Benjamin Davidson

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Section C-Blue

The Printing Press

The History of the Printing Press

Throughout the past 4000 years, record keeping has been an integral part of human civilization. Record keeping, which allows humans to store information physically for later thought, has advanced with technology. Improvements in material science improved the writing surface of records, improvements with ink increased the durability of records, and printing technology increased the speed of recording. One such printing technology is the printing press, an invention that allowed mass production of text for the first time. The printing press has influenced human communication, religion, and psychology in numerous ways.

The printing press was invented by Johannes Gensfleisch zur Laden zum Gutenberg, born to a wealthy merchant family in 1398 in the German city of Mainz. He studied at the University of Erfurt in 1419. Later in his life, in 1448, using a loan from his brother-in-law Arnold Gelthus, he began developing a moveable type printing press. By 1450, the Gutenberg printing press was in full operation printing German poems. With the financial aid of Johann Fust, Gutenberg published his 1282 page Bible with forty-two lines per page. This bible, more commonly known as the Gutenberg Bible, was considered the first mass-produced book in history because 180 copies were printed. (“Gutenberg, Johann,” n.d., para. 1-4).

The printing press was first brought to England by William Caxton. In 1469, Caxton learned how to use the press in order to sell books to the English nobility. The first book he printed, his own translation of the *History of Troy*, had great success and enabled him to craft his own printing press in Michaelmas, England in 1476. The first piece of English printing, *A Letter of Indulgence* by John Sant, was printed with this press, thus ushering in a new era for English literature.

Printing technology was brought to America almost two centuries later. British settlers often established printing presses to provide spiritual texts for colonists; thus, it is no surprise that a printing press was brought to Cambridge, Massachusetts in 1638. Printers often produced their own paper using the same techniques that were used in England. In 1690, William Rittenhouse (Rittenhausen), a German printer who learned fine Dutch paper making practices, revolutionized American printing when he established the first American paper mill in Germantown, Pennsylvania. Printers now had access to cheaper paper and had more time to work on their trade (On printing in America, n.d., para. 3).

Even after the news of Gutenberg's invention spread to other European countries, people did not adapt quickly to the new printing style. In the fifteenth century, literacy was confined to a small elite group that was wealthier than others. With a small percentage of people who could read, the demand for books was relatively small. The practice of hand-copying books, which was done for centuries by monks and scalars, produced a very low output of expensive books with many mistakes. Still, the early printing press was slower and more expensive than hand-copying; therefore, written

word was preferred as a relatively cheap, portable, and rapid method of storing and transmitting information (Volti, n.d., para. 1-6).

Basic Science and Technology

The printing press clearly relies on a medium that allows the printer to record using ink. Dating back to 15,000 B.C.E., humans have recorded on surfaces such as cave walls, tree bark, stone, clay, wood, wax, metal, papyrus, vellum, and parchment, and paper. However, printers were constantly searching for new materials because many of these surfaces were not sufficient. For example, cave paintings, in which pictures were drawn on cave walls, were impossible to transport and difficult to see without light. Papyrus (compressed sheets of Egyptian reed stalk), as well as vellum and parchment (the prepared skin of cow, lamb, goat, and sheep), were high in cost and deteriorated quickly. Clay, which dries fast, was difficult to use ("Paper," n.d., para. 1).

At the end of the seventeenth century, it was necessary that printers begin exploring other sources of paper because the worldwide production of paper lagged behind the capability of the printing press. Previous to this time, the methods to produce paper were very similar to the methods used in ancient China because paper producing technology was adequate for the demand. When the printing press became popular in colonial America, the mass production of newspapers led to paper shortage. In order to remedy this problem, linens from mummy wrappings were imported from the East. Mummy wrappings and rags were mixed and turned into pulp to create mummy paper. On average, the linens from a single mummy could supply two average seventeenth century Americans for a year. Although this source nullified the scarcity of paper, it had

non-ideal qualities such as brown discoloration, oils, and botanical residue; in addition, this source angered archeologists and decreased in supply (Wolfe, 2004, paras. 1-3).

The most effective paper is made from pulped plant fiber. Originating from China in 105 A.D., plant fiber from the mulberry tree was used to make paper (“Paper,” n.d., para. 2). When the process spread to Europe from the Arabs in the sixteenth century, Europeans used the pulp of cotton and linen rags because they were available in large quantities. Although these people used different materials than the Chinese, the cloth was turned into a pulp and made into paper using a method similar to the ancient Chinese method. Beginning in 1850, paper producers began to use wood as the primary source of plant fiber because it was abundant. However, wood grinders at the time were not effective enough to produce pulp: there were often solid chunks of wood which led to low quality paper. On the other hand, the quality of wood pulp paper was still better than the quality of rag pulp paper. As grinding machines advanced, the practice of manufacturing wood pulp paper became more refined and efficient. In modern times, most paper mills grind wood into pulp and then apply a chemical process that uses steam along with sodium hydroxide (NaOH) and sodium sulfide (Na_2SO_3) to digest the wood chips to produce a finer pulp (“Paper,” n.d., para. 7).

