

**Compelling
Question**

In what ways did Gutenberg's printing press impact change in Europe and the world?

**Standards
and
Practices**

C3 Historical Thinking Standards – D2.His.1.9-12.

Evaluate how historical events and developments were shaped by unique circumstances of time and place as well as broader historical contexts.

C3 Historical Thinking Standards – D2.His.2.9-12.

Analyze change and continuity in historical eras.

Common Core Content Standards – CCSS.ELA-LITERACY.WHST.9-10.1.B

Develop, claim, and counterclaim fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns.

**Staging the
Question**

What exactly were Johann Gutenberg's inventions and innovations? How did it impact the printing process?

**Supporting
Question 1**

In what specific ways did Gutenberg's printing press improve the production and distribution of information?

**Supporting
Question 2**

In what ways did Gutenberg's printing press affect society?

**Supporting
Question 3**

In what ways did Gutenberg's printing press affect culture?

**Supporting
Question 4**

In what ways did Gutenberg's printing press affect politics and economics?

Formative Performance Task	Formative Performance Task	Formative Performance Task	Formative Performance Task
Create an “owner’s manual” for the Gutenberg Printing Press. Include all the steps necessary to produce a 48-page document.	Create a map showing the spread of Lutheranism and the distribution of printing presses across Europe in the 16 th century. Explain the geographic evidence for a correlation between printing and religion in the 16 th century.	Create illustrated “how to” instructions for some task that may be unknown to many of your classmates (could be “owner’s manual” from FPT #1), and duplicate them for half the class. Now try to teach the task in class and observe the differences between the students with and without the printed instructions. Based on this experience, describe the impact of the printing press on medical training.	In conjunction with your school cafeteria, create a special lunch menu. Design, duplicate, and distribute to every student a flyer advertising the special menu. Compare the impact of your flyer with that of printed handbills in the 15 th and 16 th centuries.

Featured Sources	Featured Sources	Featured Sources	Featured Sources
<p>1A. Harry Ransom Center, the University of Texas at Austin, Web Exhibit, Gutenberg Bible, "Process," (video) http://www.hrc.utexas.edu/exhibitions/permanent/gutenbergbible/process/#top. (Accessed: 24 Sept. 2016)</p> <p>1B. Gutenberg-Museum Mainz, Gutenberg's Workshop, "Gutenberg's Inventions," http://www.gutenberg-museum.de/118.0.html?&L=1. (Accessed: 24 Sept. 2016)</p> <p>1C. Eisenstein, Elizabeth L. <i>The Printing Revolution in Early Modern Europe</i>. New York: Cambridge University Press, 1979.(p. ix-40)</p>	<p>2A. "How Luther went viral: Social Media in the 16th Century," <i>The Economist</i>, 17 Dec. 2011. http://www.economist.com/node/21541719 (Accessed: 19 Oct. 2016)</p> <p>2B. Woodward, Colin. "The Power of Luther's Printing Press," <i>The Washington Post</i>, 18 Dec. 2015. Book Review. Andrew Pettegree, <i>Brand Luther: 1517, Printing, and the Making of the Reformation</i>. New York: Penguin Press, 2015. https://www.washingtonpost.com/opinions/the-power-of-luthers-printing-press/2015/12/18/a74da424-743c-11e5-8d93-0af317ed58c9_story.html. (Accessed: 19 Oct. 2016)</p> <p>2C. History Channel. The book that changed the world; Gutenberg Bible. (3 min.) http://www.history.com/topics/middle-ages/videos/the-book-that-changed-the-world?m=528e394da93ae&s=undefined&f=1&free=false (Accessed: 19 Feb. 2016)</p>	<p>3A. Latin Sheet Music, http://digitalcollections.missouristate.edu/cdm4/document.php?CISOROOT=/Medieval&CISOPTR=140&REC=13 (Accessed: 24 Feb. 2016)</p> <p>3B. Nuland, Sherwin B., "Chapter 3: The Reawakening: Andreas Vesalius and the Renaissance of Medicine," in <i>Doctors: The Biography of Medicine</i>. New York: Vintage Books, 1988.</p> <p>3C. National Institutes of Health, U.S. National Library of Medicine, History of Medicine Division, "Dream Anatomy: Gallery," https://www.nlm.nih.gov/dreamanatomy/dag_I-B-1-01.html. (Accessed: 17 June 2016)</p>	<p>4A. Pettegree, Andrew. <i>The Book in the Renaissance</i>. New Haven: Yale University Press, 2010</p> <p>4B. McGrady, Patrick, director. <i>The Medieval Mind: The Machine that Made Us</i>. BBC. 2008. (Stephen Fry and the Gutenberg Press). https://www.youtube.com/watch?v=8svE2AjQWYE. (Accessed: 19 Oct. 2016) http://topdocumentaryfilms.com/machine-that-made-us/ (Accessed: 1 Nov. 2016)</p> <p>4C. Harry Ransom Center, University of Texas at Austin, Books Before Gutenberg, Written by Hand, the Scribe at Work and the Illuminator, http://www.hrc.utexas.edu/educator/modules/gutenberg/books/before/. (Accessed: 24 Feb. 2016)</p>

Alternate Formative Performance Task	Alternate Formative Performance Task	Alternate Formative Performance Task	Alternate Formative Performance Task
<p>Create a pad of personally monogrammed writing paper in the style of Gutenberg printing to understand the importance of the invention of movable type, its use in Gutenberg's printing press, and its affect on the mass dissemination of information. Use potatoes to carve character blocks and some version of an ink ball to apply ink to the raised characters. Finally use glue and/or to bind the pages together.</p> <p>Link to related hands-on-activity: http://reach.ieee.org/hands-on-activities/potato-stamp-monogram/</p>	<p>Write a letter from the perspective of a woman in 16th century Bavaria describing the differences between her life and the life of her grandmother who was born a century earlier.</p>	<p>Create a museum exhibit illustrating the use of art in 15th and 16th century printing. Identify specific pieces produced in and around the regions of Europe that housed printing presses.</p>	<p>Design and create a student almanac. Include information that you think would be most useful to you and your peers. How does your creation compare with the almanacs of the 15th and 16th centuries?</p>

Additional Sources	Additional Sources	Additional Sources	Additional Sources
<p>1D. <i>The Atlas of Early Printing</i>. University of Iowa Libraries, 2013. http://atlas.lib.uiowa.edu (Accessed: 2 Oct. 2016)</p> <p>1E. Photograph of fine art replica of an Illuminated page from a Gutenberg Bible. For more, see Missouri State Univ., Digital Collections, Medieval Manuscripts and Early Printing Collection, http://digitalcollections.missouristate.edu/cdm4/document.php?CISORO_OT=/Medieval&CISOPTR=76&REC=6 (Accessed: 16 June 2016)</p> <p>1F. Gutenberg Museum Mainz, Exhibition, 15th Century: Book and Print http://www.gutenberg-museum.de/42.0.html?&L=1 (Accessed: 17 June 2016)</p>	<p>2D. Bovey, Alixe, "Women in medieval society," The British Library, https://www.bl.uk/the-middle-ages/articles/women-in-medieval-society (Accessed: 18 Sept. 2016)</p> <p>2E. Hanawalt, Barbara A., <i>The Wealth of Wives: Women, Law, and Economy in Late Medieval London</i>, New York: Oxford University Press, 2007.</p> <p>2F. Green, L. (1979). "The education of women in the Reformation." <i>History of Education Quarterly</i>, 19, 93-116.</p>	<p>3D. Ayiter, Elif, Ph.D. Example of French incunabula art. Digital image. History of Visual Communication. http://www.citrinitas.com/history_of_viscom/images/printing/france.html (Accessed: 2 Oct. 2016)</p> <p>3E. Vesalius, Andreas. Excerpts from <i>De Humani Corporis Fabrica</i> (Fabrica and Epitome), 1543. Comparative Anatomy, http://evolution.berkeley.edu/evolibrary/article/historigy_02 (Accessed: 24 Feb. 2016)</p> <p>3F. Missouri State University., Digital Collections, Medieval Manuscripts and Early Printing Collection, (collection of 48 items) http://digitalcollections.missouristate.edu/cdm4/browse.php?CISOROOT=/Medieval&CISOSTART=1,2 (Accessed: 24 Feb. 2016)</p>	<p>4D. Dittmar, Jeremiah. "Information Technology and Economic Change: The Impact of the Printing Press." <i>The Quarterly Journal of Economics</i> 126, no. 3 (Aug. 2011): 1133-1172. https://scholar.google.com/citations?view_op=view_citation&hl=en&use_r=A76r0qMAAAAJ&citation_for_view=r0qMAAAAJ:u5HHmVD_u08C (Accessed: 24 Oct. 2016)</p> <p>The Appendix. https://scholar.google.com/citations?view_op=view_citation&hl=en&use_r=A76r0qMAAAAJ&citation_for_view=r0qMAAAAJ:gjMakFHDy7sC (Accessed: 24 Oct. 2016).</p> <p>4E. Eisenstein, Elizabeth L. <i>The Printing Press as an Agent of Change</i>. Cambridge University Press, 1980.</p> <p>4F. Baten, Joerg and Jan Luiten Van Zanden. "Book production and the onset of economic growth." <i>Journal of Economic Growth</i> 13, no. 3 (Sept. 2008): 217-235. http://link.springer.com/article/10.1007/s10887-008-9031-9 (Accessed: 24 Oct. 2016)</p>

