

The Invention of Pen and Paper

Writing has come a long way and it has been changing for centuries. When talking about the history of educational technology, and more specifically about text technologies, the pen and paper are some of the mediums that have performed an essential part on the development of writing and consequently of human thought.

To think forward we need to reason backward. This relies on the importance of exploring the development of pen and paper and the implications that have brought in writing and reading modes and in education in general.

Due to the nature of these writing tools, there is a collaborative and embedded relationship between them. For this reason, this documentary is going to approach both timelines in a continuous way with the purpose of reflecting on each development and how it is relative to each time and culture.

Prior to the invention of paper, other writing materials were used in different civilizations and periods of time, clay, papyrus, bamboo and parchment are just some of them.

The earliest form of writing dates back as far as 3500 B.C and the Sumerians of Mesopotamia are credited for the invention of the first writing system.

This writing system consisted mainly of simple pictograms that symbolize an object or idea. With the time, in the attempt to make it more explicit, this writing system evolved from pictograms to a serie of signs (wedge-like in shape) known as the Cuneiform writing system.

It represented word-sign or pictographs and word concepts or phonograms by 3000 B.C.

Soft clay was the material surface that was used for this writing form.

Scribes employed the Reed Stylus, one of the oldest writing tools to use pigment. It was carefully cut to have a wedge shape to produce impression on damp clay.

This invention brought many benefits to the Sumerians that at the time lived in major cities with centralized economies. Officials needed to keep records of products like the grain or cattle that were leaving or entering their stores and it was very hard to keep track of it by just relying on memory. It was also used for other commercial transactions or administrative procedures and for sending messages. Now people could send messages to various places without having to rely on a messenger's memory. This was one of the first ways to store knowledge and information.

With the advancement of the Cuneiform system, depictions were more simplified and conveyed to word-concepts which helped to more clearly conveyed the meaning of what the writer wanted to express that got more complex than when using word-signs. The number of characters used in writing was reduced from over 1000 to 600. This development clarified the written word to the point where the cuneiform script was eventually used to shape more abstract thoughts that also resulted in some great literary works of the ancient Mesopotamia.

Papyrus plant was very important for ancient Egyptians in a practical and symbolic way. They would associate this plant to myths related to creation and it would be used in the manufacture of a variety of objects. These plants needed shallow fresh water, and despite the

arid conditions of Egypt, they were found in the Nile Delta and in the low-lying areas of the Nile Valley.

Papyrus was used for many purposes but its writing material function was the most important one. Different type of texts were written on it, among them administrative and legal documents, letters, illustrated narratives and religious texts.

The scribal tool that Egyptians typically used consisted of thin stemmed rush styluses. Ink and water with carbon-based black was used for texts or red color which was extracted from hematite. A reed plant was cut to a length of around nine inches, to later be hammered until soft at one end. After it was frayed and trimmed to finally be able to hold enough ink to write several letters before it needed more ink.

The papyrus scroll was the main writing tool used by Egyptians, which was also shipped in high quantities to Europe, especially to Rome and Greece. On its heydays, the Papyrus became an ingrained standard for writing.

With the time the parchment became more popular among medieval European scribes. Parchment was made of processed sheepskin and calfskin and despite being an over expensive material, it prevailed in the Middle Age and the papyrus began its decline. Parchment required a more elaborate preparation than papyrus to make this surface smooth and supple. Because of its smoothness, it easily took writing on both sides and it was a durable material.

The invention of paper by the Chinese was a big step forward in writing history. Paper's history dates back around 2000 years. It is generally cited that in 105 A.D, Ts'ai Lun, an official of the Imperial Court reported the invention of papermaking. It is known that Ts'ai Lun mixed mulberry bark, rags, hemp and other bast fibers with water to later pounded them into a sheet. However, according to some recent archeological records, papermaking predates this dates to around 200 years earlier.

