

HIGH SCHOOL STUDENTS' DECISIONS TO READ PRINT OR ELECTRONIC
TEXT: LEARNING OUTCOMES AND PREFERENCES

By
Sarah Abigail Auman

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Advisor

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This study examined high school history students' decisions to read text on the computer screen or to print a copy. Subjects were randomly assigned either to an experimental website, which included additional features beyond the text, or to a control website, which only included the text. Results indicated that the decision to print or to read on the screen was often made before visiting a website and was not heavily impacted by the specific design. Overall, the control group had more positive responses to electronic text than did the experimental. On test questions, those who read the experimental version surpassed the performance of the control group and equaled the performance of those who read a printed copy.

Headings:

Books in Machine-Readable Form

Electronic Books -- Aims and Objectives

User Interfaces -- Evaluation

Introduction

The notion of reading electronically originated years before the advent of the desktop computer. Vannevar Bush, writing in 1945, predicted in the future individuals would own “memex” machines, which would store books along with records and would provide fast retrieval of these materials.¹ Bush foresaw a machine with “slanting translucent screens, on which material can be projected for convenient reading.”² The vision of electronic reading continued through the decades. In 1968, Alan Kay expressed the idea of a portable, interactive electronic book named “Dynabook”, which would rely on the wireless exchange of data.³ The notion also found its way into science fiction, appearing in episodes of *Star Trek*, and as the “Encyclopedia Galactica” in Douglas Adams’ *Hitchhiker’s Guide to the Galaxy*.⁴

Today, electronic publishing is no longer science fiction, but it is still far from being mainstream. Bush’s concept of the “memex” machine is much like personal computers today, but many people do not find reading from them to be comfortable. Alan Kay’s idea of a portable electronic book has seen the light of day in a number of different products, but these have yet to become a commonplace way of reading books. The World Wide Web has emerged as a

successful medium in which to provide access to electronic journals, digital libraries, electronic reserves, and full-text books, yet providing text in electronic form often does not cut out paper, since people may print out a copy of a work rather than reading it on the computer screen. In much of the literature, there is either the overt or underlying assumption that people will not read long works on the screen, and although this makes good sense and may well be true, more research needs to be conducted to determine if there is a certain length that most people will not read beyond and what other factors influence people's decisions to print out a document.

Cultural resistance has more to do with the slow rate of adoption of screen reading than does the current state of screen technology, which continues to improve. We are in the midst of the greatest revolution in publishing since the invention of the printing press, and in the coming years we can only expect to find more readings available electronically. Yet to achieve the visions of people such as Vannevar Bush, Alan Kay, and Douglas Adams, we need to overcome the resistance to reading from the screen.

Some theorists suggest that for electronic texts to become successful, they must provide features which are not possible in printed texts.⁵ Surprisingly, although there has been much conjecture, there has been little research into what new features people might like or dislike. Finding out what works and what does not is vital if the electronic book industry and screen reading are to take off.

Students are an especially important group to study, since they increasingly use the Internet for research and school work, and their responses are a good indication of what the public's attitudes will be in the future. Electronic reserves, electronic textbooks, and the use of online classrooms are all changing the experience of being a student. Publishers believe textbooks and reference works are viable to make available electronically and are increasingly doing so. It could well be that today's student who uses electronic textbooks will support the market for a wider selection of books when she graduates.

Publishers are not the only ones to gain from this research; libraries and their patrons, bookstores who offer e-book products, and the general public stand to gain tremendously from improved electronic text formats. What Edward Burke Huey wrote in 1908 continues to be relevant today: "Reading is the means by which the world does a large part of its work. . . .The slightest improvement either in page or in the method of reading means a great service to the human race."⁶

This study seeks to find out what students do and do not like about reading from the screen, as well as determining if a particular design, including features not possible in printed texts, encourages more reading from the screen than a plain text version with no additional features. Will one version lead to more students printing out a copy than the other version? Which version will lead to the greatest learning: the printed copy, the plain text version, or the version with additional features? I predict that the electronic version with

additional features will lead to less printing of paper copies, improved learning, and more positive responses.

Defining Electronic Text

The electronic forms of libraries, reserve collections, journals, and books all demand the creation of new models for the systems they transform, as well as making the distinctions among libraries and publishers murkier than ever before for the lay person. Defining and distinguishing among the terms “digital library”, “electronic reserves ” and “electronic book” is not as easy as it may seem. Librarians would define a digital library differently than the media, who often call the whole Internet a digital library.⁷ A library may provide access to electronic journals and books through its online catalog, but not consider those resources part of its digital library. Electronic reserves also are not considered part of a digital library, since a digital library’s collections are seen as permanent, while electronic reserves are seen as temporary and not worth spending much human effort on the quality of presentation.⁸ A student who visits an academic library’s website likely would not make these distinctions, but would see all the offerings as part of the digital library.

It is a little easier to distinguish how an electronic book available for reading on the World Wide Web differs from other websites. Generally speaking, something published is designed to be read in its entirety, instead of being designed to quickly find particular bits of information. Robin Peek notes

that electronic publishing is different from other information available on the Web:

Publishing has special attributes that differentiate it from communication. Publishing implies the creation of a “thing” whether that be an e-journal, an online book, a CD, and so forth. Publishing has finality, responsibility, legal, and even moral implications. When something is published, the authors ask for readership and the chance for the information to be considered important.⁹

For the purposes of this research, electronic publishing encompasses all of its manifestations: electronic journals, digital libraries, electronic reserves, and electronic books. The website designed for the study is referred to as an “electronic reading environment,” for it could be used for any electronic publishing format. Often it is easy to tell at a glance the difference between paper books and journals; there are differences in size, layout of covers, and cover material. When both are electronic, however, it is more difficult to determine genre at a glance. It could be that in the future, the distinction will not be important, and designs of sites will become more alike than different when a clearer picture of how people like to read on screens emerges.

Digital Text: Gains and Losses

Digital text and the printed page are two different mediums, each of which brings its own benefits and limitations. A computer screen or portable reading device cannot compete with the legibility of the printed page, nor can it mimic the flexibility and feel of a traditional book.¹⁰ Although electronic books

may allow one to highlight, underline, and write in the margins, they cannot match the speed and ease of annotating printed pages.¹¹ A printed book allows portability without needing a technological infrastructure,¹² and seeing books on a shelf facilitates browsing much more easily than can be done on a screen.

On the other hand, digital text may bring with it the ability to cut and paste sections of text, to refer to a dictionary, to manipulate font type, size, and color, and to quickly search through a work for a specific passage.¹³ Electronic texts use zero paper and ink, and since publishers distribution costs are cut by providing the works online, this means that electronic works are often more affordable than print counterparts.¹⁴ For libraries, electronic texts should be appealing, since they can be stored in a much smaller physical space than paper books and journals, and they also offer the ability to lease additional copies of a work for the time period in which it is popular.¹⁵ Libraries should also find statistics gathering on material use to be much simpler with electronic texts than with printed works.¹⁶

Current downsides to electronic publishing include that there are not many titles available in electronic form and not enough adherence to the Open E-Book Standard, meaning that a title formatted for one reading device likely will not be readable on another device. There are also legitimate concerns about security and copyright, and how to determine that an online author is who he or she claims to be. Another issue worrying electronic publishing is how to ensure continued availability in the years to come. What happens when providers go

out of business and sites stop being maintained, or when technology changes and certain formats can no longer be interpreted? Besides working out the best design for electronic reading devices, these issues need resolving in order for electronic publishing to succeed.

Implementations of Electronic Text Reading Devices/Software

Various reading devices and software packages have emerged over the years, most not finding much success in the marketplace. By far the most popular format is Adobe Acrobat PDF. This format preserves a document's formatting across platforms, ensuring that it will print as the publisher intended and appear on the screen uniformly. Adobe has added the ability to annotate the text, to bookmark sections, and to view thumbnails. One may move through a PDF document either by scrolling or paging, yet PDF files are designed primarily for printing. When a PDF file loads, the text is often too small for viewing on the screen, and when one uses the magnifier tool to increase the size, it may then be too large to read on the screen, without scrolling vertically and horizontally. One person to criticize PDF files noted that "In some respects, Acrobat's ease of transition from paper to screen-based documents can be seen as a problem rather than a virtue. It means that many documents will be produced which have been neither written nor designed for the screen."¹⁷

Unlike PDF files, which are proprietary, there are a growing number of websites that offer free books to anyone with a browser or to those who belong to

a subscribing member. Project Gutenberg provides free public-domain titles in text format for downloading. These titles can then be read on a personal computer, printed out, or read on an electronic reading device. NetLibrary offers copyrighted titles in a format incompatible with reading devices. It protects copyrights by lending the books for a limited time period, restricting copying and printing capabilities, tracking usage, and using encryption and watermarking.¹⁸ Many libraries subscribe to netLibrary, which currently offers 38,000 titles, including textbooks through its MetaText Division.¹⁹ Its interface displays a menu to the left and text to the right. The menu contains a table of contents, a dictionary, a book marking feature, and the ability to search within the current eBook or search for another one. One navigates through the text by paging through it, but some pages are long enough that one also needs to scroll down to read the entire page. NetLibrary has had financial difficulties, and there have been some concerns that it will not be able to stay in business, but it was recently acquired by OCLC and now may have a better chance to survive.

