Describing Communication Technologies: The Hyperlink

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ETEC 540 - Text Technologies: The Changing Spaces of Reading and Writing

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December 7, 2021

The hyperlink is a particular aspect in the development of information that has fundamentally transformed practices of reading and writing in the digital age. The words “hyperlink”, and its related terms “hypertext” and “hypermedia”, today conjure up an immediate association with the internet, but these words, the ideas behind them, and estimations of how they could transform reading, writing, and information practices actually predate not only the internet but even personal computers.

History and Development

Vannevar Bush was an American engineer who dared to dream of a speculative information machine called the Memex, a portmanteau of the words “memory” and “extension”. In the July 1945 edition of the Atlantic Monthly, only months away from what would be the end of the second world war, Bush published a description of his proposed Memex device and its futuristic functions of information storage, retrieval, modification, and most interestingly what he called “associative indexing”. This was the idea that an editable index of trails between documents could be created with which one could actively navigate to related pieces of media within the memex’s interface, and that any given piece of content could be connected with several such trails so that informational relationships could be actively re-organized and explored in novel ways. Bush predicted that, quote “wholly new forms of encyclopedias will appear, ready made with a mesh of associative trails running through them, ready to be dropped into the memex” (Bush, 1945).

A military radar technician named Douglas Englebart was inspired by Bush's ideas, and in the 1950s began imagining how such an idea could be attempted. He envisioned combining electronic screens like the ones used in radar, with computers, which at the time were "large electronic devices stored in air-conditioned rooms, at many degrees of separation from the 'user'[…] attended to by technicians and fed their information out to these technicians on punch cards and printouts" (Barnet, 2019, p.3). Englebart's idea of a human-computer interface with a screen to view documents and the ability to create and navigate "links" between different files was eventually developed into the NLS, or "oN-Line System", and by 1968 had become the world's first functioning hypertext system (albeit a self-contained one) (Barnet). The words "hypertext" and "hyperlink" had been coined just a few years earlier in 1965 by a contemporary of Englebart's named Theodor Holm Nelson, who at the time was working towards his own information organization/retrieval/linking system called Xanadu (Wierzbicki, 2015).

Bush, Englebart, and Nelson all saw the potential for machine-assisted organization/ connection/navigation system that could relate documents by association as a tool that could help humanity solve increasingly complex problems in the world through better and more meaningful information management. However, the mere invention of a working hyperlink system would not have done much (and indeed, did not do much) for altering information, literacy, and education practices more broadly without widespread access to the tools required to engage with it. Just as the mass production of books by the printing press makes little difference to the life of someone who cannot read, the development of hyperlinks means little to someone without a computer.

Early Popular Use

Personal computers were introduced as a commercial product in the late 1970s, and over the next several decades they made their way into an increasing number of homes and businesses, primarily as a tool for word processing, mathematical and algorithmic tasks, and games (Wierzbicki). However, the hyperlink's "big break" didn't come until the invention of HTML (Hypertext Markup Language) and the World Wide Web by Timothy Burners-Lee and his colleagues at CERN in Switzerland, followed by the development of popular Mosaic web browser in 1993 (Wierzbicki). "Key to the initial popularization of hyperlinks was the introduction of graphical browsers such as Mosaic by indicating clickable hyperlinks in blue-colored underlined text, which became the de facto standard for displaying links on the web" (Helmond, 2019, p4). The convergence and increasingly adoption of these new technologies suddenly created a context in which hyperlinks were being encountered, used, and understood by the wider public for the first time. Hyperlinks (particularly in their common form of hypertext) became synonymous with websites and the global connective reach of the internet.

Soon after, user-friendly HTML editors and free hosting services opened up a new era of "mass amateur website building" (Helmond, p.5). This enabled increasing numbers of people to participate in the creation of their own hyperlinks instead of just following links that were already published. In an age before internet search engines, one of the early popular uses of hyperlinks was to publishing lists of links to other websites and "engaging in 'web rings', a way of interlinking websites with similar topics" (p.5). In the decades since, the explosive growth and

spread of the internet, and hyperlinks along with it, haves permeated nearly every aspect of life in many societies.