Years after, paper played an essential role in the early writing culture of Chinese, they would no longer have to write in smaller sections, like other tools that were used before: the bamboo and the silk. Bamboo was usually used to write documents but it was too heavy to transport and silk was normally too expensive to consider, these writing materials were called Ji.

It is known that Chinese emperors jealously guarded the secrets of papermaking. It was actually until 751 A.D. when the Chinese army was defeated by the Ottoman Turks in the battle of Talas that this invention was spread in the Middle East. Among the Chinese soldiers that were captured some were skilled papermakers. The first paper mill industry was build in they year 793 A.D. in Baghdad. By the end of the 10th century, the paper had replaced parchment and papyrus in the Middle East.

It was 500 years later, around the year 1150 AD. when the paper found its way to Europe as a result of the Muslim invasion of Spain.

One of the first mills that manufacture paper in Europe was in Spain, where Arabs built around the year 1009 AD. Arabs controlled the paper production until they got expelled in 1244, so then papermaking gradually spread across Europe.

As it happens with every transition, the paper had several critics. It was said that it was more expensive than parchment, it was too fragile and it was also associated with Arabs who were not trusted and rejected the paper. The Christian community initially banned paper in Western Europe calling it a “pagan art” and believed that the parchment was the only sacred material to be used to carry the Bible text. In fact, in 1221 the Roman Emperor Frederick the II declared all official documents written on paper to be invalid.

It was until the 15th century with the advent of printing when Europeans fully embraced paper and the demand of it became much higher. Paper production needed the construction of more water mills, so over 6000 water mills were built in England and many more throughout Europe. In the early papermaking process, Europeans would use rags made with cotton, that was cleaned and heated in an alkali solution and later added bleach and gelatin.

It would not be until the 19th century when the invention of the steam power engine decreased the cost of paper and grew up its production. This engine was able to make paper fiber from wood, changing the new main source for paper production in the west.

Paper becoming so readily available, impacted reading and writing practices and contributed to the expansion of literacy to masses, which emphasized an increase of levels of education in population. Now more people were able to have access to books and texts and consequently to learning writing and reading.

The Pen

The quill pen began to spread as a popular writing tool around the 7th century BC. It was made from large birds' feathers would write with ink on surfaces like the parchment. The point of the feather was treated so it could hold the ink to make it flow to tip. They were also used with brushes to illustrate manuscripts with images and became more popular when writing started to spread to the western world.

The main disadvantage that had is that writers needed to constantly dip it into ink and could easily stain the writing surface.

Fountain pen offered the practicality for longer writing, and it could be filled with ink in different ways. It is known that early designs of fountain pens are characterized for problems with leaking, and inconsistent ink flow due to an imperfect understanding of the role that air pressure plays in the operation of pens.

Pens needed three other inventions to really improved their functionality: iridium-tipped gold nib, hard rubber, and free-flowing ink. The first pen to have all this was in 1850 but it had to be filled with an eyedropper.

In the early 20th century with many technological innovations, they could experiment with new filling systems to improve fountain pens. They retained their dominance until the 40's and 50's, because its successor, the ballpoint pen was still too expensive.

Around the 60's, companies like Paper Mate and Parker Pens started improving the manufacture of ballpoint pen by changing the ink formula and using a different ball texture for the nib that made its production way cheaper. This result in high numbers of sold pens and its popular usage dominated over the fountain pen. Ballpoint pen is commonly seen everywhere, and it has been highly used in educational contexts providing an easy way to conduct writing over the paper.

These writing tools had provided us a writing space with a visual clarity that allowed us to linger information and enlarge the potential of writing, reading and human thought.

Along these timelines, we can see an intrinsic and constant change in the transformation of materials for pen and paper, that as a medium had brought advancements and changes that are relative to every time and culture's needs. In this sense, the functionality of pen and paper is not just an external force, instead, it is part of cultural practices.

Their development aside from bringing accessibility to information and therefore to literacy has brought up the ubiquity of writing, which is one of the major features of modern societies and has been essential for social progress.

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