Over the years, various portable electronic reading devices have come into the marketplace, but none has become a success. The Smart Book arrived in 1988, only to disappear soon thereafter.²⁰ Since the late 1990s, a slew of reading devices have come into the market. Many of the same features reappear on multiple devices, but some also have notable features that distinguish them from their competitors. The Rocket eBook is the lightest weighing device, fits comfortably in one hand, and allows the text's layout to be switched from

portrait to landscape. The SoftBook Reader is the only device that is fully compliant with the Open E-Book Standard. The Everybook Dedicated Reader offers two screens hinged together to resemble a hardback book.²¹

In 1999, North Carolina State University Libraries experimented with loaning out Rocket eBooks and Softbooks.²² Users reported that the Softbook was best for reading textbooks and the smaller Rocket eBook for fiction. Users enjoyed being able to read in the dark, to manipulate font size, to change the layout of the text on the screen, and to look up words in a dictionary.

While people may be willing to check out electronic reading devices when they are free, they may not be willing to purchase such a device. Already owning desktop computers, laptops, and PDAs, people may not see the need for another machine. From all the evidence to date, electronic publishing's future is in designing reading environments or software packages to be used with existing hardware. This may change if the technology being designed by MIT's Media Lab and Xerox Palo Alto's Research Center is accepted into the marketplace. They have each created an electronic ink to be used on flexible "paper" that they believe someday to be able to produce for less than one dollar a page.²³ The resulting product closely matches the clarity of printed pages, but with this technology, one is able to alter text and images by command.²⁴ All of the titles in a person's library could be read on the same electronic pages.

Literature Review

In the relevant literature, there is as much opinion as experimental findings. There are those who feel strongly that the printed page will never be equaled or surpassed by a screen. Sven Birkerts 1994 book, *The Gutenberg Elegies: The Fate of Reading in an Electronic Age*, gave voice to and popularized the concern that electronic text discourages insight. Another person, Tony Cawkell focused on how paper-based books are more natural than electronic counterparts, when he wrote in 1999:

Inefficient as the paper book or journal may be, the fact is that at the presentation interface the print-human match is far better than the machine-human match, both in terms of information transfer and of human behavior. For general browsing, book reading, scanning news items, appreciating pictures or drawings, and being generally entertained, print on paper is superior. . . It can be written on, carried about, and digested in aeroplanes, on trains, or in the bath. It looks nice on shelves, and makes a very acceptable gift.²⁵

Cawkell went on to ask whether buyers of e-books “will be limited to a younger gadget-conscious, keep-up-with-the-Jone’s group who currently have no books on their shelves and spend their leisure hours watching television?”²⁶ Writing about the growing field of electronic publishing, Dave Denison observed:

If books have been important to you in a certain way, if you have developed a feeling about them as physical objects, you will

probably have a sense of trepidation about e-books. If your business is publishing and selling printed books, it's more than trepidation: Electronic books are one more sign that the world's gone mad.²⁷

On the other side, there are those who believe that screens will do a better job than paper in a matter of a few short years. Ted Nelson declared in 1987 that "the question is not can we do everything on screens, but when will we, how will we, and how can we make it great? This is an article of faith—its simple obviousness defies argument."²⁸ Plenty of others fall somewhere in the middle, believing that electronic and print mediums will coexist in the future. One such person, Jane Dorner, writing a review of *The Gutenberg Elegies* observed:

Why...ink squeezed on paper [is] fundamentally more valid than light signals on a screen as a decoding mechanism between one person's imagination and another's, I do not know. I suspect it is, in part, technophobia - an assumption that the electronic age has got its emphases wrong because its terminology highlights 'information', 'retrieval' and 'data' rather than the print idiom of 'insight', 'review' and 'detail'. I believe the two cultures of reading print and reading on screen can live side by side. It is not a case of 'either/or' but 'and/together'.²⁹

Studies into reading differences between the two media have attempted to end the opinions by presenting hard facts, yet many of these studies have been inconclusive or contradictory. Writing a review of the literature in 1992, Andrew Dillon criticized many of the studies for attempting to control so many variables that the resulting experiments ended up being far different than how most people read.³⁰ The studies generally split between those concerned with outcome measures, such as reading speed, comprehension, and proof-reading

ability, and those interested in process differences, including people's eye movements, manipulations of text, and ways of navigating when reading.³¹ Dillon argues that these studies do not do a good job of investigating "the major stumbling block of reader preference," and "the assumption that overcoming speed or accuracy differences in proofreading is sufficient to claim, as some authors have, that 'there is no difference' between the media is testimony to the limitations of some ergonomists' views of human activities such as reading."³² This review primarily will focus on the results of outcome measures, as they are directly related to this study.

Reading Speed and Comprehension

A common finding is that reading from the screen is slower than reading print by 20 to 30%.³³ Due to different interface designs among the studies it is hard to determine if the slower reading speed is due to a constant or if it results from different factors in each study.³⁴ Research by Horton, Taylor, Ingacio and Hoft in 1996 determined that web pages are often skimmed instead of read thoroughly, leading to speculation that users may have adapted to the slowness of reading from the screen to read less thoroughly.³⁵ Although most of the evidence points to slower screen reading than print reading, this finding has been countered by opposite results in some studies. Susanne Askwall found that when reading short texts (22 sentences) there was no difference in speed.³⁶ Paul

Muter and Paula Maurutto found that improving screen technology lessens, and may put an end, to reading speed differences.³⁷

When subjects have been prompted to increase their speed of reading, reading from the screen resulted in better comprehension than reading from print.³⁸ This could be because fast reading on the screen is still slower than fast reading of print, so subjects in the screen-reading group spent more time with the material. Other studies have shown no measurable difference in comprehension between reading from the screen and paper.

Accuracy

When researchers measure accuracy, they commonly test an individual's ability to find errors in a proofreading assignment, although they might also ask an individual to locate certain parts of the text or to recall the substance of particular sections.³⁹ Each study defines its own measure of accuracy, so drawing conclusions across studies is difficult. To catch spelling errors it seems to be just as useful to read from the screen as it is from paper, but to perform best at more demanding proofreading, printed material is superior. A study lead by Dennis Egan in 1989 studied how students performed when searching for text on the screen and in print. When the search question was not in a heading and was exactly as it appeared in the text, finding the string in the text was superior on the screen, because of the search capability. When the search words appeared in headings however, print and screen were equally useful for searching. When the

search words differed from their answer in the text, the print version was superior for searching.⁴⁰

Fatigue

It is commonly believed that reading from the screen over a lengthy time period can cause eye strain or vision problems. Studies into the issue have come to different conclusions. In 1984 Gould and Grischkowsky had subjects complete 45 minute work tasks either on paper or on the screen and then rate their fatigue, tension, and stress levels.⁴¹ Subjects also had vision measurements, including flicker, contrast sensitivity, and visual acuity, taken at the start of the experiment and after each work task.⁴² The results found neither medium resulted in more fatigue than the other. In 1987, Wilkinson and Robinshaw came to different conclusions when they discovered performance decreasing as a 50 minute task progressed.⁴³ They believed Gould and Grischkowsky's equipment had been of too high quality to reveal the differences, and they criticized their experimental method for allowing too many rest periods to match the typical activities of people who work in front of computer screens.⁴⁴