Summative Performance Task	Argument	Write a thesis essay that directly addresses the compelling question using specific claims and relevant evidence from historical sources to support your conclusions while acknowledging competing views.
	Extension	Create a trifold board detailing the social, cultural, political and economic changes that may have resulted from the introduction of Gutenberg's printing press.
Taking Informed Action	<p>UNDERSTAND: Research the ways in which social media has been used to affect social and political change in the past five years</p> <p>ASSESS: Examine the advantages and disadvantages of relying on social media for news and information</p> <p>ACTION: Choose a significant cause which you feel passionate about and use your social media accounts (Snapchat, Facebook, Instagram, etc.) to educate people and rally support for it</p>	

TO THE TEACHER

All *REACH* Instructional Units are intended to be “classroom-ready.” Each unit begins with a *Unit Plan* in the form of a [C3 Inquiry Design Model](#). The *Unit Plan* includes learning objectives, content standards, formative and summative tasks, links to primary and secondary resources, and a warm-up activity.

Units are organized around a *Compelling Question* designed to inspire curiosity and promote discussion among students. To that end, we have also included a brief student introduction to the topic entitled, *Staging the Question*. Once students have been introduced to the topic, any number of *Formative Performance Tasks* may be completed using the included *Document Excerpts* (teachers may elect instead to utilize full-text documents linked within the *Featured Sources* and *Additional Sources* sections). *Document Excerpts* are print-ready in single-sheet format and keyed to the citations in the *Featured Sources* and *Additional Sources* sections of the *Unit Plan*. Teachers should select the *Formative Performance Tasks* and accompanying *Sources* that best suit their own instructional needs – content requirements, performance goals, student readiness, and time constraints. Upon the completion of each unit, students should be adequately prepared to complete the *Summative Performance Task* and *Taking Informed Action* sections of the *Unit Plan*.

To further assist the teacher, we have included a more thorough *Background Information* section. This document is intended to serve as professional reading prior to implementing the unit. Teachers may also wish to read the full-length primary and secondary sources from which the shorter excerpts were taken.

STAGING THE QUESTION

During the 15th century, the craft of printing took on most of the elements that it was to retain (with only minor changes) for the next 300 years. By the mid-1400s, five key elements of the printing system were in place.

Relevant IEEE REACH Videos:

History of Paper (04:13 min) <http://reach.ieee.org/multimedia/the-printing-press-papermaking/>
Gutenberg's Printing Press (05:39 min) <http://reach.ieee.org/multimedia/the-printing-press-the-press/>
Typeset of the Past (03:46 min) <http://reach.ieee.org/multimedia/the-printing-press-typesetting/>

This material has been taken from the following website:

<http://www.bl.uk/treasures/gutenberg/type.html> (Accessed: 19 Feb. 2016)

1. PAPER

Before paper, the most common medium for writing and printing was parchment. Parchment is made from animal skin (especially goatskin, sheepskin, or calfskin – a variant known as vellum) that is scraped, stretched, and dried. The resulting product is flat, smooth, and durable, so it is an ideal writing surface. Archaeologists have discovered Egyptian documents written on animal skins dating back to about 2500 B.C.E., but the early Egyptians used papyrus (made from reeds of the same name) more commonly. The use of parchment became much more widespread throughout the Mediterranean region in the 2nd century B.C.E..

Papermaking techniques, originally developed in China, spread west along the Silk Road between the 8th and 12th centuries. By the early 15th century, paper was widely available throughout Europe, but it was still expensive and untrusted by printers in terms of its durability. The proliferation of paper throughout Western Europe was associated with the spread of more readily available manuscript books and pamphlets, and the reproduction of woodcuts, playing cards, and other forms of popular imagery. For the Gutenberg process, papermaking was an “enabling technology.” As historian Robert Friedel has suggested: “The alternative to paper, parchment and vellum, primarily, were both expensive and technically unsuited for making rapid reproductions. Printing was by no means ‘caused’ by paper, but it would have been unthinkable without it.”

2. TRADE in printed material

Xylography, the printing of images and words with wooden blocks, was an important trade by the early 15th century. Woodcuts were at first primarily religious, but later other images and text became less expensive and more affordable for “illiterate laborers.” Most early printed books were travel literature. Demand for printed playing cards, first seen by travelers to Asia, spurred a trade centered in Venice, strategically located to dominate East-West commerce. As the trade diffused northward across Europe, it took root in the German cities.

3. INK:

The ink used by scribes throughout history was typically water-based with a gum binder. Because this type of ink did not adhere to metal, it was unsuitable for the new metal typeface used by the Gutenberg press (water-based ink would run off and smear). Oil-based inks were developed in the mid-15th century, shortly after oil-based paints became popular with artists. These new inks continued to use lampblack or powdered charcoal for pigment, but the oil mixture adhered to the metal used in Gutenberg’s moveable type process. German typesetters used a pad of stuffed leather that had been dabbed into the thick ink to apply ink to the typeface, a standard method probably developed in German woodcut shops.

4. THE PRESS – the screw press:

“The use of a screw to facilitate bringing together two flat wooden surfaces had been common for many years, found in everything from wealthy households, where they were used for keeping linen smooth, to papermills, where stacks of wet paper had to be tightly pressed before drying, to oil factories, where olives were pressed, or vineyards, where presses had been used for grapes for a thousand years. To be sure, with the advent of printshops, the design of the press underwent considerable modification, primarily to speed up the work, but the principle of the screw press was no mystery to any observant mechanic.”

5. TYPE

“The part of printing that posed the greatest difficulty – for the fifteenth century mechanic as well as for the modern historian – was the type.” Making type was the most difficult problem to solve because the efficiency and economy of the printing trade was directly impacted by the compositor’s skill to form and make available the type pieces. The craft of the compositor (typesetter) entailed organizing type into cases and composing type into pages. The task was complicated by the norms of manuscript practices. Letters within each typeface varied in width, and typesetters had to make accommodations for evenly justified margins, columns, enlarged initial capitals, and hyphenations. So, a single type size in an early printshop may have required 150 matrices (character molds) to produce. Consequently, variety and quantity within the framework of rigid standardization characterized the making of type from the very beginning. Like other printers, Gutenberg in Mainz faced all the many challenges associated with relief printing, which “relied on a raised printing surface, with the image defined by forming a flat surface on which the ink is placed for transfer to paper, surrounded by lower, non-inked space defining the boundary of the printed image.”

The technique required each page be formed by hundreds of individual letters with rigidly standard heights and depths, while at the same time allowing for considerable variation in widths (a W that takes up as much space as an i). Additionally, 15th century printers faced challenges of printing in more than one color, creating forms for composed pages, and dividing sheets into quarto, octavo, and smaller sizes. “[P]ractical printing involved printing large sheets on which as many as eight or sixteen pages might be set, each oriented in the correct fashion so that when the sheet was folded properly, a ‘signature’ of pages in the right sequence would result.”

Historians continue to debate how much credit should Johann Gutenberg receive for the invention of typography. Gutenberg was experienced working with precious metals, and probably only a goldsmith could have come up with the means for accurately shaping large numbers of very small pieces of metal, through the use of punches, matrices, and molds. Historians do not know how type was made in Gutenberg’s workshop in 1450, but “the method that does appear in the fifteenth century involved shaping a letter on a positive punch (that is, with a relief surface) of a hard material (eventually steel), which was used to make a matrix (negative impression) in a slightly softer material (eventually copper or a copper alloy).” “This matrix was then placed at the bottom of a mold, the sides of which were two L-shaped pieces of metal. The L-shape allowed the two parts to slide past one another, making a rectangular form of precisely even height, but variable width.” Molten metal (usually a lead-tin alloy) was poured into the type mold, and once the metal hardened the two halves of the mold were separated. Goldsmith skills were evident in the use of different metals and the carefully designed molds. Thus, skilled metalworkers helped make books by the mid-15th century.

