Since the Han dynasty, Chinese leaders « adopted the idea that script and knowledge were a State concern and were inseparable from power »[75]. The Chinese Grand School was a direct emanation of the imperial State, like the Roman law school in Beyrouth, like the Byzantine Pandidakterion, like later the palatial schools established by the Carolingians. Whether they depended on the State or not, these establishments exerted a great intellectual power and brought prestige and prosperity to the cities where they settled. Besides, in most cases, their members – students and teaching staff – distinguished themselves from the surrounding society, not just by their erudition, but also by their way of life, their manners, sometimes their clothing, often by rituals, obligations or prohibitions, by specific modes of expression and by a discipline which made them a particular elite.

A side remark regarding most of the institutions mentioned in our text, if one insists to apply them a modern denomination: the term college, in the present American sense (education up to the Bachelor or licence level) describes them better than that of university.

Thus, the approach by contents as well as the approach by institutions allows us to speak, without abuse of language, of "higher education": institutions positioned at a considerable socio-political level, and where the knowledge which was transmitted or elaborated required a serious previous training. Their aims – to train leaders, citizens capable of participating in public affairs, senior officials, lawyers, doctors, scientists, religious authorities (one of the few places where women had access to higher education outside their family home) – confirm this categorization.

Timing is specific to each cultural area. Nevertheless, there was an almost simultaneous emergence of institutions of higher learning between the 4th and 3rd centuries BCE within the main civilizations. No dissemination of institutional models can be observed between these

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75 Florence Bretelle-Establet & Karine Chemla (dir.), « Qu'était-ce qu'écrire une encyclopédie en Chine ? What did it mean to write an encyclopedia in China?", Introduction to *Extrême-Orient, Extrême-Occident*, hors-série, 2007, p. 11.

centres. Scarce contacts appeared a little later, particularly between Greece and Western India during and after Alexander's conquests, later between the Indian and Chinese cultural areas where Buddhism created a vast cultural community. The diffusion of institutional models is evident, on the contrary, within each cultural area: Plato's Academy and the Aristotelician Lycaeum became models in the Mediterranean world, as well as various schools of rhetoric, law and medicine – sometimes through voluntary transfer, by spin-off processes comparable with the creation of new cities, sometimes by forced emigration following a war or a cataclysm ; in India, at the end of the first millennium, the great monastery of Nālandā inspired imitators in various regions and probably as far as Angkor; the great Chinese schools were emulated in the main neighbouring countries.

Some of these centers inherited pre-existing groups of scholars and disciples, which they "consolidated" to meet the requirements of civic life (case of Athens and other Hellenic cities), the administration of an empire (China, under the Han dynasty which restored law and order after a period of civil wars), the provision of public health (medical schools), or even to maintain the proper momentum of learning, its transmission and expansion (Athens, Alexandria and the major Indian centres) in addition to socio-economic and political needs.

Relationships with religious faiths were as varied as the realities covered by the term *religion*: almost non-existent in Ancient Greece and Rome (where most of these schools had little or nothing to do with mystery cults or spiritual guides), they became very close in monasteries and cathedral schools, and even more so in Muslim madrassas, while the term religion can hardly be applied to Chinese philosophies.

Stages of development occasionally resulted in impressive concentrations of teachers and students – several thousand, or even tens of thousands in the main learning centres, with frequent international travel, but less often from one cultural area to another. One can thus imagine a background with a much larger pool of learned individuals who had benefited from "secondary" or "primary" education. Let us remind that the world population around 400 CE is estimated to have numbered 200 million (of whom 70 million within the Roman Empire and a similar order of magnitude in China), expanding to 400 million in the mid-13th century.

One observes also major disasters, phases of constriction or of collapse, generally due to external invasions that destroyed the urban fabric, the centres of learning and the social groupings of scholars. Revolts, coups and revolutions would result in comparable regression, as happened in Alexandria and Byzantium, Western Europe or China.

These disasters have often put an end to institutions whose longevity stretched over centuries, sometimes over a millennium. Yet the institutionalization of higher education

centres has given them a strong resilience, and we know many cases where a school or a learned monastery has risen several times from its ashes (Monte Cassino in the early Middle Ages, for example). Some may have experienced a decline, while surviving for centuries after their "golden age". A limit of the present study is that it has only described well-known institutions – well-known at least by specialized historians – which attract attention precisely because of their longevity. A more comprehensive research, beyond the scope of this paper, would describe many other centres. There are also traces of institutions that have remained in the project stage, such as the one that Cassiodorus dreamed of for Rome, or the multi-confessional medersa-university planned by Alphonso X of Castile for Toledo. In the present state of our study, it appears that the longevity of institutions of higher education, in antiquity as since the Middle Ages, is due to convergences of intellectual, social and political interests, which kept them active beyond the lifetime of an influential master or the prosperity of a capital.

Why was there initially a need to establish these institutions, rather than simply training young people in families or trade environment (which was often the same in the case of professional transfers from father to son)? Or to be content with the ephemeral master/disciples formula, which will survive for a long time in many manual or art trades, or even in professions like lawyers or architects?

We should find elements of answers in the writings of founders like Isocrates or Cassiodorus. The *a priori* obvious hypothesis is that these institutions favoured both economies of scale through the concentration of skills, the possibility of attracting donations and legacies to maintain and expand the institution, an increased prestige for the teacher who professed before a large class, the pooling of collective equipment (library, naturalist collections, botanical garden, even printing in medieval China), finally the constitution of a distinguished elite, able to influence public affairs through its network of relations and its intellectual and moral influence.

Forming a new elite or strengthening existing elites, higher education participated in the long movement of social differentiation that began in the Neolithic period and in the early stages of urbanization. From the fourth century B.C., these institutions were also instruments of civilization. Instruments of civilization, of course, in the sense that they taught modes of thought and manners characteristic of the "civilized" elites; but also in that they served their expansion: in the great empires, these institutions were important instruments of

Hellenization, then of Romanization[76], a little later of the Sinization in the Far East, and even more clearly of the international development of the three great religions, Buddhism, Christianity and Islam.

The fact that today, in several cultural areas of ancient tradition, the history of even very old higher education institutions is often described with the vocabulary of current American universities, in an anachronism that shocks the historian, shows that this phenomenon continues, albeit from a new centre, that of the contemporary economy-world. A remarkable paradox, as the prevailing discourse promotes the "de-westernization of history"!

76 A striking example is that of the Menian schools in Autun [Augustodunum] (A. Hostein, art. cit.).