Since these studies were conducted, screen quality has improved and an understanding of what causes computer eyestrain has become better documented. Computer Vision Syndrome (CVS) is the name given to the condition which includes such symptoms as eyestrain, headaches, blurred vision, dry and irritated eyes, slow refocusing, neck pain, backache, light sensitivity, and

double vision.⁴⁵ Environmental factors account for most of these problems and eliminating them has been shown to relieve the symptoms almost entirely. Poor office arrangement, poor lighting, bad screen resolution, and screen glare all contribute to CVS, but all of these can be improved upon.⁴⁶

Preference

Many of the studies in the 1980s and early 1990s employed inexperienced computer users as research subjects, so the results might be due to subjects' negative feelings towards reading from the screen. In 1980, a study lead by Cakir reported that subjects found typewritten paper to be superior over screen text.⁴⁷ In Muter's 1982 study, users reported a slight preference for reading from a book.⁴⁸ Egan and others found subjects preferred a hypertext statistics text on a high quality screen over a paper statistics textbook.⁴⁹ In 1991, Muter and Maurutto reported that fifty percent of subjects in their studies revealed a preference for the screen, leading some to believe that preferences are changing as technology improves and more people are becoming accustomed to using computers.⁵⁰ The area of personal preference warrants more study, especially now as screen technology and users' computer experience have both improved. Dillon's observation in his 1992 review of the literature still holds true today:

What seems to have been overlooked as far as formal investigation is concerned is the natural flexibility of books and paper over VDUs; books are portable, cheap, apparently 'natural' in our culture, personal and easy to use. The extent to which such

'common sense' variables influence user preferences is not yet well understood.⁵¹

Process Measures

Although outcome measures may show little or no difference between the two media, it is commonly acknowledged that reading from screens is a different process than reading papers. Tracking eye-movements is one method to help explain the difference, yet it is not always clear from looking at these records what a user was thinking at a particular time. Also, measuring eye-movements is a somewhat intrusive process, forcing the subject to remain still through the use of a head restraint. A study by Gould and others in 1987 had subjects read one 10-page text on paper and another on the screen.⁵² Eye-movements were divided into four kinds: fixations, re-fixations, regressions, and undershoots, and after analysis it was determined that screen reading led to 15% more forward fixations per line.⁵³ Gould generally found no differences in eye movements between the screen and paper conditions and accounted for the 15% fixation difference as being due to resolution factors.⁵⁴

Manipulation differences are another area that process measures attempt to explain. Not many people would argue that text on a screen is easier to manipulate than paper. Dillon describes the problem well:

Manipulating paper is achieved by manual dexterity, using fingers to turn pages, keeping one finger in a section as a location aid, or flicking through tens of pages while browsing the contents of a document, activities difficult or impossible to support electronically."⁵⁵

Reading a book or a journal is much the same process, but when one tries to read various electronic books or journals, one is likely to be faced with a wide array of interfaces each with different ways to manipulate the text.

Navigating through an electronic document is considered one of the greatest challenges facing those who read on the screen. Hammond and Allinson summed up the difficulties faced by readers: "First, users get lost. . . Second, users may find it difficult to gain an overview of the material. . . Third, even if users know specific information is present they may have difficulty finding it."⁵⁶ Some studies support the idea that readers of printed text create a visual map in their minds of where sections of text are located within the whole, but on the screen, particularly when scrolling is the navigation method employed, it is much more difficult to maintain such a visual memory.⁵⁷ The literature suggests that there is no performance difference between paging through electronic text with a button and scrolling, and preference for one of the methods over the other appears to be a matter of taste.⁵⁸

Studies into optimal window size, line length, spacing between lines, and font size have found that the variables interact with each other. Font type has been shown not to impact reading, as long as it is of reasonable legibility.⁵⁹ It may be that because of the different visual angle of reading from the computer screen, electronic text requires longer lines than does print to result in the same legibility and reading rate.⁶⁰ Rayner and Pollatsek argue that the optimal line length is moderate, at 52 characters a line, because if a line is too long, returning

to the correct next line is difficult, but if lines are too short, readers do not make much use of each fixation.⁶¹

Learning Online

Student-centered electronic resources are a quickly growing area on the World Wide Web. Some teachers, not used to the technology, may be reluctant to use it in class, but research shows that good use of computer assignments actively engages learners and encourages exploration.⁶² The Internet provides access to direct source material, so students can read Jefferson's writings online for instance, instead of reading excerpts in a textbook. With all of the research material, the Internet also brings with it the danger of students turning in work that is not their own. They either can purchase a paper online or assemble a paper by cutting and pasting text directly from various sites. By assigning questions to students that require analysis of resources, rather than asking straight factual information, the concern of plagiarism is reduced.⁶³

Although more entirely online classes are coming into existence, most educators believe in mixing traditional class instruction with the added benefits of online learning. One strong advantage of having readings and class assignments online is that the time pressures on both teachers and students are partially alleviated. Students who work part-time often find it difficult to make it to the library when it is open, but when their reserve materials are available online, they can retrieve them anytime of the day. Also, in large classes students

run the risk of becoming just another face, but with managed learning environments, such as Blackboard, which provide class assignments, online discussions, and personal web pages for each student, the World Wide Web contributes to making the student more of an individual and provides more opportunities for participation. Such environments also work well for group work, allowing individual group pages to be set up. Teachers have noticed that online discussion boards foster more reflective discussions, since students have additional time to think before sharing their thoughts with the class.⁶⁴

Textbook publishers have expressed an interest in electronic publishing, believing that textbooks and reference materials could be improved by hypertext and the ability to interact with the text.⁶⁵ Tom Wilson, imaging the ideal electronic textbook, foresaw students directly e-mailing the author with questions and ideas. His vision included the use of computer-marked tests to help students judge their progress, with the results being made available to the author, who could then highlight problem sections in the text that may need reworking. Also, he envisioned designers making note of usage logs to learn how students progress through a text. Wilson wrote that "'Text-book' is hardly a word to be applied to an artifact of this kind - the text has become an interactive-electronic classroom."⁶⁶

Publishers have made attempts to establish themselves as leaders in providing "interactive-electronic classrooms," viewing the electronic versions as new ways to make a profit. Textbook publishers receive no revenue from used

book sales, but by establishing websites, publishers can make profits by keeping the information updated and providing access to additional materials.⁶⁷ While their implementation coincides with Wilson's ideas in some ways, it also differs in notable ways. Houghton Mifflin signed a deal with netLibrary in 2001 to provide electronic textbooks through netLibrary's MetaText division, which presents the textbooks in an interactive learning platform. MetaText allows instructors who select the textbooks to personalize their individual sites by adding syllabi and lists of enrolled students, as well as providing the capability of annotating the text and making announcements.⁶⁸ Students gain access to the resource through individual home pages, and once there, they may highlight, bookmark, annotate, search the textbook, or check grades.⁶⁹ MetaText does transform textbooks into "interactive-electronic classrooms," but it makes the instructor the contact person instead of the author, and it comes at a cost.

Reading device vendors have tried to manufacture reading devices marketed especially for reading textbooks. One notable example, Everybook, presents pages on two color screens, which measure 8 1/2 -by-11-inches and weigh a total of 3.65 pounds. When a user downloads titles to be read in its proprietary format, included in the downloaded material are advertisements. How companies make a profit from providing online educational material raises concerns about students' privacy and academics becoming too commercialized. What is stated on Everybook's website only reinforces the concern:

Because the consumer is seeing our advertisements in an online environment, we can track how long the consumer waits before turning the page and clearing the ad. Cross-referenced with initial demographic data received from the EB owner at activation time, EBS will provide valuable trend and market information to plan future advertisements.⁷⁰

Whether publishers, reading device vendors, libraries, or individual instructors will emerge as the leaders of interactive textbooks remains to be seen, but non-commercial providers would likely provide the greatest protection to students.

Social Studies Research

Research into high school social studies classes has found that students today are taught much the same as were students at the turn of the century.⁷¹ Studies conducted in the late 1980s and early 1990s indicated that secondary education in history continues to stress “lecture, recitation, and required memorization of factual information from textbooks.”⁷² This style of teaching persists despite research showing that a curriculum best serves its students when it “blends reading of multiple sources, authentic writing tasks, discussion, and experiential learning.”⁷³

The capabilities of the World Wide Web and other electronic technologies create opportunities for teachers to enact the teaching methods shown to be most effective. A study conducted by Saye and Brush examined whether a multimedia-supported learning environment would help students become more engaged with an assigned topic, be more inclined to consider different

viewpoints, and better guide students in discovering knowledge.⁷⁴ The results of the study indicated that multimedia does assist students in becoming more interested in a topic and encourages them to consider different viewpoints, but a teacher's instruction is a more effective way to impart knowledge than guided self-discovery.⁷⁵ Technology does not do away with traditional teaching methods, but it does provide ways of augmenting student learning. Online environments that integrate reading assignments with additional resources such as discussion boards, thought-provoking questions, and links to appropriate websites for further research, may be an effective way of putting an electronic reading into context.