Document 1B Excerpt

Gutenberg's Inventions

Printing with wooden forms on paper was something Europe had been familiar with since the late 14th century. Gutenberg's concept went one important step further than this simple form of printing; his basic notion was that any text could be reduced to its individual components, to its letters, numbers and punctuation marks. He was concerned with finding a process which would enable these elements to be mass-produced, the texts they composed to be printed to faultless perfection and the elements themselves to be reusable, which in turn would save not only materials but also space.

Punches and Matrices

If you imagine just how many stages of planning and experimentation were needed until this pioneering invention produced results which were faultless in every respect, then it is quite plausible that several years passed until all details had been perfected. The various steps Gutenberg had to take to turn his ideas into practice included producing – with absolute precision – the individual letters and characters of what printing jargon calls “figures” as punching dies. These dies, uniform in size and style, were engraved in a hard metal (probably steel) and could be vertically “punched” into a softer metal when and as often as required. This produced a negative or a matrix, made of a square of copper or any other soft metal.

The Hand Mould

The hand mould or casting instrument was developed to cope with mass production. The caster was a hollow mould or cast made out of metal with wooden clamps which could be separated into two and placed in the matrix. This saved vast numbers of hollow moulds having to be produced. The casting metal, an alloy of lead, tin and other admixtures, presumably antimony, was heated to almost 300°C and poured into the remaining opening in the manual caster. Letters could be removed immediately and only had to have the metal casting tip removed with a hammer. The letters were then placed in a type case and sorted according to the frequency with which they were used.

Setting and Printing

Before printing commenced the compositor made up one or more lines in a composing stick. These lines were then arranged in a galley (a wooden tray) to make up the printing forme for the page. The forme was then lifted into the wooden press.

The Printing Press

Screw presses used to make oil, wine, and paper had existed before Gutenberg. In printing, a number of contraptions had to ensure that the plate exerting pressure, the platen, was pressed vertically onto the form and was unable to twist out of position when the crossbeam or bar was moved sideways. Unlike the watery ink used with woodcuts, printing ink had to be slightly sticky and a deep black to produce good-quality print. It was made from soot, oil and resin. The inked plates were pressed onto evenly dampened paper – at least one double page at a time for books – and then hung up to dry on lines.

SOURCE: *Gutenberg-Museum Mainz, Gutenberg's Workshop, "Gutenberg's Inventions,"*
<http://www.gutenberg-museum.de/118.0.html?&L=1>. (Accessed: 24 Sept. 2016)

Document 1C Excerpt

The preparation of copy and illustrative material for printed editions also led to a rearrangement of bookmaking arts and routines. Not only did new skills, such as typefounding and presswork, involve veritable occupational mutations, but the production of printed books also gathered together in one place more traditional variegated skills. In the age of scribes, bookmaking had occurred under the diverse auspices represented by stationers and lay copyists in university towns; illuminators and miniaturists trained in special ateliers; goldsmiths and leather workers belonging to special guilds; monks and lay brothers gathered in scriptoria; royal clerks and papal secretaries working in chanceries and courts; preachers compiling books of sermons on their own; humanist poets serving as their own scribes. The advent of printing led to the creation of a new kind of shop structure; to a regrouping which entailed closer contacts among diversely skilled workers and encouraged new forms of cross-cultural interchange.

Thus it is not uncommon to find former priests among early printers or former abbots serving as editors and correctors. University professors also often served in similar capacities and thus came into closer contact with metal workers and mechanics. Other fruitful forms of collaboration brought together astronomers and engravers, physicians and painters, dissolving older divisions of intellectual labor and encouraging new ways of coordinating the work of brains, eyes, and hands. Problems of financing the publication of the large Latin volumes that were used by late medieval faculties of theology, law, and medicine also led to the formation of partnerships that brought rich merchants and local scholars into closer contact. The new financial syndicates that were formed to provide master printers with needed labor and supplies brought together representatives of town and gown.

As the key figure around whom all arrangements revolved, the master printer himself bridged many worlds. He was responsible for obtaining money, supplies, and labor, while developing complex production schedules, coping with strikes, trying to estimate book markets, and lining up learned assistants. He had to keep on good terms with officials who provided protection and lucrative jobs, while cultivating and promoting talented authors and artists who might bring his firm profits or prestige. In those places where his enterprise prospered and he achieved a position of influence with fellow townsmen, his workshop became a veritable cultural center attracting local literati and celebrated foreigners, providing both a meeting place and message center for an expanding cosmopolitan Commonwealth of Learning.

SOURCE: Eisenstein, Elizabeth L. *The printing revolution in early modern Europe*. 2nd Edition. Cambridge University Press, 2005.

The start of the Reformation is usually dated to Luther's nailing of his "95 Theses on the Power and Efficacy of Indulgences" to the church door in Wittenberg on October 31st 1517. The "95 Theses" were propositions written in Latin that he wished to discuss, in the academic custom of the day, in an open debate at the university. Luther, then an obscure theologian and minister, was outraged by the behavior of Johann Tetzel, a Dominican friar who was selling indulgences to raise money to fund the pet project of his boss, Pope Leo X: the reconstruction of St Peter's Basilica in Rome. Hand over your money, went Tetzel's sales pitch, and you can ensure that your dead relatives are not stuck in purgatory. This crude commercialization of the doctrine of indulgences, encapsulated in Tetzel's slogan—"As soon as the coin in the coffer rings, so the soul from purgatory springs"—was, to Luther, "the pious defrauding of the faithful" and a glaring symptom of the need for broad reform. Pinning a list of propositions to the church door, which doubled as the university notice board, was a standard way to announce a public debate.

Although they were written in Latin, the "95 Theses" caused an immediate stir, first within academic circles in Wittenberg and then farther afield. In December 1517 printed editions of the theses, in the form of pamphlets and broadsheets, appeared simultaneously in Leipzig, Nuremberg and Basel, paid for by Luther's friends to whom he had sent copies. German translations, which could be read by a wider public than Latin-speaking academics and clergy, soon followed and quickly spread throughout the German-speaking lands. Luther's friend Friedrich Myconius later wrote that "hardly 14 days had passed when these propositions were known throughout Germany and within four weeks almost all of Christendom was familiar with them."

....But writing in scholarly Latin and then translating it into German was not the best way to address the wider public. Luther wrote that he "should have spoken far differently and more distinctly had I known what was going to happen." For the publication later that month of his "Sermon on Indulgences and Grace", he switched to German, avoiding regional vocabulary to ensure that his words were intelligible from the Rhineland to Saxony. The pamphlet, an instant hit, is regarded by many as the true starting point of the Reformation.

The media environment that Luther had shown himself so adept at managing had much in common with today's online ecosystem of blogs, social networks and discussion threads. It was a decentralized system whose participants took care of distribution, deciding collectively which messages to amplify through sharing and recommendation. Modern media theorists refer to participants in such systems as a "networked public", rather than an "audience", since they do more than just consume information. Luther would pass the text of a new pamphlet to a friendly printer (no money changed hands) and then wait for it to ripple through the network of printing centers across Germany.

Unlike larger books, which took weeks or months to produce, a pamphlet could be printed in a day or two. Copies of the initial edition, which cost about the same as a chicken, would first spread throughout the town where it was printed. Luther's sympathizers recommended it to their friends. Booksellers promoted it Travelling merchants, traders and preachers would then carry copies to other towns, and if they sparked sufficient interest, local printers would quickly produce their own editions, in batches of 1,000 or so, in the hope of cashing in on the buzz. A popular pamphlet would thus spread quickly without its author's involvement.

SOURCE: "How Luther went viral: Social Media in the 16th Century," *The Economist*, 17 Dec. 2011.
<http://www.economist.com/node/21541719> (Accessed: 19 Oct. 2016)

Document 2B Excerpt

In the conventional survey course, Martin Luther leaps onto the historical stage out of nowhere: an unknown monk in an obscure German provincial town who, by performing the rather routine academic exercise of nailing a thesis to the doors of the local church, triggers the Protestant Reformation. The selling of indulgences was so hated, one gathers, that Luther was able to ride a wave of popular sentiment to reshape the course of Western civilization.