As the population became more literate and the newspaper became more popular into mid-eighteenth century, the demand for printed material skyrocketed. Printers could now make more money by printing faster. Because the population was interested in current news, there was a need for printers to devise a technique to print the news faster. The first breakthrough came in 1812 when Friedrich Koenig and Friedrich Bauer invented the steam-powered press. This press was able to print 1,100

newspapers per hour, approximately four times the speed of manual presses. The greatest printing press improvement came from Richard Hoe in 1847 when he engineered a rotary printing press. Instead of laying movable type on a flat bed, the type was set onto the outside of a large cylinder. Paper was then placed on a flat bed. When the cylinder was rotated, paper would feed into the machine with high pressure between the flat bed and cylinder, thus allowing contact for the ink to be imprinted onto the paper. This inventory further improved the press, called the Hoe press or lightning press, by adding another cylinder. In addition, using even more cylinders, Hoe devised a machine that could print of both sides of a continuous piece of paper patented by France's Nicholas Louis Robert in 1798.

Language is another important consideration to printing. Printers who used moveable type printing presses had to hand lay each letter that they wanted to print; thus, the printer needed to cast each letter to be able to print. Moreover, the same letter was often used multiple times for each press indicating that it is necessary to cast many of the same letters. A language with more letters, such as Chinese, requires a vaster base set of letters compared to a language such as English. Movable type for languages that have fewer letters is easier to replace and manufacture. In countries such as China, hand-copying was much more effective than the printing press until the press became much more advanced (Printing, 2009, Original letterpress plates section, para. 3).

Impact of the Printing Press on History

The printing press influenced communication in numerous ways. Before the printing press, explorers could only record manually. Because it was very expensive to have many books copied, maps were very scarce; therefore, the information discovered by mapmakers was not used often. When it became cheaper to print, explorers were able to share their information with others, thus allowing increased education and easier navigation. The printing press also allowed scientists of all fields to compare their findings with others. Scientific theories started to form on a large scale because more supportive evidence was accessible. In mathematics, a field which relies heavily on uniform systems, mathematicians were able to build upon other works as they became available. All people were able to educate themselves better with more accessible and affordable text. Also, scientists were able to spend more time thinking about scientific concepts and less time copying previous research. The printing press clearly influenced communication (Volti, n.d., para. 1-3).

Religion was impacted by the printing press in several ways. As the amount of written communication increased, ideas spread easily. Religious ideas were no exception. Martin Luther, the leader of the protestant reformation, utilized print technology in order to spread his views. The Christian church had no control over the spread of such religious ideas. To halt the spread of these ideas, the Church would have to bring to a standstill the production of all printing presses. However, this would mean halting the printing of the Bible, a message that the Church did not want to send. In order to read the Bible, many people became literate. It is evident that the printing press affected religious movements (Volti, n.d., para. 7-9).

The printing press has influenced psychology in several major ways. Before the printing press, people were apt to believe that the text they were reading was true because only the most noteworthy information was recorded. Since the printing press became popular at the end of the eighteenth century, everything from medical textbooks to treaties on astrology were widely distributed. With so much original research circulating, it is no surprise that much of it was contradictory. People became less willing to accept the judgment of a single individual or a group of individuals. As a result, a more critical approach to understanding emerged. The printing of newspapers also impacted the psychology of people worldwide. The farther away that a reader was to a newspaper printing business, which were often located in cities, the more time it would take to get a newspaper. When newspapers first came out, travel was relatively slow; thus, it took even longer to get a newspaper. People lived closer to cities in order to improve their access to newspapers. Thus, urbanization increased. In addition, a culture based on print media was more individualistic than a culture based on collective means of communication. Because the printing press caused a movement away from the church, people had less collective communication and more individual thought. The printing press brought about fundamental change in the psychology of educated people (Volti, n.d., para. 4).

Extensions and Future Applications of the Printing Press

The printing press will likely not be improved upon or used in the future. Although advancements have been made to the printing press, modern printers are more reliable, more durable, faster, and easier to use than printing press. In addition, computers eliminate the need to physically set movable type into position; also, written text can be

edited much easier with a computer. As the capabilities of hard disk storage and of the computer improve, the need to physically store information will be eliminated and replaced by electronic storage. Because improvements have been made for every aspect of the printing press, designs of various printing presses will have no use in the future.

The printing press impacted and influenced the human environment in numerous ways that made possible communication and the spread of ideas. The use of the printing press also inspired millions to become literate. Gutenberg's invention facilitated the change of writing from record keeping to communication. Similar forms of communication will continue to affect human psychology globally.

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