Research Questions

Reviewing both the existing literature on reading and on online learning environments reveals the need to examine likes and dislikes on the individual level. There is much theory, and a large amount of information gained from laboratory reading experiments, but little research that examines preferences in natural reading conditions. If reading environments for students are to succeed, better information about how they like to read, which medium they choose to read, and what features help them learn must be determined. This study attempts to fill in the gaps in the knowledge of reading preferences by answering the following questions:

- Will an electronic book website designed with a student's reading needs in mind, including discussion questions, the capability to e-mail notes to oneself, and the ability to change the font size and colors, encourage a student to read more text from the computer screen, rather than printing out the text to read on paper, than from a site with the same text but no added features?
- Will the added features lead students to learn more than those who read a print version or a plain text version?

- Will the website with additional features cause more positive responses from students?

Methodology

Experimental Design

The design of the experimental site was the independent variable, and it was measured by its presence or absence. Three dependent variables were measured: the percentage of text read on screen, the recall and recognition of information contained in the text, and the students' responses to the websites. The percentage of text read on screen was measured by the number of words read from the computer screen. To measure the recall and recognition of material contained in the text, students answered four questions at the end of the questionnaire completed after finishing the reading assignment. Students' responses to the websites were measured by their answer to several yes/no questions, and by their responses to open-ended questions.

Participants

From a pool of 51 high school juniors and seniors in Matthew Scheer's A.P. U.S. History, regular U.S. History, and American Government classes at St. Timothy's Hale school, a private school in Raleigh, NC, 22 completed the study.

They were advised that participation in the study was voluntary and would not influence their grade in the class. Participants were included if both they and a parent consented to the study and the student turned in the consents, completed the study, and returned the questionnaire. If not all of the paperwork was turned in, the student was excluded. Please see the consent letters in Appendix A.

The student body from which the subjects for this study were drawn is predominantly Caucasian and from affluent families. All of those to respond to the question reported having one or more computers in their homes, and as a whole, the students spend a significant amount of time on the Internet. At the time the study was conducted, the group's average time spent on the Internet in the past week was 10.11 hours. Twelve females and ten males completed the study; 6 males and 6 females participated in the experimental group, while 4 males and 6 females took part in the control group.

Procedures

Participants were told, both by their teacher and in consent letters, that this research project would examine students' attitudes toward reading on the computer screen and reading from printed pages, and which medium leads to a greater learning potential.

The participants were randomly assigned to either the experimental or control group. Both groups read a text which was also a regular homework

assignment. If a student decided not to participate, he or she was provided a paper copy of the relevant text. The experimental group received the URL for the site with added features, and were instructed that they had the option of reading on the computer screen or printing out a version to read. The control group received a URL to a site with the exact same text, but none of the added features, and also had the option of reading on the screen or printing out a version.

Packets including instructions and a questionnaire were numbered with a code which was not attached to a student's name in any way. The odd numbered packets contained the URL for the experimental group, and the even numbers the URL for the control group. The students completed the reading assignment and questionnaire in their own time, and had the choice of completing the assignment at a school computer or at home. They were instructed not to speak to each other about their experiences until all the questionnaires had been turned in.

Instructions included in the packets informed the participants that they had the option of reading the works on the computer screen or in a print version, or of switching between the two versions as often as they would like to, for any reason, as long as they marked the start and end passages. Examples of how to mark the text were provided. To motivate individuals to read the entire works, they were informed here that on the short questionnaire to be completed after reading the stories, there would be a few test questions that should be easy to

answer if they had read the works through to the end. Also provided were directions to read the text at their leisure and to explore any of the options available to them, if they chose to. They were asked to note the time that they started reading and the time that they finished. The instructions are included in Appendix B.

Upon finishing the text, the students then filled out a questionnaire to assess how the two websites were used and how they felt about the electronic and print versions of the text. Please see the questionnaires in Appendix C. Four test questions were included at the end of the questionnaire to test students' recall and recognition of facts from the assigned reading. The test questions were designed in consultation with the students' teacher, and they did not count in any way toward the students' grades.

Materials

The U.S. History students read a fireside chat given by President Franklin D. Roosevelt on May 7, 1933, and the Government students read President Woodrow Wilson's Fourteen Points. Four students read the Wilson reading, and 18 read the Roosevelt reading. There was no difference in the design of the experimental and control sites between the different readings, but there was a difference in the length of the readings: the Wilson reading was 1,228 words and the Roosevelt reading was 2,963 words. Three students participated in the experimental group and 1 in the control group for the Wilson reading, while 9

participated in the experimental group and 8 in the control for the Roosevelt reading.

Website Design

Currently, designers of e-books are confined to PC screens and handheld devices. For this study, a web-based electronic reading environment was designed to see if a particular design would encourage more students to read from the screen. People may not be willing to purchase an e-book reading device or take the time to download software and titles to their desktops, while they might be willing to read a title that is available to be read on any computer, is easily accessible, attractive, and free. The guiding principle behind this design was to provide the user with more options than are available in a printed text.

After examining several commercial devices and PDF files, it was found most offered similar features: annotation, changeable font size, a bookshelf of available titles, and a search option. This site design attempted to preserve these features with the limitations of the Web. Annotation is not simple to replicate with the Web, but a link called E-mail Notes to Yourself is included. Using the web browser's built in Find option, users may easily search within the text. Many of the devices only allow two choices for font size, and most do not allow color or font-type manipulation. With electronic books, people should have the option of customizing their reading environment to a greater extent; this is one of the least exploited benefits of having text in electronic form. This

implementation gives users this control with the Change Settings link, which opens up a Remote Control to manipulate the color, font size, and font type (the Netscape Browser does not support the JavaScript that changes the font size, type, and color, but it does support background color changes. To try and provide the same kind of experience to the Netscape users, code was added to detect the browser type and send Netscape users to a different site that contained a Remote Control with more background color options.) The site also includes a bookshelf from which users select the reading assigned to them, and discussion questions which provide students with ideas to focus on while reading the text.

The electronic reading environment is laid out in the following manner: the text is located in its own scrollable box in the middle of the page, discussion questions are located to the left of the text, and the bookshelf of available titles is located to the right. Along the top of the screen runs a menu of options: Email Notes to Yourself, Change Settings, Home Page, and Print Version. Screen shots of the electronic reading environment are located in Figures 1-4.