No surprise that it's more complicated than that, but a new book by British historian Andrew Pettegree reveals a central and heretofore little-appreciated aspect: Luther's master role in the imagination and execution of what had to have been the world's first mass-media-driven revolution. Luther ... figured out how to share his vision through the innovative use and manipulation of a nascent communications technology: the printing press.

"Printing was essential to the creation of Martin Luther, but Luther was also a determining, shaping force in the German printing industry," Pettegree writes. "After Luther, print and public communication would never be the same again."

When Luther nailed his 95 theses to the door in the Saxon backwater town of Wittenberg, moveable type was something like the computer in the 1960s, a useful and expensive tool used by academics and elite institutions. "Most customers were churchmen, scholars, or students, with a smattering of rich collectors from the nobility," Pettegree explains. "Consequently the first printers aligned their production to the established best sellers in these customers' favored fields," typically works that were "long, expensive, and in Latin" and written by long-dead authors. Wittenberg's only print shop produced ugly, sloppy copies of the theses of local university students....

As "Brand Luther" makes clear, Luther realized the untapped potential of print as a mass medium and used it to broadcast his message to lay readers across the German states, bypassing the traditional gatekeepers via this new social media. He responded to the first scholarly criticism of his theses not in Latin, the language of scholarship, but in German, with a clear, straightforward 1,500-word essay that could be read aloud in 10 minutes. It fit perfectly into an eight-page pamphlet that could be quickly and cheaply printed and reprinted, each copy using but a single sheet of paper, folded in quarto. "It was an instant publishing sensation."

...By 1519, this unknown monk had become Europe's most published author, his 45 original compositions republished in nearly 300 editions.... Three years later, Luther had produced some 160 writings, the majority addressed to the Christian people of Germany in their own language, even though many of them had never before owned a printed work. "They responded with an interest and enthusiasm unprecedented in recent history," driving the production of 828 editions, the printing, sale and distribution of which capitalized and transformed the German print industry.

SOURCE: Woodward, Colin. "The Power of Luther's Printing Press," *The Washington Post*, 18 Dec. 2015. Book Review. Andrew Pettegree, *Brand Luther: 1517, Printing, and the Making of the Reformation*. New York: Penguin Press, 2015 . (Accessed: 25 Oct. 2016)
https://www.washingtonpost.com/opinions/the-power-of-luthers-printing-press/2015/12/18/a74da424-743c-11e5-8d93-0af317ed58c9_story.html

Quinta in post

signū fecit iesus primū co

Quinta in post
epiphie
Introit

ti disci puli s suis.

Morate de u in

ōnes ange li e ius au

di ui t et le ta ta est

syon

SOURCE: Latin Sheet Music, Missouri State University, Digital Collections,
<http://digitalcollections.missouristate.edu/u?/Medieval,138> (Accessed: 24 Feb. 2016)

Document 3B Excerpt

[*De Humani Corporis Fabrica*] epitomizes the confluence of science, technology, and culture in a way that few, perhaps no, other books have ever done. It was an outgrowth of the vigorous spirit of the Renaissance, and in some ways is the highest expression of the Renaissance mode of thought: while it celebrates a return to the logical thought and observational methods of the Greeks, it eschews their tendency toward conjecture and philosophical speculation. The best of antiquity is revived, and its errors discarded. This is particularly discernible in the language of the text, an erudite form of Latin that is reminiscent of the finest of Roman rhetoric. With the publication of the *Fabrica*, as it is commonly called, medicine was finally lifted out of the medieval murkiness into which it had been immersed by compilers, interpreters, and mistranslators of Galen. The sounds of sweet reason and scientific detachment are heard in the voice of a writer educated in the classics, skilled in the language and literature of the two ancient cultures, and imbued with those rediscovered values of antiquity that gave Europe its Revival of Learning.

While representing a return to the Greek emphasis on direct study of nature, the *Fabrica* also provided for the first time in history a vehicle – the technically accurate, magnificently annotated illustrations – by which nature’s secrets might be learned. For, despite its literary virtues, it was not the text proper that made the project succeed; indeed, the text of the *Fabrica* remains the least-read of the great books of medicine, and to this day only fragments of it have been translated into English. The great glory of the Vesalian masterpiece lies in its illustrations. Executed by one of Titian’s ablest pupils, they brought anatomy to life on the printed page.

....It must, accordingly, be recognized that the pages of the *Fabrica* are in many ways the culmination of the work of the artists. It would have been impossible had not the artists of the time been observers and doers of dissection, just as the artistic triumphs of the Italian school would never have been created were it not for the anatomists.

There are several other varieties of artist whose work is displayed in the *Fabrica*. These are the printers with their newly developed techniques of typography, and the fashioners of the wonderful wooden blocks to which the drawn pictures were transferred by a technique that had been developed only during the previous half-century. To many observers whose interest in the history of science is peripheral, the significance of the *Fabrica* is that it represents a triumph of the art of making books. The typography, the illustrations, the correlation of the text with the pictorial material – all of these factors made its publication a turning point not only in medicine, but in the history of education and the history of the printed book as well. Some contemporary publications had approached its qualities, but nothing exactly like it had ever before been published; it became the prototype of a volume for the teaching of science. It went just far enough beyond its closest predecessor to turn the remarkable corner toward the modern textbook.

SOURCE: Nuland, Sherwin B., “Chapter 3: The Reawakening: Andreas Vesalius and the Renaissance of Medicine,” in *Doctors: The Biography of Medicine*. New York: Vintage Books, 1988.



De Humani Corporis Fabrica...

Basel, 1543. Woodcut. National Library of Medicine.

Andreas Vesalius [anatomist] (1514-1564)

Stephen van Calcar and the Workshop of Titian [artists]

Vesalius dissects a cadaver in the center of a crowded anatomical theater, while Death hovers over the scene. Before *De Fabrica*, depictions of dissection had the anatomist presiding at some distance from the cadaver, while lower ranking barber-surgeons did the dirty work of dissecting.

SOURCE: National Institutes of Health, U.S. National Library of Medicine, History of Medicine Division, "Dream Anatomy: Gallery," https://www.nlm.nih.gov/dreamanatomy/da_g_l-B-1-01.html (Accessed: 17 June 2016)

[Many more images at the website]

Document 4A Excerpt

In the first years printers were understandably preoccupied with the technical demands of the new art. But in some senses even when the book was printed, and the finished text stacked ready for the binder, the most challenging task still lay ahead: how to bring the book, now printed in 300, 400, or even 1,000 copies, to a host of individual purchasers: purchasers at this point unknown to the printer. This would seldom have happened in the manuscript age, when the man who commissioned the manuscript often knew the scribe personally: it was an individual and often very personal transaction. The buying of a printed book from a large stock was a very different thing. Purchasers had to be trained to understand that they desired a book that they had not personally commissioned....

It was the difficulties posed by this new marketplace that accounted for the failure of so many publishing ventures in the last third of the fifteenth century. The investment that a printer made in type, paper, and wages was all directed toward a clear goal: the production of a finished artifact. But unless the edition was supported by a wealthy sponsor or patron, the costs could only be recouped once the books had been sold. For many printers this demanded skills for which experience in a workshop producing manuscript books offered little help, and a network of commercial contacts they did not possess. The pool of potential purchasers was large, but often widely dispersed. The desire of many printers to publish eye-catching, luxurious or innovative publications accentuated this problem, since books like this were the most difficult to sell to a clientele dispersed around Europe. Printers would often have to hold stock for a long time before the edition was sold out: this again was a problem not anticipated by those familiar with the retail manuscript trade.

The bitter reality of the fifteenth-century expansion of print was that the rush of the new had brought print to many towns where the production of books was not commercially viable. The market was too large and too dispersed for the small producer. In the last two decades of the fifteenth century, as printing moved towards a more fully commercial basis, this brutal truth became more apparent.

During these years the geography of European print was radically transformed. Gradually, printing became concentrated in a small number of major centers of production; and within these centers, printing increasingly became the business of a small number of larger firms. The extent of this transformation has been masked by a focus on the rapid spread of print. Closer examination tells a different story. In Italy, printing was known, at some point in the fifteenth century, in around eighty different places. But of these only eleven could sustain a printing press continuously through the period, and the four largest centers of print between them accounted for 80 percent of the total output. The experience of smaller cities was quite different. Printing arrived in Treviso in 1471, and some eleven different printers worked in the town over the next twenty years. But when the last of these shops closed in 1494, it would be another ninety-five years before a printer worked in the town again.