The Remediation of Reading

Hyperlinks have become a common feature in everyday communication that has transformed how we read, write, and learn. What was once seen as tool to connect approximations of printed text has since entirely remediated written media (Bolter & Grusin, 1999). Today, the screen is often no longer seen as a substitute for the printed page, but as the home for a whole new type of writing never intended to be set to paper in the first place (Dobson & Willinsky, 2009)

Hyperlinks in written media demand a participatory role from the reader (in a sense that goes beyond just the act of clicking). "The methods and techniques of understanding that are applied while reading printed texts may be ineffective in the process of reading from the screen" (Kazazoğlu, 2020, p. 459). Navigating or "reading" hyperlink-enhanced content requires of the reader a literacy to not only *recognize* a hyperlink from common design conventions and context cues such as buttons or blue underlined text, but also to appropriately choose *if and when* to even engage with each link. The reader must continually make judgment calls about *how* they will navigate a hyperlink-rich environment, at the risk of otherwise either missing something important or wasting time on extra content that isn't important if they make the wrong choice. This is the other side of the proverbial coin of Nelson's vision of how hyperlinks will "free users

from the hierarchical constraints of printed text, allowing consumption of knowledge in any particular order" (Zimmer, 2009, p.110).

Hyperlinks are often thought of in the context of hypertext, but the multimedia affordances of HTML mean that for hypertext, the definition of "text" becomes increasingly flexible to the point of becoming indistinguishable from hypermedia. While traditional printed text can be accompanied by illustrations, photos, and graphs, hyperlinks not only invite the inclusion of additional forms of media such as audio, video, animated images, and interactive experiences into the environment, but also enable many of these media to also act as (or include) hyperlinks of their own. This allows images and videos to play an active role in the act of "reading" and navigating a hypertext rather than just sitting adjacent to and supplementing the text. "Digital text has multi-faceted characteristics with written, spoken, visual, and audial components[…] As a result of this people's "reading" and "writing" skills have changed" (Kazazoğlu, p.459).

Implications for Education

For those who are familiar with the everyday use of hyperlinks, their existence and use may seem "transparent" to the reader; they interpret the content naturally and as an "immediate" experience without a conscious awareness of the act of actively engaging with the medium that holds that content (Bolter & Grusin). In education, especially with younger students who are still developing their various literacy skills, it is important that this experience is not assumed to be

the default for students. For example, reading tools such as Raz-Kids (Raz-Kids, n.d.) are marketed to support reading literacy, but it is important to understand that the hyper-link rich environment, embedded with interactive image and audio links, would likely present to a younger student as a form of hypermediacy, in which "the viewer acknowledges that she is in the presence of a medium and learns through acts of mediation or indeed learns about mediation itself" (Bolter & Grusin, p.71) rather than being able to "see through" the environment to focus their learning solely on the singular medium of written text. Whether or not this is a good or bad thing isn't the point of mentioning this scenario, but is instead intended to highlight how we as teachers cannot even start to ask such important questions about issues like these if we are unaware of them.

The New London Group (1996) proposes that meaningful 21st-century education education be focused on the practice of design. For the writer/designer/creator of digital content, the choices made available through the multimedia affordances of hyperlinks invoke the "iterative nature of meaning-making, drawing on Available Designs to create patterns of meaning that are more or less predictable in their contexts" (p.22). Learning to effectively write with hyperlinks means learning to effectively make meaning of all the various forms of digital media that are brought together through "convergence culture", in which "cultural forms and practices which were once distinct are merging together because such forms (e.g. television shows, music, blogs, videos) are now easily mixed with each other" (Tran, 2016, p.216). This makes the case for why reading and writing literacies should be re-framed within the concept of *metaliteracy* as a framework for understanding modern communication. (Mackey & Jacobson, 2011). "As

producers of digital documents, information-literate individuals must make critical choices about the precise media format to articulate ideas and the online site or tool for doing so" (p.74). This also means that "youth need to understand on some level how to design new media in order to become critical participants in today's media culture" (Tran, p. 216). For out students to become truly fluent in "reading" and "writing", it cannot be forgotten that "emergent technologies present information in new ways through the fragmentation of ideas, links to resources, a shifting or transient sense of time and place, and the blurring of lines between actual and virtual space, as well as between text and image" (Mackey & Jacobson, p.74-75). Educators should think beyond electronically printed text as a stand-in for the printed page, and provide opportunities for students to construct meaning in ways that reflect what it means to be literate in a hyperlink-saturated world.

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