



Education

Education—the process of learning and teaching—has taken many forms over millennia, from storytelling, oral instruction, and imitation in hunter-gatherer societies to the formal, specialized, and (often) lengthy schooling afforded students in today’s industrialized world. Although the history of education is traditionally told nation by nation, rather than from a global perspective, passing our collective knowledge to future generations is central to the human experience.

Education is a word used in many ways. Its Latin roots, *e* (“out”) and *ducere* (“to lead or draw”), suggest the meaning “to lead out or draw forth.” Education can be defined as learning and teaching, both informal (in daily life) and formal (schooling). Learning from experience and observation can occur without teaching, and, of course, teaching can occur without learning. Education can also mean the study of learning and teaching.

The Uniqueness of Humans

Learning, defined as modification in response to specific experience, certainly occurs in other animals; how far back hasn’t yet been determined. Other animal learning can be classical conditioning, as in Pavlov’s experiments, or operant conditioning, in which an animal is rewarded for chance behavior. It can be observational learning, or modeling, as birds learn their songs or wolves learn hunting behavior. A third kind of other animal learning, called insight learning, occurs when some animals

like chimpanzees, ravens, and other birds are able to solve problems the first time they encounter them. In every species the balance between genetically determined and learned behavior varies; humans are unique in the large portion of their behavior that is learned.

Humans are unique in other ways. Our capacity for language and communication far exceeds anything in the rest of the animal world. Our talent for syntactical, symbolic language permits us to exchange and pass on our knowledge so precisely that over time it accumulates. This talent, combined with the long dependency of juveniles on adults, has meant that humans accumulate collective learning in ways strikingly different from other animals. Since this is so, education lies at the heart of human life, in ways unlike those of any other animal, changing over time as human culture has evolved.

The Foraging (Paleolithic) Era

More than 95 percent of human history took place during the foraging (Paleolithic) era of hunter-gatherers, even if almost as many humans are alive now as during that entire period. Archeologists have found little to indicate how education took place in that society; we can only surmise based on knowledge of current hunter-gatherers.

Direct observation and imitation surely occurred during the foraging era. Given the human gift with language, however, storytelling and oral instruction must have played increasing roles in the education of the young as culture evolved. In the earliest years, when humans lived in small bands of twenty



Members of a Bushmen tribe keep alive the ancient tradition of handing down history through stories and song. Photo by Urša.

to sixty, young humans learned from their parents, extended family, and kin. As human societies expanded into tribes and chiefdoms, the young, as they reached puberty, must have experienced more structured social experiences, such as rituals and initiations.

Hunter-gatherers accomplished amazing feats: they migrated out of Africa into new environments around the world and survived harsh ice ages. To do this, they had to develop increasingly complex skills and to pass them on to their offspring. These skills included developing new tools and techniques, chipping stone tools, hunting large animals, creating sophisticated art, sewing furs into warm clothing, building shelters, cooking, and navigating terrain.

Two examples suggest the collective learning passed down by hunter-gatherers. The San bushmen of the Kalahari Desert in South Africa have survived for millennia. The women use a blanket and smaller carry bags, a hide sling, and an all-purpose wooden digging stick. The men use a bow and poison-tipped arrows, plus a small spear, to hunt small animals. They have named some 260 species of wild animals and collect more than 100 species of plants. The Inuit of Alaska and northern Canada have survived for millennia with fur clothing, canoes, and hunting equipment all made from stone, bone, tusk, and antlers. The techniques of San and Inuit adults, plus immense knowledge of their environment, are successfully passed to their children by means of imitation and direct oral instruction.

Education in Early Agricultural Societies

When people began domesticating plants and animals about ten thousand years ago, they also domesticated themselves to live in settled communities and tend their flocks and fields. Settling down into a village, and later into town life, constitutes the most significant change in human ways of life, the first step toward the high density and complexity of current human culture.