SOURCE: Pettegree, Andrew. *The Book in the Renaissance*. New Haven, CT: Yale University Press, 2010.

Document 4C Excerpt

The Scribe at Work

The subject of a book, how it was to be used, and for whom it was intended, influenced the size, lettering, and decoration. For example, a Bible to be used for the conducting of church services, would be rather large and beautifully decorated, while one destined for personal use might be smaller, and less decorated, depending on the income of the owner. The scribe would begin his work by outlining the margins on the parchment leaf with a compass, pricking marks down the side of the page and drawing a straight line between the points. He would rule the lines in the same way, calculating where the large initial letters and illustrations would fall, and then copy the text, writing with a goose quill. Ink was made from gallnuts, the swellings on oak leaves caused by gall wasp larvae, with the addition of ferrous sulfate, or less often from the black carbon residue on oil lamps.

Until the 9th century, (usually) there were no divisions between the words in either Greek or Latin manuscripts. In other words, the reader would have to know when one word left off and another began. The text would be checked for scribal errors only, corrected, and then the rubricator would add the titles, initial capitals and paragraph marks. Rubric comes from the Latin word for red, because these important headings were often inked in red. After the rubrics were added, the manuscript was ready to be sent to the illuminator.

It is certainly possible that one scribe could have completed the whole process by himself, and evidence exists that some did (Cherubs and Camel in the Book of Hours, shown [below], illustrates the assembly-line technique). This is a Book of Hours, a small prayer book for private devotions often owned by women, was copied sometime in the fifteenth century, but was never finished. The area destined for the illuminations was left blank and then completed much later in the nineteenth century.

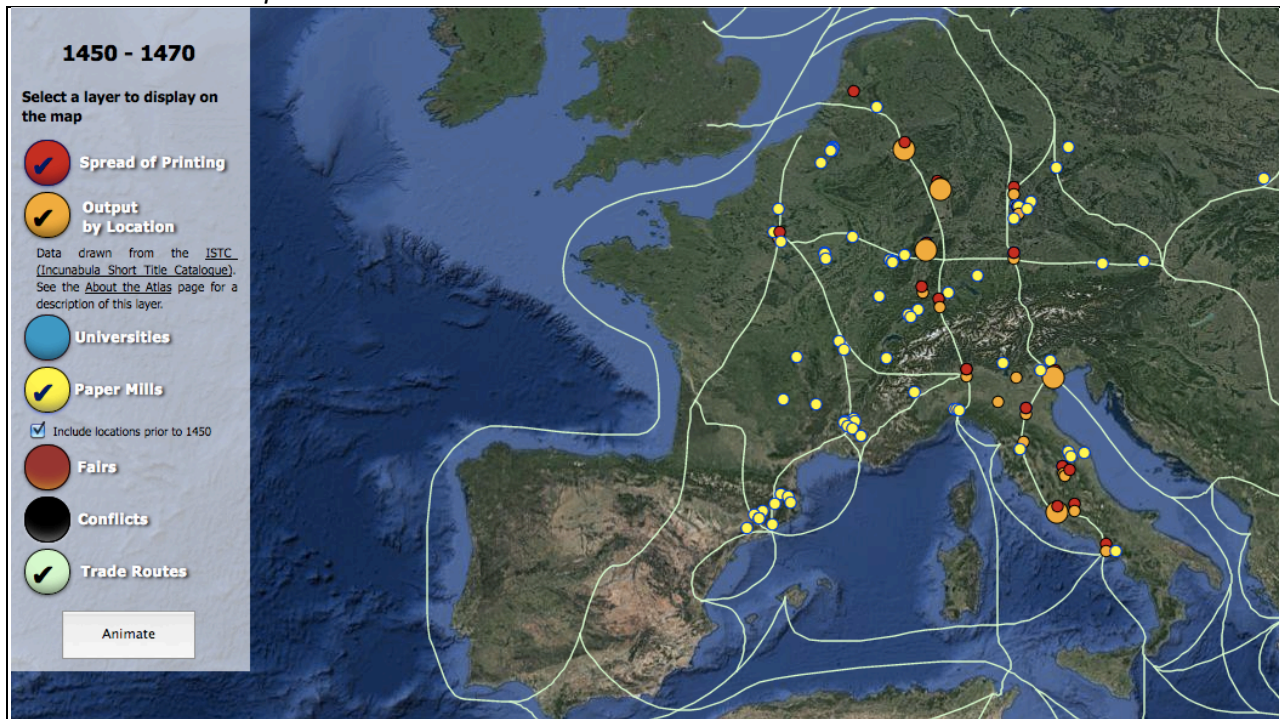


SOURCE: Harry Ransom Center, University of Texas at Austin, Books Before Gutenberg, Written by Hand, the Scribe at Work and the Illuminator,

<http://www.hrc.utexas.edu/educator/modules/gutenberg/books/before/> (Accessed: 24 Feb. 2016)

ADDITIONAL SOURCES

Document 1D Excerpt



SOURCE: *The Atlas of Early Printing*. University of Iowa Libraries, 2013.

<http://atlas.lib.uiowa.edu> (Accessed: 2 Oct. 2016)

<https://printingmuseum.org/>. Photo by IEEE History Center

Document 1F Excerpt

The Gutenberg Museum has a number of major works from the early years of printing on permanent display. Books printed up to 1500 differ in many ways from the books we are familiar with from later years. These early examples have no title page, chapter headings or page numbers. What they do have are pages of beautiful illumination and illustration. Visitors will notice that the protagonists of first few decades of the printed book often still clung to the traditional forms of the manuscript. The characteristics of the modern book emerged only gradually through fierce competition among printers, dependent on selling their books to be able to continue business, and through technical innovation in the printing of pictures.

The Colophon

The colophon, an inscription bearing the place and year of publication and often also the printing workshop (our modern equivalent is “book credits”), wandered from the back to the front of the book, where these facts and the contents of the book were more effectively advertised. A standardized title page was soon developed.

Pictures in Books

It wasn't until the 1460s that woodcuts were included in printed books. Printing type matter and woodcuts side by side in the printing press was initially a difficult feat to master. Printing in more than one color, a distinguishing feature of the two editions of the Mainz Psalter from 1457 and 1459, was discarded, as the process proved too time-consuming. The Psalter, on view in the museum treasury, is nevertheless an aesthetic highlight of the early years of printing – as is the Gutenberg Bible.

The Most Beautiful Book of the Renaissance

Francesco Colonna's “Hypnerotomachia Poliphilis” (“Poliphilus's Dream”) is without exception considered one of the most beautiful books of the 15th century. The book contains woodcuts in the style of the Italian Renaissance which harmonize perfectly with the typography. The book was published by Venetian Aldus Manutius at his officina in 1492. Some of the text is arranged in the shape of a vase, heart or triangle, which enhances the decorative nature of the pages.



SOURCE: Gutenberg – Museum Mainz, Exhibition, “15th Century: Book and Print,”

<http://www.gutenberg-museum.de/42.0.html?&L=1> (Accessed: 17 June 2016)

Document 2D Excerpt

Most people in medieval Europe lived in small rural communities, making their living from the land. Peasant women had many domestic responsibilities, including caring for children, preparing food, and tending livestock. During the busiest times of the year, such as the harvest, women often joined their husbands in the field to bring in the crops. Women often participated in vital cottage industries, such as brewing, baking and manufacturing textiles. The most common symbol of the peasant woman was the distaff - a tool used for spinning flax and wool. Eve is often shown with a distaff, illustrating her duty to perform manual labor after the fall from Paradise. An image often seen in medieval art is a woman waving her distaff at a fox with a goose in its jaws; sometimes, in satirical images, women are even shown attacking their husbands with a distaff or some other domestic implement.

Women living in towns had similar responsibilities to those in the countryside. Just as rural women helped with their husbands' work, urban women assisted their fathers and husbands in a wide variety of trades and crafts, including the production of textiles, leather goods, and metal work, as well as running shops and inns.

....Most women, even those in privileged circumstances, had little control over the direction their lives took. The marriages of young aristocratic women were usually arranged by their families (but here it is worth noting that their husbands, too, had little choice in their partners). Once widowed, such women had legal independence and, in many instances, autonomy over considerable financial resources.