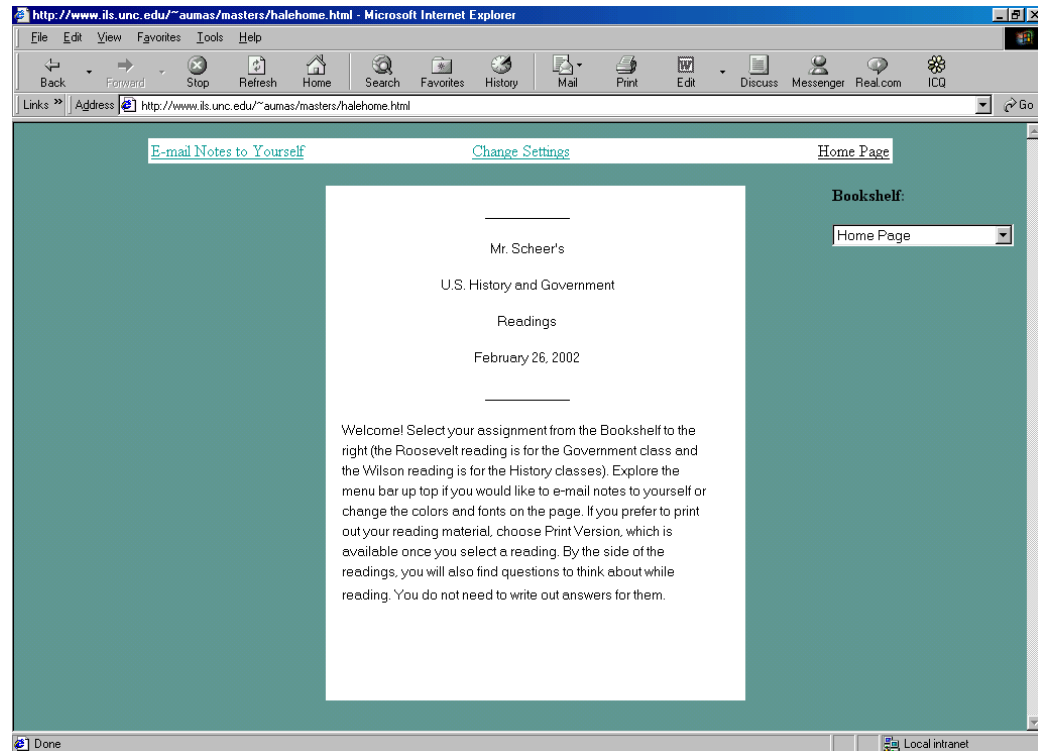


Fig. 1: Home Page for the Experimental Group

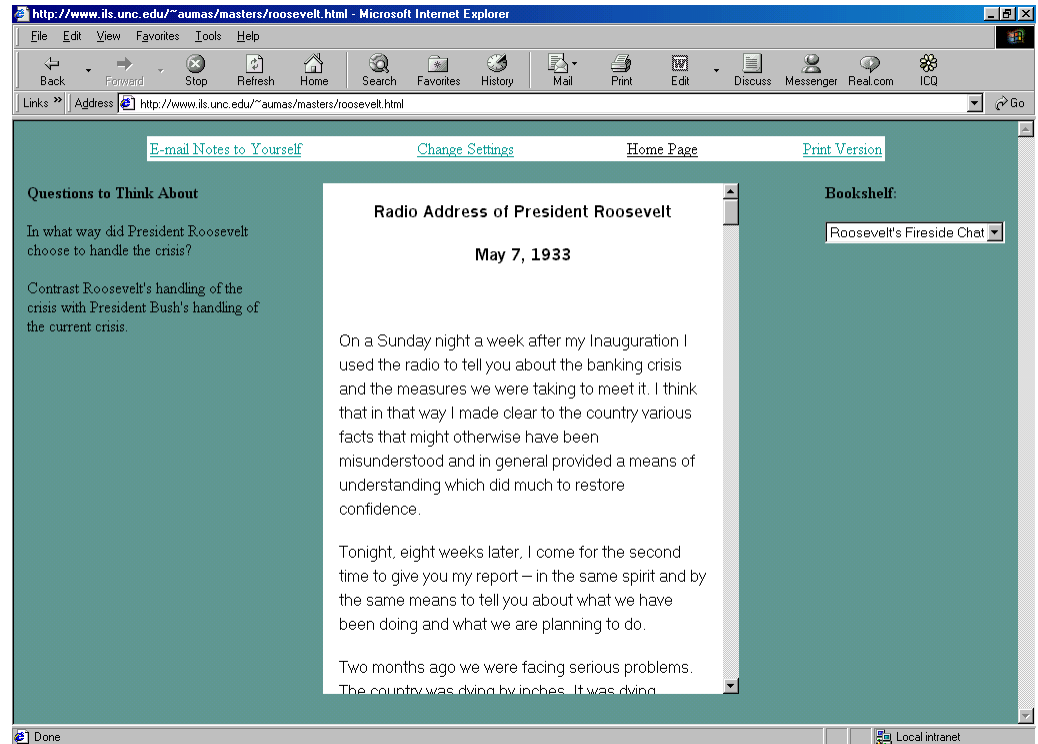


Fig. 2: Roosevelt's Radio Address

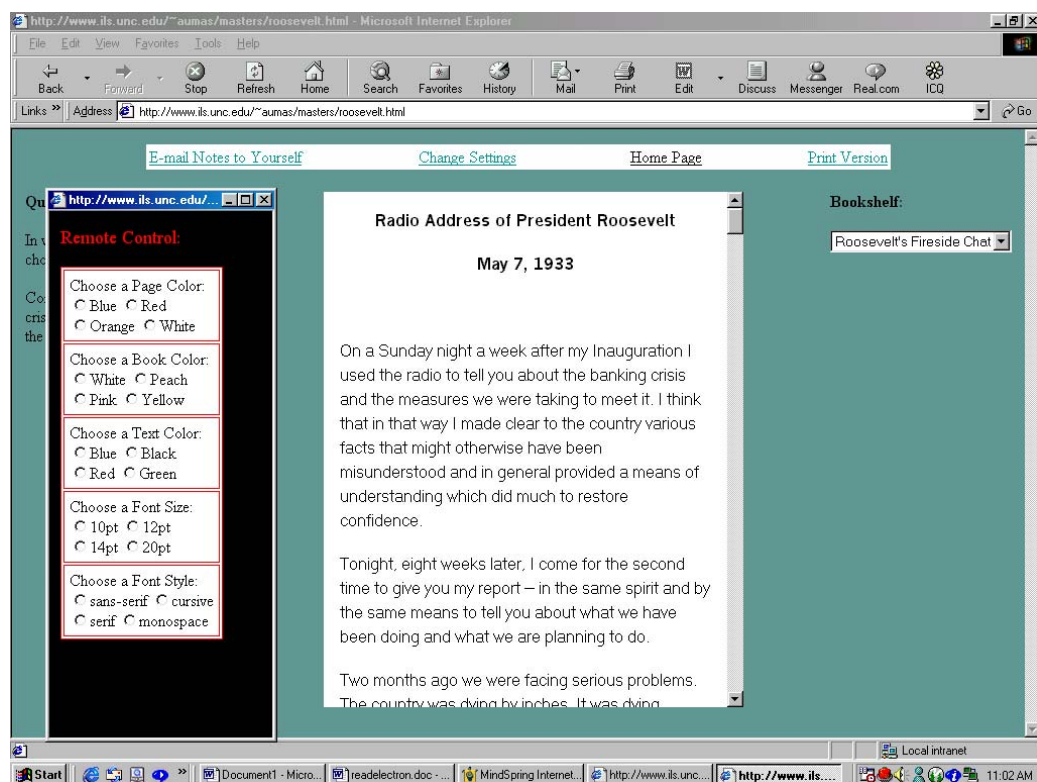


Fig. 3: Remote Control Selected

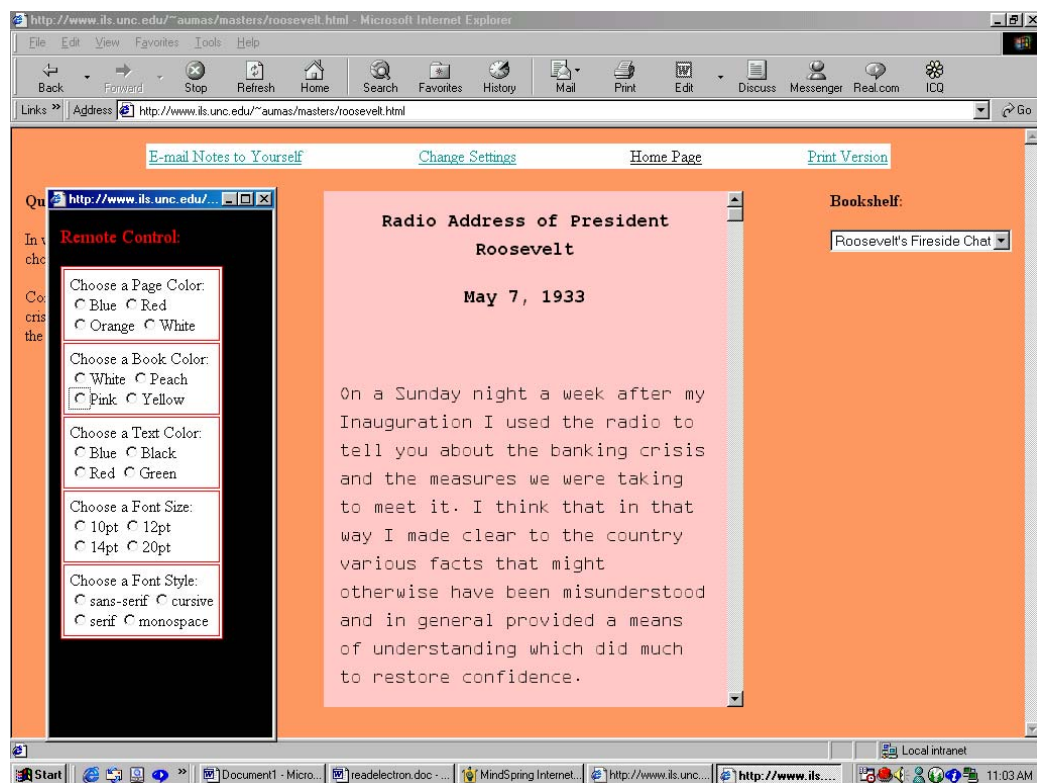


Fig. 4: The Roosevelt Reading After Being Changed by the Remote Control

The plain text version, which those in the experimental group had the option of choosing as the print version, and those in the control group received as their only version, contained none of the features from the experimental site. It displayed black text on a white page; the HTML contained no margin formatting or line spacing elements. Figure 5 contains a screen shot of the plain text version.