With village life people began manipulating nature, rather than simply relying on it. They increased their interaction with certain plants and animals, learning enough to take over their care and their genetic development. Collective learning began to accelerate; new tools (spades, scythes, mortar and pestle, hand axes, plows) and new techniques (carpentry, weaving, pottery, and religious practices) appeared. With settled life, people could support more children, and they needed them for labor. The human population began a steeper increase, estimated from less than 10 million to 50 million in the five thousand years from 8000 to 3000 BCE.

Yet no formal schooling emerged, as far as we know, nor any need for systems of writing. Everything known could still be passed down through observation and imitation, oral instruction, rituals, and storytelling. Gender roles were becoming more specialized, but otherwise people were still generalists; they had to learn at least most of skills assigned to their gender, which mostly took place within the household.

These assertions about learning and teaching during agricultural time are difficult to substantiate. Archeologists do not find evidence of how education took place before written records and substantial buildings. We can only surmise based on what is known from the archeological record about life in agricultural times and from current examples of agricultural societies, none of which is entirely free of the influence of modern life.

Education in Early Civilizations

As populations increased in density and towns grew into cities, some human societies began to take on



A section of the Diamond Sutra scroll (c. 868 CE), the oldest known printed and dated book in the world, was discovered in China's Dunhuang caves in the early twentieth century.

a constellation of new characteristics. These societies are technically called civilizations, or agrarian civilizations to emphasize their dependence on their surrounding agriculture. This happened all over the world, largely independently. Early agrarian civilizations include Sumer (about 3200 BCE), Egypt (about 3100 BCE), the Indus Valley (about 2300 BCE), northern China about 1700 BCE, the Classic Maya (250–800 CE), the Aztecs (late fifteenth century to early sixteenth century CE), and the Inca in the Andes (early sixteenth century CE).

Not all of these early agrarian civilizations shared exactly the same characteristics, but all had a high density of population concentrated in cities, a surplus of food, ranked social stratification, specialized occupations, and coercive forms of taxation. Most developed a system of writing and notation. With this transformation of human society came a transformation of education: formal schooling emerged as apprenticeships developed for learning specialized occupations, and schooling was organized for the tiny elite fraction of the population who learn to read and write.

Schooling often began by being attached to the royal court; sons of nobles joined the kings' sons in

learning law and administration. For example, in Egypt the only school in the Old Kingdom (c. 2575–2150 BCE) was attached to the royal court. As the need for scribes and administration increased, other small schools appeared where boys studied from age five to ten, and then were apprenticed in administration. From the mid-third millennia BCE to the mid-second millennia BCE the number of literate Egyptians probably would not have exceeded 1 percent.

For an early civilization, the Aztecs were unusual in having mandatory schooling for all—girls as well as boys. Every *calpolli*, or ward of related families, had its own schools, of which there were two kinds. Young commoner women attended *cuicacalli*, or houses of song, to learn songs, dances, domestic crafts, and childrearing. Young commoner men were trained to be warriors. Every *calpolli* had to provide four hundred soldiers under command of its own officers, trained at a school called a *telpochcalli*. Boys started school at puberty and attended until their midtwenties, when they withdrew to marry. Students ate with their families, but slept at the school, to avoid drunkenness and sexual license. They first entered battle at age twenty. Sons of nobles attended different



schools (*calmecac*) attached to temples, where they received more intensive administrative and religious education in addition to military training. Sons of gold workers and feather workers learned the details of Aztec religious iconography by attending schools for nobles or their own version of such schools.

Education in Developed Civilizations

As civilizations developed around the world, many schools and learning centers still depended on state or imperial governments and on religious institutions, but a few were independent entities; free public schools sprang up in China in the late thirteenth century under one Mongol ruler of the Yuan dynasty who believed it would improve everyone's lives.