....The two main alternatives for a medieval woman were to marry, or to 'take the veil' and become a nun. Almost all female orders required women to live behind the walls of a monastery or within an individual cell, living a life of contemplation, prayer and work. Though the appeal of this way of life might be difficult to grasp today, for a medieval woman, one of its attractions must have been freedom from the dangers of childbearing.

Most women, however, were married, usually as teenagers. Afterwards, they were responsible for managing the household, whether this was a great castle or a small peasant hovel. Wealthy women had servants, who assisted them with cooking, cleaning and childcare, and so were left time to engage in other pursuits. Popular diversions for aristocratic women included religious activities, hunting, dancing and playing games.

....Although historical sources about medieval women are not as numerous as those relating to men, they are much richer than is often supposed. Through surviving documents, literary and other texts and images, it is clear that medieval women were resilient, resourceful and skilled. Moreover, in exceptional instances they were capable of exercising political power, learning and creativity outside the domestic sphere.

It is, however, dangerous to generalize about the status and experience of medieval women, whose lives were shaped by as many different considerations as they are today. Interpretations of women's place in medieval society have to strike a balance between exceptional individuals, who by dint of their wealth, status and achievements are often relatively well documented, and the experience of ordinary women, whose lives tended to leave few traces on the historical record.

SOURCE: Bovey, Alixe. "Women in medieval society," The British Library,
<https://www.bl.uk/the-middle-ages/articles/women-in-medieval-society> (Accessed: 18 Sept. 2016)

Document 2E Excerpt

The distinction between girls and boys became prominent in education and apprenticeship. For boys, the advice manuals had injunctions on how to behave in school, with satiric poems about what happened to boys who misbehaved. No such literature exists for girls, and, indeed, it is difficult to find information on their schooling. The apprenticeship for boys and girls also differed with regard to the ages of entry, prior preparation required, and the length of the apprenticeship.

A statute passed in 1406 tried to limit the entrance into apprenticeship to those boys and girls whose parents had landed wealth, but the House of Commons added a clause assuring the right “of every man or woman, of what ever estate or condition they be, to set their son or daughter to take learning at any manner of school that pleaseth them.” The inclusion of education is curious and leads one to assume that education, even for girls, was becoming more common. One historian of London has argued that the statute should be read as an indication that girls were being educated and had complete access to apprenticeships.

We have no evidence of girls attending grammar school, song schools, and other such establishments for the education of boys. But it is entirely possible that some women as well as men ran schools for teaching reading and writing in English and doing sums, which would later be known as “dame” schools. For example, William Cresewyk, a grocer, left 20 s. to a “schole-maysteresse” in 1406. The fraternity of St. Nicholas recorded the name of Agnes, *doctrrix puellarum*, among its members. Again, the orphans court is a good source. While most of the provisions for education were for boys, Alice Reigner, an illegitimate daughter of a corn dealer, was to have 1 mark a year toward her education. William Rouse, a mercer, left nine children when he died in 1486. Each of his children, four boys and five girls, were entrusted to William Mylburne, a painter, “to find them to school honestly for four years next after my decease.” A chandler’s daughter attended school from age eight to thirteen at a cost of 25 s. for fees. Other evidence indicates an education of four or five years for girls. Only two of the orphan girls entered nunneries, but they would certainly have had an education.

While guilds in the fifteenth century required male apprentices to be able to read and write, no evidence suggests that girls needed these skills. Some trades, however, were based on literacy. Alice and Matilda, orphaned daughters of John Shaw, a vintner, were apprenticed in 1420 to Master Peter Churche, a notary public. Presumably they had some writing skills before they were apprenticed. Women had other needs for reading and writing skills. Some women carried on their own business; others took over their husbands’ businesses when they were abroad or died, or needed to read communications sent about business.

SOURCE: Hanawalt, Barbara A. *The Wealth of Wives: Women, Law, and Economy in Late Medieval London*. New York: Oxford University Press, 2007.

Document 2F Excerpt

The Renaissance humanists had shown great interest in the education of the young. The Protestant reformers, many of whom came from the humanist circles, followed in their train. When the less enduring values of the Northern Renaissance began to fade away, these evangelical successors almost imperceptibly converted it from an elite to a popular movement, and institutionalized much of humanism in the school, church, and state, so that the movement became a part of the life of every Protestant community.

The Contribution of the Wittenberg Reformers

The indispensable personality in the transferral of Renaissance ideals to the Reformation was Philipp Melanchthon, who was a pupil of Reuchlin and Erasmus, becoming, in turn, the educator of thousands of pastors, teachers, musicians, lawyers, physicians, and statesmen. Although the *Praeceptor Germaniae*, as he is commonly called,...wrote more about the education of boys than the schooling of girls,...a significant poem was turned up some years ago in which he expresses definite favor toward serious studies for the fair sex:

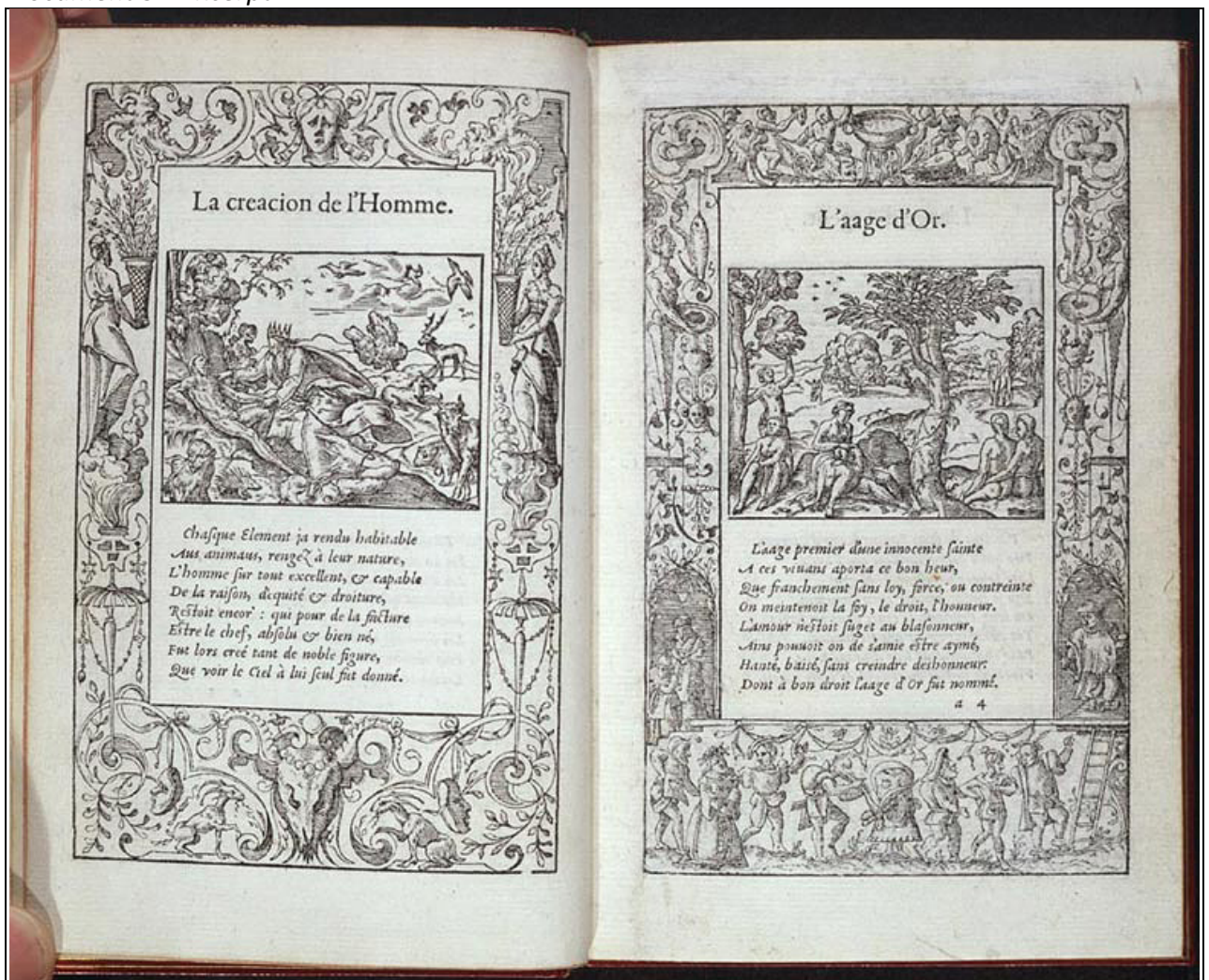
....Let sweet girls vie with the males,
As I see it, your glory will not be light.
Both sexes share the muses by common consent,
I judge them to be less difficult for you!