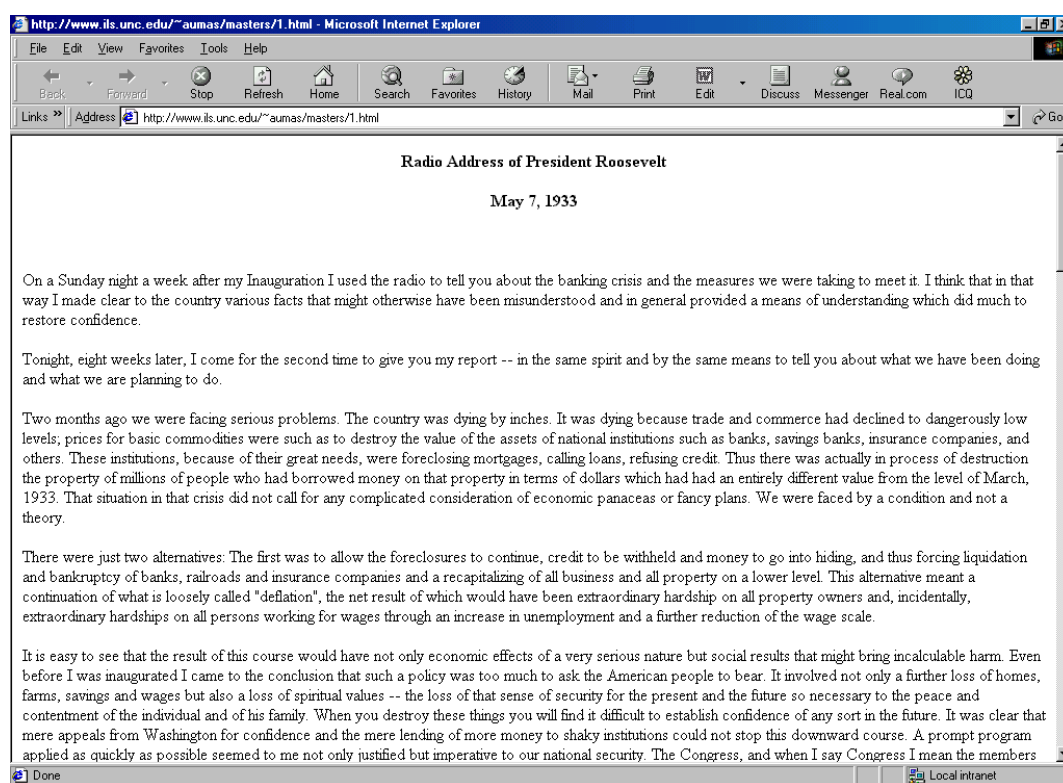


Fig. 5: The Plain Text Version of Roosevelt's Radio Address

Limitations and Benefits of this Study

Because this study was not conducted in a controlled environment, it was not possible to mandate the browser and computer type, screen size and

resolution, or to eliminate distractions. Yet the design of this study probably attracted more participants, since it could be done in any time they chose, than would have been attracted if they had to appear in a computer laboratory at a certain time. Also, this study encouraged the website to be used as it would be in a real world implementation, so the results might point to more realistic experiences than would be gained from a better controlled experiment. Certainly, the results from this study should be seen as preliminary and may point to specific areas in need of additional examination.

Results and Discussion

Decision to Read on Screen or in Print

Out of 22 subjects, five chose to print out a copy of the reading assignment, 3 in the experimental group and 2 in the control group. The reasons given for printing out a copy were not directly related to the design of the two sites, but tended to have to do with either a previously defined preference for print or the need to carry the reading to be read somewhere without computer access (see Table 1). These results disprove the first research hypothesis: additional features did not entice more subjects in the experimental group to read from the screen.

Table 1: Reasons For Printing

	<i>Portability</i>	<i>Defined Preference</i>	<i>To underline</i>
Experimental	2	1	
Control		1	1
Total	2	2	1

Number of subjects in each group to report reason

No one chose to print out a copy after reading some of the text on the screen; the decision appears to have been made prior to visiting the websites. The text was either read entirely on the screen or entirely on paper. Perhaps

longer reading assignments would have found more subjects reading some text on the screen and some printed out.

The people who printed out a copy reported one reason for doing so, but those who chose to read on the screen often provided more detailed reasoning for their decision. Each subject's answer was broken down into its discrete parts and coded into the categories that emerged: the ease, quickness, and convenience of reading on the screen, the short length of the reading, not having access to a printer, not wanting to waste paper, and not minding reading from the screen. Table 2 displays the number and kind of comments that were made by each group.

Table 2: Reasons For Reading on the Screen

	<i>Ease/Quickness/ Convenience</i>	<i>No Paper Wasted</i>	<i>Do Not Mind Screen</i>	<i>Novelty of It</i>	<i>Shortness of Reading</i>	<i>No Printer</i>
Experimental	5	1	2	2	1	1
Control	6	4	1			
Total	11	5	3	2	1	1

Number of subjects to report reason as contributing to decision

It is notable that so few in either the experimental or control group decided to print out a copy of the reading. Certainly, the shortness of the reading played a part in the decision, although only one subject noted that fact. Another possible reason was that this was the first time the class had ever had a reading assignment available on the Internet, and the novelty of that probably lead some to read from the screen. By far the most popular answer to the

question, "If you read on the screen, what was your reason for doing so?" had to do with how easy it was to access the reading and read it on the screen, rather than waiting for it to print out and having to handle a number of loose pages. It could be that underlying the responses mentioning "ease," "easy," "convenient," and "quick" was the belief that reading from the World Wide Web was somehow less work than reading from paper. The medium lends itself to skimming rather than thorough reading, and its hypertext encourages jumping from one task to another instead of concentrating on one. It is also associated with more fun activities, such as e-mail, instant messaging, and online games, than is the usual history reading assignment taken out of a textbook. In general, the World Wide Web is not viewed to be as scholarly as is a textbook or a printed article, which could have attracted less studious students to read from the screen. Reading from the screen in this study was associated with shorter reading times than reading print, which is interesting given the evidence that reading from the screen is slower than reading print (see Table 4) .

For some subjects, the design of the site had little to do with the decision to read on the screen or on paper. Two of those who printed out a copy and three of those who read on the screen came into the study with clear preferences already defined, and how the site was designed had no impact on their decisions. The design of both the experimental and control websites impacted the decision to print out a copy when two subjects wanted to take the reading with them and when one subject wanted to underline the text. Because they could not take the

electronic reading with them or underline on the screen, these participants printed out a copy. The results suggest that website designers should try to provide more of the features of print documents electronically, while continuing to provide printing capabilities for those who do not like reading on the screen. Formatting text for easy reading on PDAs may well be a useful direction to pursue, as would adding annotation and underlining capabilities to more online documents.

Testing Results

Subjects answered questions to test how much they learned soon after completing the reading. Recognition questions presented subjects with a question followed by five multiple-choice options. These questions were graded either a 1 if the answer was correct or a 0 if the answer was incorrect. Subjects had an easier time answering the recognition questions correctly than the two recall questions, which asked the student to write a short response. The recall questions were graded by assigning 0 for no credit, 0.5 for partial credit, and a 1 for total credit. The sum of the subject's scores on the four questions was used as a measure of how much they learned from the reading. Four was the highest score a subject could achieve.

While the study did not have enough participants to merit inferential statistical analysis, those who read the experimental version had a higher median score than those who read the control version. Those who read the paper version

had a median score higher than the control and equal to the experimental version. Due to the few number of students who opted to print out a copy, further study is needed to more accurately measure the learning potential of the different versions.