India

As agrarian civilizations developed in Afro-Eurasia, large-scale religion also developed with the spread of literacy beyond the royal courts—Hinduism, Buddhism, Confucianism, Judaism, Christianity, and Islam. These religions set up centers of learning, as exemplified by Taxila, a Hindu and Buddhist center near the present city of Islamabad, established in the sixth century BCE. The greatest Indian center of learning, Nalanda, in eastern India near Nepal, was founded as a Buddhist monastery in the fifth century CE and grew to house up to ten thousand students, flourishing until the twelfth century CE. It attracted students from Turkey to Korea, with a nine-story library housing hundreds of thousands of volumes.

Greece and Rome

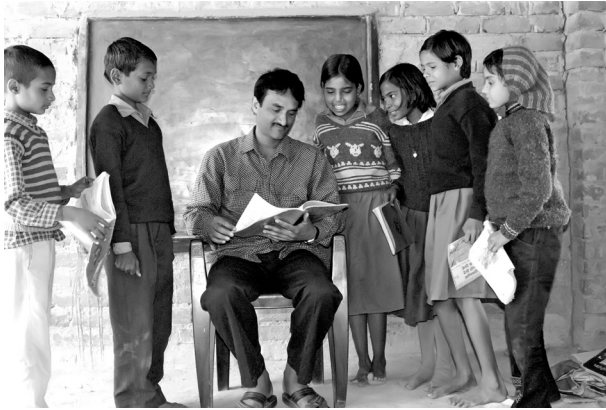
In the classical Greek city-states of Athens and Sparta, strikingly different modes of education were available. In Athens the state provided two years of military training. Other education was private; anyone could open schools and charge tuition. Girls rarely received any education. Schools of higher education developed—the Platonic Academy by Plato and the Lyceum founded by Aristotle. In Sparta girls did receive a formal state education and boys were taken

at age seven to school dormitories and taught little other than sports and fighting. Literacy in classical Greece is estimated at no more than 5 percent. Rome had many private schools charging admission by the second century BCE; there literacy rose to probably not more than 10 percent.

China

During the Zhou dynasty (1045–256 BCE) China had five “national” schools for aristocrats and nobility. Confucius formulated his ideas in the early fifth century BCE, and by 124 BCE the Emperor Han Wudi set up an Imperial Academy based on a curriculum of the Five Classics of Confucius. A civil service nomination system, set up during the third century CE, developed during three more centuries into an imperial examination system, which gave rise to schools that taught the Chinese classics. This system was used until 1905, except when interrupted under Mongol rule of China. Khubilai Khan (reigned 1260–1294) believed that free public education for all children could improve everyone's quality of life. His government created many public schools, which used colloquial rather than classical Chinese to help students learn faster.

Two Chinese innovations—papermaking and printing—had implications of global dimensions for the exchange of information, mass literacy, administration, and scholarship. A court official, Cai Lun, developed paper production in the early second century CE. Experiments in woodblock printing began about 600 CE, and by the eleventh century the Chinese printed some texts with movable ceramic types that were affixed to a metal plate and rubbed by hand on paper—but they did not put this technique into general use. Papermaking spread to Korea and Vietnam by the fourth century, to Japan and India by the seventh, to the Islamic world by the eighth, to Muslim Spain by 1150, to France and Germany in the 1300s, and to England in the 1490s. Printing reached Korea (where types were sometimes made of bronze) and Japan, but it was resisted by the Islamic world, which valued handwritten calligraphy, and was delayed in Europe because of the absence of paper until the



Students and their teacher in India. Our capacity for language and communication, combined with the long dependency of juveniles on adults, has meant that humans accumulate collective learning in ways strikingly different from other animals.

Photo by Ajay Singh.

fourteenth century. Johannes Gutenberg developed movable type from metal alloy in the fifteenth century; it is not clear whether he was aware of Chinese and Korean precedents.