Melanchthon wrote these lines in tribute to a young woman who had composed a Latin oration "On the Child Jesus," which was published by Ambrosius Moibanus, the Breslau reformer who manifested a concern for the education of women.

....In [Luther's] writings he dealt with the role of women in society while he insisted upon compulsory school attendance for all, girls as well as boys. So early as his "Address to the Christian Nobility of the German Nation" (1520) he lamented that the convents had forsaken their original purpose of education women, called upon German leaders to provide elementary and secondary schools, and added: "And would to God that every city also had a girls' school where the girls could hear the Gospel for an hour every day, whether in German or Latin." Four years later he urged the aldermen of all the German cities to provide "the best-possible schools both for boys and girls in every locality," with the observation that thereby men would be trained for public service and women for managing the house, children, and servants. He felt that girls as well as boys should learn not only religion but also history, classical and modern languages, literature, music, and mathematics. Intellectually-qualified girls should study the liberal arts, like their brothers; among the available vocations he pointed out the need for female teachers.

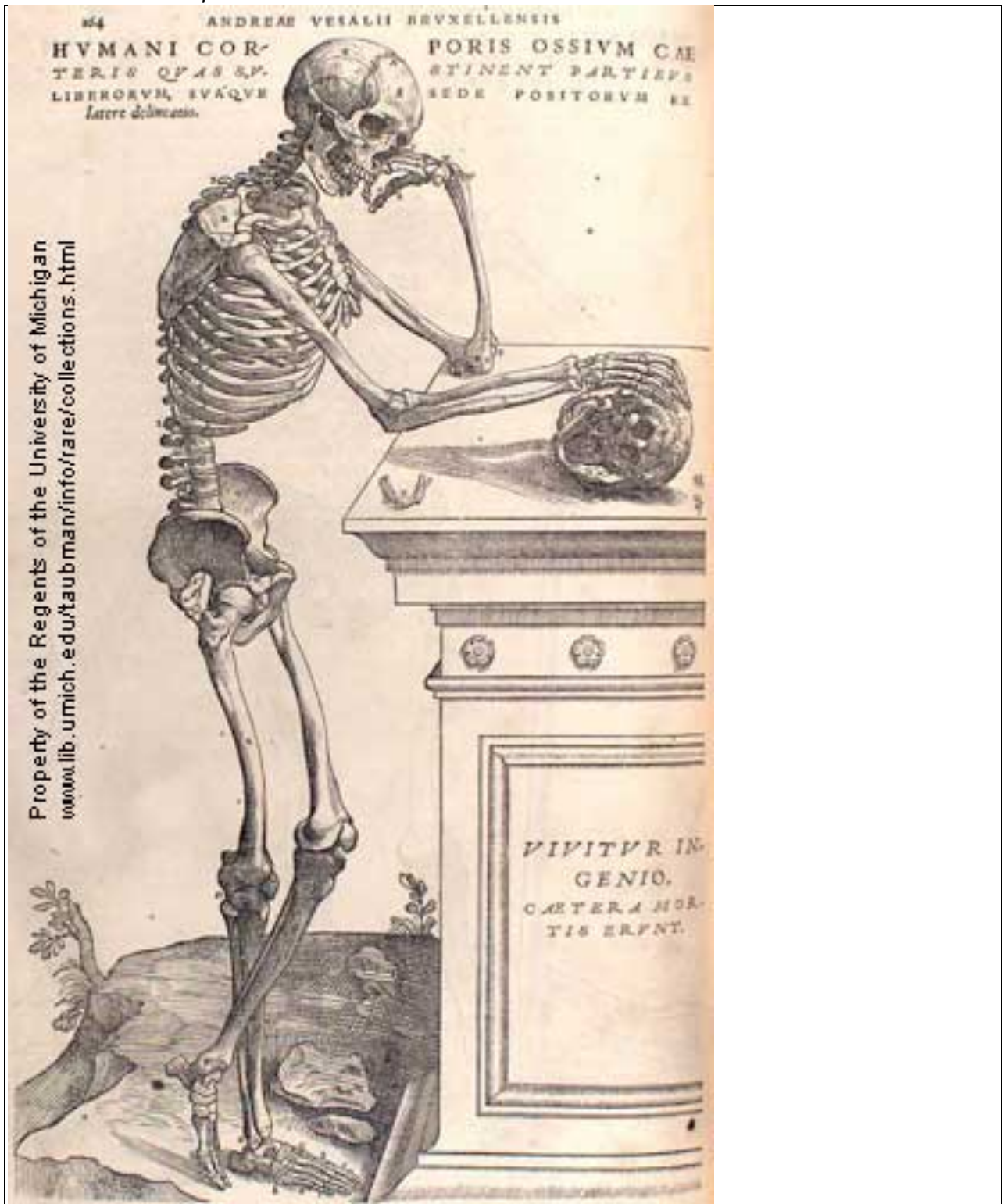
These proposals of Luther were fused with the pedagogical principles of Melanchthon....and laid the foundation for universal education for boys and girls in northern Germany, and, a little later, in Denmark and Norway.

SOURCE: Green, L. "The education of women in the Reformation." *History of Education Quarterly*, 19: 93-116. (1979)



SOURCE: Ayiter, Elif, Ph.D. Example of French incunabula art. Digital image. History of Visual Communication. (Accessed: 2 Oct. 2016)

http://www.citrinitas.com/history_of_viscom/images/printing/france.html



SOURCE: Vesalius, Andreas. Excerpts from *De Humani Corporis Fabrica* (Fabrica and Epitome), 1543. Comparative Anatomy, http://evolution.berkeley.edu/evolibrary/article/history_02 (Accessed: 24 Feb. 2016)



The illustrations for this 1572 German translation of humanist Petrarch's "De Remediis Utriusque Fortuna" are among the most famous works of Hans Weiditz.

SOURCE: Missouri State University, Digital Collections, Medieval Manuscripts and Early Printing Collection, (collection of 48 items)

<http://digitalcollections.missouristate.edu/cdm4/browse.php?CISOROOT=/Medieval&CISOSTART=1,2> (Accessed: 24 Feb. 2016)

The key point is that cities that adopted print media benefitted from positive, localized spillovers in human capital accumulation, technological change broadly defined, and forward and backward linkages. These spillovers contributed to city growth by exerting an upward pressure on the returns to labor, making cities culturally dynamic, and thus attracting migrants. They were localized by high transport costs historically associated with inter-city trade and because the printing press fostered new and important face-to-face interactions.

Historically, migration drove city growth. Migration was central because urban death rates exceeded urban birth rates, and cities drew migrants to the extent that they offered relatively high wages and attractive cultural and economic opportunities. Moreover, in the pre-industrial era, commerce was in general a much more important source of urban wealth and income than tradable industrial production. As a result, city growth was typically contingent on commercial success.

Print media played a key role in the acquisition and development of skills that were valuable to merchants and businessmen. Print media contributed to the spread of literacy, the accumulation of human capital, and technological change. More broadly, print media fostered the emergence of dispositions, competencies, and aptitudes reflective of and suited to life in a commercial environment.

...More broadly, print media was associated with the development of new, bourgeois competences, preferences, and ways of thinking. The urban middle classes were the principle purchasers of books. Between 1450 and 1500, printing technologies spread to meet a specific demand: "demand for books among the merchants, substantial artisans, lawyers, government officials, doctors, and teachers who lived and worked in towns...men who needed to read, write, and calculate in order to manage their businesses and conduct civic affairs, who were being educated in increasing numbers in town and guild schools, and who in the fifteenth century were swelling the arts faculties of the universities."

A culture developed in which schooling in languages was part of a progression in which pupils went from "arts to marts". For the first time, some cities began to run schools for children who were not going to learn Latin – using printed grammar school texts. Grendler (1990) observes that the availability of inexpensive texts was a key prerequisite for the spread of literacy in Renaissance Europe. In the 15th century, it became expected that the children of the upper bourgeoisie would attend school and, alongside religious materials, school books generated high returns for Renaissance printers. Bolgar (1962: 428) observes that, "Some measure of elementary education was sought after by all who wished to raise themselves a little in the world." This sort of mobility – one contingent on education and literacy – was the mobility of city dwellers. Broadly, the new technology was associated with an emerging culture of information exchange and the development of an urban, bourgeois public sphere.