Table 3 : Median Test Scores

	<i>Median</i>	<i>N</i>	<i>Standard Deviation</i>
Experimental	3.5	9	.88192
Control	3.0	8	.87624
Paper	3.5	5	1.17260
Total	3.5	22	.90603

The experimental, control, and paper versions of the Roosevelt reading assignment were associated with different median reading times. Since only four subjects read the Wilson reading, the median reading times for that group were not calculated because not enough participated to draw conclusions. The results run counter to most research into screen and paper reading: those who chose to read the printed version had a longer reading time than those who read on the screen. One possible reason for the time difference may be that the people who opted to print out a reading were more conscientious students and thus read more thoroughly. It could also be that the screen versions lead to more skimming than did the printed copy. It is interesting to note that those who read the experimental version equaled the performance of those who read the paper version, and they did so in a shorter median reading time.

Table 4: Median Time to Read Roosevelt

	<i>Median</i>	<i>N</i>	<i>Std. Deviation</i>
Experimental	16.00	6	4.037
Control	14.00	7	4.680
Paper	21.00	4	6.702
Total	16.00	17	4.934

Students' performance on the test questions was related to the amount of time they spent reading; 52.67% of the variance in test scores was explained by the amount of time spent reading the assignment. It is likely that the design of the experimental version caused subjects to spend more time on that website than on the control website, and this time difference accounted for much of the difference in performance on the test questions. The experimental website included questions to think about while reading the assignment, which may have encouraged students to ponder the reading more than those who received the control version. These questions were always visible, so students could refer back to them while reading different sections of the text. Taking the time to explore the options available in the experimental website could also account for some of the time students spent with the text. More scrolling was required with the experimental site as well, which may also have contributed to the time difference.

Responses to the Two Versions

Those who received the control version were more likely to answer the question, “Would you want to have other class readings available on this website?” affirmatively than those who read the experimental version (see Table 5). The chi-square test returned a P value of 0.05, indicating that this result is significant. Answers to the other questions that tried to gage students’ reactions did not reveal significant differences. It could be that this question was the best measure of students’ responses to the websites. This result disproves the hypothesis that the website with additional features would elicit more positive responses from students. The experimental website could have caused negative reactions in subjects, because it did require learning a new interface, unlike the control website that simply required reading.

Table 5: Would you want other readings available on this website?

	<i>Yes</i>	<i>No</i>	<i>Total</i>
Experimental	3	8	11
Control	7	3	10

Another measure of students’ feelings about electronic documents is whether or not they would pay for the service. Questions that measured students’ willingness to pay for electronic documents elicited similar responses from both the experimental and control groups, but overall the control group’s responses were more positive. In answering the question, “In the future, would you use a similar website to access/read assignments if it were free?”, 66% of those to receive the experimental version answered affirmatively and 80% of

those who received the control version said yes. To the question, “Would you use a similar website if it cost less than buying a textbook or photocopying text?”, 50% of the experimental group’s readers answered yes and 70% of the control group’s readers answered yes. Most students balked at the idea of paying the same for electronic documents as they would for printed copies of the text; only 17% of the experimental group’s readers and 20% of the control group’s readers answered that question positively. These results are important for those who develop online electronic resources for students. Many of these, such as electronic reserves, are often free except for the cost of printing out a copy, but if most students would be willing to pay a small price for the service, libraries might be able to provide more readings electronically.

Table 6: Would you use a similar website if it were free?

	<i>Yes</i>	<i>No</i>	<i>Total</i>
Experimental	8	4	12
Control	8	2	10
Total	16	6	22

Table 7: Would you use a similar website if it cost less than buying a printed copy?

	<i>Yes</i>	<i>No</i>	<i>Total</i>
Experimental	6	6	12
Control	7	3	10
Total	13	9	22

Table 8: Would you use it if it cost the same as buying a printed copy?

	<i>Yes</i>	<i>No</i>	<i>Total</i>
Experimental	2	10	12
Control	2	8	10
Total	4	18	22

Open-ended questions probed into what students liked and did not like about reading on the screen and how they would improve the electronic reading environment. Tables 9 and 10 show respondents answers to the questions about the best and worst things about reading on the screen. By far the most popular best thing was not having to turn pages and instead being able to scroll quickly through the document. Sixty-nine percent of those in the experimental group made this observation, while 38% in the control group noted the same reason. Not wasting paper was the second most popular comment overall, and was the experimental group's most common observation; 63% of respondents in the control group noted this reason, while 15% in the experimental group did the same. Many more in the control group found not wasting paper to be the best thing than did those in the experimental group, which could be because the experimental group's reading environment appeared more like a book, while the control group's website appeared more like a print article on the screen. It is noteworthy that so many showed concern about using paper, and further studies should determine if people will sacrifice their reading medium preference to save paper, or if a document needs to seem important to the individual to warrant printing.

Table 9: What was the best thing about reading on the screen?

	<i>No page turning/scrolling easy, quick</i>	<i>No wasted paper</i>	<i>Font was large, easy to read</i>	<i>No need for a light to read</i>
Experimental	9	2	1	1
Control	3	5		
Total	12	7	1	1

Number of respondents to note each reason.

Table 10: What was the worst thing about reading from the screen?

	<i>Harder to read/Keep Focus/Glare/Brightness</i>	<i>Scrolling</i>	<i>Could not annotate reading</i>	<i>Easy to lose place</i>	<i>Distracted by other things online</i>
Experimental	4	2	3	1	2
Control	3	1	1	2	
Total	7	3	4	3	2

Number of respondents to note each reason.

While some study participants responded that scrolling was a good thing, others placed it in the worst category. Scrolling was the only category to appear in both the best and worst, lending support to the idea that how best to navigate through an electronic document is a matter of personal preference. The most common worst thing about reading on the screen was that it was more difficult than reading paper, because of glare, brightness, or losing of one's focus.

Overall, 37% of the subjects ascribed to this reason, and within the experimental and control groups, 37% and 43% respectively, found this to be the worst.

Another frequent mention, not being able to annotate the text, was the worst

thing for 21% of those to respond to the question. Other worst things included feeling lost in the text and not knowing how much was left to read, and being distracted, either by instant messages or by thinking of other things one wished to be doing online.

Answers to the question, “In what ways would you improve this site?,” brought out a wide array of answers, and understandably, different kinds of answers from the two groups. More people in the experimental group skipped the question or answered that they would change nothing than did those in the control group. The control group’s website was so lacking in features that it may have brought changes to mind than did the experimental group’s version. Only one answer spanned both groups: to provide a summary or high points of the article. The most common response for those who received the experimental website was to make the margins of the reading wider, followed closely by those who commented that they did not like scrolling. Those in the control group would have liked links to other sites and background information, a bigger font, color, music, and a different layout.

Table 11: In what ways would you improve this site?

	<i>Margins Wider</i>	<i>No Scrolling</i>	<i>Have documents in PDF format</i>	<i>Summary of article</i>	<i>Links/background information</i>	<i>Bigger Font</i>	<i>Color</i>	<i>Music</i>	<i>Layout</i>
Experimental	3	2	1	1					
Control				1	3	2	2	1	1

The responses to the design of the websites provide designers of electronic reading environments with feedback into what people like and do not like about reading on the screen. Judging from the results, the design of reading websites should have adjustable margins and annotation capabilities, and users should be able to set the font and color size and be able to either scroll or page through a document, depending on their personal preference. The content should include a summary and additional information on the topic, either on the site or available through links.

Conclusion

Future studies are required to provide more conclusive measures of people's preferences for print or screen reading and to determine which medium contributes to better learning. If this study is repeated, more specific measures of the individual features in the experimental version should be developed to better judge what specifically contributes to learning and to positive feelings. Research into different user populations is called for, as much could be learned by comparing the reading needs of diverse groups.

Predicting what will happen with the future of electronic reading is tricky territory. New technological developments might suddenly make screen reading commonplace, but more likely, screen and print will continue in tandem for years to come, with the number of electronic titles slowly catching up to print titles. If future research confirms that people have learned to skim text more effectively on the screen than in print, and that they learn just as much in doing so, screen reading for work and school tasks could become more popular.

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Appendix A

Dear Parent:

I am writing to request permission for your teen to participate in a research project which examines students' attitudes to reading on the computer screen versus reading from printed pages, as well as which medium offers the greatest learning potential. This study will require your teen to use a computer with Internet access, either at home or at school. One reading assignment from Mr. Scheer's class will be made available on a website, and your teen will decide to read it on the screen or print it out. A short questionnaire following the assignment will ask the student's opinions about the experience. Your teen's participation in this study could lead to improved websites for students' reading and studying needs.