Islamic World

By the sixth century CE Persia had a flourishing Academy in the city of Gundishapur, the intellectual center of the Sasanid dynasty (224/228–651 CE). It included Zoroastrian, Persian, Greek, and Indian learning, especially in medicine. For the ninth through thirteenth centuries the intellectual center moved to Baghdad, built in the 760s just as the process of papermaking was learned from Chinese prisoners of war. Cultured Muslims were devoted to books, substituting linen rags, beaten to pulp, for the hemp or mulberry bark used in China. In early Islamic days mosques carried out schooling, but by the ninth century schools became separate from mosques. Called *madrasas*, these schools granted academic degrees at various levels and are sometimes called the first universities, though they were more like colleges. Probably Arab scholars carried out the most advanced science in the world from about 800 to 1400 CE.

In the fifteenth and sixteenth centuries Timbuktu (now often spelled Timbuctou), in the current West Africa nation of Mali, became an Islamic center of learning. It was home to Sankore University and other *madrasas*, whose primary focus was on the Qur'an

but also included logic, astronomy, and history. More than 100,000 manuscripts were held in libraries in Timbuktu.

Europe

After the disappearance of the Roman Empire, monasteries of the Catholic Church were centers of learning in Europe. The first emperor who united most of Europe after the Romans, Charlemagne, king of Franks (reigned 768–814 CE), provided for monastic schools and centers for book copying. Monasteries in the twelfth and thirteenth centuries, particularly in Spain, provided a large number of Greek and Arabic translations, especially in medicine and science. Universities emerged in Europe from the early second millennium. They enjoyed unusual autonomy from both church and state as separate corporations in charge of themselves, in contrast to Chinese and Islamic centers of higher learning. In the early twelfth century the Catholic Church mandated that every cathedral provide free education for poor boys. Gradually by the sixteenth to eighteenth centuries, education became more widespread.

Education in Modern Industrial Nations

When the explorations of Spanish and Portuguese sailors joined the world's two hemispheres, a new era of world history began. It produced another turning point in world history, the Industrial Revolution, characterized by the burning of fossil fuels and the surplus of resource extraction beyond even rapid population growth. Unlike the agricultural revolution, the Industrial Revolution emerged independently in only one place (Britain) and spread first to nearby or related places in western Europe and the United States, with a resulting domination of the world by Western nations through the twentieth century.

The Industrial Revolution fostered the development of the modern nation-state, with its increased bureaucracy and involvement in the daily life of its citizens, upon whose support the state increasingly depended. Education for political participation became a vital

part of industrialization. In Europe and the United States, as industrialization spread in the nineteenth century and child labor laws were enacted, most governments began to provide free compulsory primary education for all their citizens, giving the state power to remove children from the tutelage of their parents for part of the time. In Japan, under the Tokugawa shogunate (1600/1603–1868), samurai leaders provided sufficient schools to achieve a literacy rate of about 40 percent by 1848, a condition that helped Japan begin rapid industrialization. In Russia, with a literacy rate less than 30 percent at the beginning of the twentieth century, the new Communist government in 1919 focused on universal compulsory education for children and literacy for adults, achieving about 70 percent literacy by 1936.

The demand for formal education in industrial societies has not ceased. By the late nineteenth and early twentieth century industrializing governments began to add compulsory secondary education and to develop their universities into larger institutions with much more research capacity. Oral traditions and teaching by example continue to be used, of course, although they are often not even considered to be education.

Trends for the Future

As can be seen in this brief account, the complexity of the educational enterprise has increased over time. The length of childhood and of initial learning, notably long in humans to begin with, has been extended in industrial societies and now may last longer than the entire average lifespan two hundred years ago. Lifelong learning is a growing trend. Education has become in modern times central to industrialization and the human effort at productivity, as it has always been central to human survival.

This article constitutes a most preliminary sketch of the history of education, which has yet to be told from a global perspective, rather than nation by nation. Yet even this brief sketch reveals the cooperative behavior required to pass on collective learning to succeeding generations and the centrality of education to the human experience.

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See also Adolescence; Childhood; Dictionaries and Encyclopedias; Initiation and Rites of Passage; Libraries; Missionaries; Universities

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