Print media was widely traded, but cities with printing presses derived benefits from the technology that others did not. In part this was because print media was heavy, sensitive to damp, and as a result costly to transport. Transport costs in early modern Europe were sufficiently high that print media often spread through reprinting rather than inter-city trade.

SOURCE: Dittmar, Jeremiah. "Information Technology and Economic Change: The Impact of the Printing Press." *The Quarterly Journal of Economics* 126, no. 3 (Aug. 2011): 1133-1172.

https://scholar.google.com/citationsview_op=view_citation&hl=en&user=A76r0qMAAAAJ&citation_for_view=A76r0qMAAAAJ:u5HHmVD_uO8C (Accessed: 24 Oct. 2016).

The Appendix. [https://scholar.google.com/citations?](https://scholar.google.com/citations?view_op=view_citation&hl=en&user=A76r0qMAAAAJ&citation_for_view=A76r0qMAAAAJ:gjMakFHDy7sC)

[view_op=view_citation&hl=en&user=A76r0qMAAAAJ&citation_for_view=A76r0qMAAAAJ:gjMakFHDy7sC](https://scholar.google.com/citations?view_op=view_citation&hl=en&user=A76r0qMAAAAJ&citation_for_view=A76r0qMAAAAJ:gjMakFHDy7sC) (Accessed: 24 Oct. 2016)

Long before *Poor Richard*, printers had learned from their daily experience that time was money and that profits and piety went together. They were carriers of a 'spirit of capitalism' for the simple reason that they were capitalists themselves. If they deserve to be singled out among contemporary entrepreneurs, it is because they were temporarily in command of the nascent communications industry and played a key role in reshaping cultural products and conveying ideas. Their outlook was reflected in handbooks like *The Merchants Mappe of Commerce* and in the advice such handbooks contained. The tables and rules, the admonitions concerning extravagance and the advice as to the cumulative advantages of saving a farthing a day had already appeared in Italian merchant manuals before printing. They were probably not entirely new to Elizabethan merchants. But such instruction was being presented in a form that entered almost every English household – well before Philadelphia printers had set up shop. By the seventeenth century, in England at least, the almanac outsold the Bible. 'No other book in the English language had as large a circulation as the annual Almanac.'

The contents of these almanacs ... contained uniform tables for computing costs of goods and payments of wages, and lists converting weights and measures or providing distances between main towns.

...The same considerations also apply to all the other practical manuals, directories, maps and globes that proliferated after print. The increased output of practical handbooks, to be sure, is occasionally noted by social historians, but then it is almost always explained in terms of a new demand created by a 'rising middle class.'Instead of concentrating on a vaguely conceived, ever-expanding demand, more thought should be devoted to a specific transformation that affected production and supply.

...the Renaissance was on the whole a period of economic regression, yet the shopkeepers established in a great many cities had abundant arithmetical needs. Think only of the printing presses and the bookshops, which were particularly abundant in university towns...in Salamanca at the beginning of the sixteenth century there were already fifty-two printing presses and eighty-four bookshops...These petty merchants were not interested in the theory of numbers but they needed practical guidance for their accounts.

Merchants needing practical guidance had not been lacking in earlier centuries.Even though the growth of towns and the expansion of trade created new demands from the eleventh century on, manuals of instruction, tables, maps and charts remained multiform and in short supply. The concentration of shopkeepers and petty merchants in particular sixteenth-century college towns did not in itself change this situation any more than did the 'rise of a middle class.' Expanding markets had long been in existence. What had changed were the products that could be supplied. Some of these products in turn were designed by printers with their own special needs in mind. The popular road-guide turned out by Charles Estienne in 1553: *Guide des Chemins de France* may serve as an example. This guidebook laid out routes long familiar to those who were engaged in the book trade; routes which had been travelled for fifty years by members of the publishing dynasty to which Charles Estienne belonged. The French merchants who followed the paths laid out by Estienne's road-guide will do nicely as symbols of the larger historic process that was at work. After the fifteenth century, Western businessmen, who launched various new enterprises and broke new paths in many fields, were often indebted in their pioneering endeavors to the early printers who first pointed the way.

SOURCE: Eisenstein, Elizabeth L. *The printing press as an agent of change*. Vol. 1. Cambridge University Press, 1980.

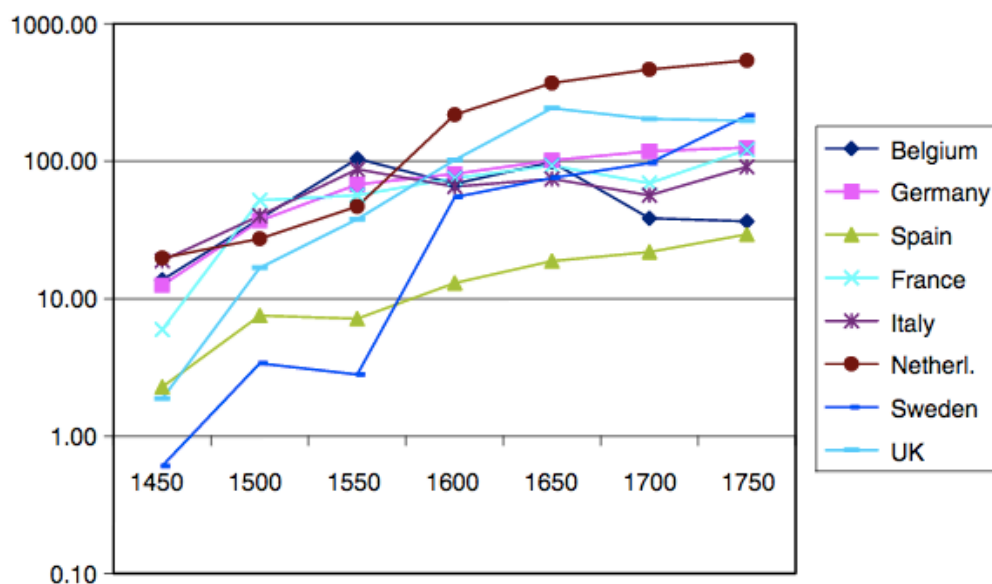


Fig. 1 Book production in early modern Europe, 1450/99-1750/99 (number of new editions per million inhabitants, log scale of vertical axis). Source: see text

The estimate of the output of printed books is based on the number of titles or editions that appeared in Western Europe between 1454 and 1800. The most important sources for counting new titles are meta-catalogues (or short title catalogues) that are based on the books in library catalogues and are inventories of editions published in different countries and/or languages....

For the 15th century, Belgium and Italy have the highest levels of book production per capita, overtaken at around 1600 by The Netherlands and Great Britain (Fig. 1). This is an important result in itself, because literacy values in England during the Industrial Revolution were previously estimated as relatively modest and stagnant. However, such a pessimistic view of human capital formation during the 1750–1850 period tends to overlook the strong increase which occurred in the centuries before 1750, when Great Britain became one of the most literate countries of Europe. The strong growth of human capital formation in the Low Countries and England is consistent with what we know from other studies. Thus, the higher number of books per capita could have created substantially greater growth capabilities. Germany, the country where Gutenberg invented the moveable type, belonged to the middle group as it had clearly less books per capita than Great Britain or The Netherlands. Belgium displayed an interesting development, starting out from a high level but falling off heavily in relative terms in the 18th century.... Spain started at similarly low values as Great Britain in the 16th century, and arrived at the lowest overall value in 1750–99. The biggest growth success was Sweden, rising from the lowest value in 1450–1599 to a position on par with Great Britain in the late 18th century. The Swedish and Dutch gained enormously during that period, relative to the Germans, for example, who destroyed their economy in religious wars.

...we provided a new indicator for advanced literacy by employing the number of books per capita in pre-industrial Europe. It was exactly in the countries in which book production increased fastest that real wages developed systematically better over the centuries before the Industrial Revolution than in countries with lagging human capital formation.

SOURCE: Baten, Joerg and Jan Luiten Van Zanden. "Book production and the onset of economic growth." *Journal of Economic Growth*, 13, no. 3 (Sept. 2008): 217-235.

<http://link.springer.com/article/10.1007/s10887-008-9031-9> (Accessed: 24 Oct. 2016)