This study is being carried out with the support of The University of North Carolina at Chapel Hill and has received approval by its Institutional Review Board. Participation in this study is completely voluntary. Your teen also will be asked to consent to this study, and if you or she/he declines, the student will be provided with a copy of the reading assignment. Your decision will not impact the performance of your teen in this class. The questionnaires will remain anonymous, and at the end of the study, they will be destroyed.

Thank you in advance for your cooperation, which will assist me greatly in my pursuit of a Master's Degree. If you have any questions or concerns, please contact me at (919) 401-9077 or at aumas@ils.unc.edu, or my advisor Dr. Gary Marchionini at (919) 966-3611 or march@ils.unc.edu. You may also contact the UNC Academic Affairs Institutional Review Board at the following address, if at any time you have questions about your teen's rights as a research participant.

Academic Affairs Institutional Review Board
Barbara Davis Goldman, Ph.D., Chair
CB# 4100, 201 Bynum Hall
UNC-CH
Chapel Hill, NC 27599-4100
(919) 962-7761, or E-mail: aa-irb@unc.edu

Sincerely,

Abby Auman
School of Information and Library Science
University of North Carolina at Chapel Hill

Please indicate whether or not you wish to have your teen participate in this project by checking a statement below, signing your name, and returning one copy to school. The other copy is for your records.

I do grant permission for my teen to participate in the research project.

I do not grant permission for my teen to participate in the research project.

Parent/Guardian Signature

Name of Student

Date

Dear Student,

For my Master's Degree project, I am examining how much people learn and how they feel about reading on the computer screen and reading from printed pages. You could help me greatly by agreeing to participate in this project, which should not take too much of your time, and the results could lead to improved website design. This project will provide one reading assignment from Mr. Scheer's class on a website, which you may read on the screen or opt to print out. A questionnaire following the reading should take less than 15 minutes to complete.

This study is being carried out with the support of The University of North Carolina at Chapel Hill and has received approval by its Institutional Review Board. Participation in this study is entirely voluntary. If you decide not to participate in this study, you will be provided with a copy of the reading assignment, and your decision either way will not affect your performance in this class. The questionnaires will remain anonymous, and at the end of the study, they will be destroyed.

Thank you in advance for your cooperation. Once the results are in, I hope to share them with the class. If you have any questions or concerns, please contact me at (919) 401-9077 or at aumas@ils.unc.edu or my advisor Dr. Gary Marchionini at (919) 966-3611 and march@ils.unc.edu. In addition, you may contact the UNC-CH Institutional Review Board at the following contact information, if at any point in this study you have questions or concerns about your rights as a research participant.

Academic Affairs Institutional Review Board
Barbara Davis Goldman, Ph.D., Chair
CB# 4100, 201 Bynum Hall
UNC-CH
Chapel Hill, NC 27599-4100
(919) 962-7761, or E-mail: aa-irb@unc.edu

Sincerely,

Abby Auman
School of Information and Library Science
University of North Carolina at Chapel Hill

Please indicate whether or not you wish to participate in this project by checking a statement below and signing your name. Please turn in one copy at school, along with your parental permission form, and keep the other copy for your records.

I agree to participate in the Print Versus Screen Reading research project.

I do not agree to participate in the Print Versus Screen Reading research project.

Print your name here

Sign your name here

Date

Appendix B

Instructions:

Please read these instructions thoroughly before beginning the assignment and refer to it during the assignment if need be. When you are finished with the assignment, please return this sheet to the envelope.

At the end of these instructions, you will find a URL to point your browser towards. Please read the assignment at your leisure.

You have the option of reading the text on the computer screen or of printing out a print version, which you may do at any time. If you would like to switch between the two versions, you may do so for any reason, as long as you mark where you start and where you end on the printed copy.

5 For example, if you were to start reading the print version at this sentence, mark the beginning of it by underling the first word and writing an S beside it. If you decided to stop reading at the end of this sentence, mark it by underling the last word and writing an E in the margin. E

If you print out a copy, please return the marked version in the envelope provided.

There will be a few memory questions, which will not be graded or count in any way toward your grade, to be completed at the end of this assignment. They should be easy to answer if you read the work through to the end. You are on your honor not to consult with the website, with a copy you may have printed out, with any notes you may have taken, or with anyone else when answering the questions. Thank you for your honesty, since the results of this study depend upon it.

Please note below the time that you begin the assignment (meaning that the website has loaded) and the time that you finish reading. If you take any breaks, please note those as well.

Begin: _____

End: _____

Break: From _____ To _____

Once you are finished reading the assignment, and it is still fresh in your mind, please answer the questionnaire enclosed in the inside envelope. It should take no more than 15 minutes to complete. Thank you for your help.

If you are in a Government class, point your browser to:

<http://www.ils.unc.edu/~aumas/masters/1.html>

If you are in the History class, point your browser to:

<http://www.ils.unc.edu/~aumas/masters/2.html>

Appendix C

Questionnaire

Do you have one or more computers in your home? Yes No

How many hours in the past 7 days have you spent on the Internet, including e-mail, surfing the web, instant messaging, etc.? _____

Other than for this assignment, in the past 7 days have you used the Internet for school-related work? Yes No

If so, what did you use it for?

Please circle which browser you used for this assignment? Internet Explorer

Netscape Other _____

If you know what version your browser is, please enter that here: _____

Please circle your gender: Male Female

Would you want to have other class readings available on this website? Yes No

In what ways would you improve this site? Please use the back of the page, if you need more room to answer.

For each word below, please CHECK ONE BOX to indicate how well the word describes the design of the website you just used.

	Describes Very Well	Describes Well	Describes Adequately	Describes Poorly	Describes Very Poorly
Organized					
Interactive					
Confusing					
Useful					
Enjoyable					
Distracting					
Boring					

Please CIRCLE ONE ANSWER for each of the following questions.

I enjoyed this history assignment: More than Most About the Same as Most Less than Most.

In the future, would you use a similar website to access/read assignments if it were free? Yes No

Would you use a similar website if it cost less than buying a textbook or photocopying text? Yes No

Would you use it if it cost the same as buying printed copies of the text? Yes No

For the following questions, please write on the back of the page if you need more room.

If you chose to print out a copy to read, what were the reasons? _____

If you did not choose to print out a copy, what were the reasons?

Please CHECK ONE ANSWER for each of the following questions.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I like doing my history homework.					
History is one of my least favorite subjects in school.					
I would rather write an essay for history class than solve math problems.					
I dislike reading my history textbook.					

If you read the assignment on the computer screen, please answer the following questions:

What was the best thing about reading on the screen?

What was the worst thing about reading on the screen?

Test Questions for the Wilson Reading:

Choose the Best Answer

1. Which of the following was not incorporated in Woodrow Wilson's Fourteen Points?

- A. Absolute Freedom of the Seas.
- B. The Formation of an independent Poland.
- C. Evacuation of German troops from Belgium and restoration of Belgian sovereignty.
- D. Formation of an alliance between the Democratic powers in Europe against communist Russia.
- E. The Return of Alsace-Lorraine to the French.

2. The primary purpose of the Fourteen Points was to

- A. Promote a lasting peace in Europe.
- B. Strengthen the alliance between France, Britain, the United States and Russia during World War I.
- C. Punish Germany following World War I to make sure it never could rise again to cause problems in Europe.
- D. To set up free trade throughout the world.
- E. To put forth a allied military strategy for winning World War I.

Short Answer

1. In what way does Wilson hope Russia is to be treated in the coming years?

2. What will happen with regards to colonial claims under Wilson's plan?

Test Questions for the Roosevelt Reading:

Choose the Best Answer

1. In President Roosevelt's address, Roosevelt claims

- A. That the United States is well on the way to recovery.
- B. That America's economy was still in an uncontrollable tailspin.
- C. That some progress had been made on the economy, but it was too early to call it a recovery.
- D. European debts dating back to World War I were to blame for America's faltering economy.
- E. That Hitler's economic policies had bankrupt the west.

2. President Roosevelt's tone can best be described as

- A. Alarmed
- B. Cautiously Optimistic
- C. Pessimistic
- D. Exuberant
- E. Depressed

Short Answer

1. What did Congress do with regards to the sale of beer?

2. Why does Roosevelt warn against too much optimism?

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