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ABSTRACT

This study focuses on teachers as designers using constructive hypertext and their perspectives on evaluating Web-based hypertext projects. The research setting was a graduate level course focused on learning hypertext and designing hypertext projects in Web-based environments. The 11 participants were in-service teachers and graduate students majoring in education. During the 10-week course, the participants learned how to design hypertext, studied different aspects of hypertext theories and discussed the criteria for evaluating hypertext projects. This study describes and interprets the participants' learning process in applying hypertext theory in their Web design and evaluating Web-based hypertext. Writing hypertext is writing a story waiting to be unfolded differently for each reader. In hypertext, there are fewer conventional constraints on authors, and infinite possibilities for readers. This research captures some of the inspiring moments of how the participants learned hypertext theory, created hypertext projects and evaluated hypertext projects. (Contains 22 references.) (Author)

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Criteria for Evaluating Web-based Hypertext

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ABSTRACT

This study focuses on teachers as designers using constructive hypertext and their perspectives on evaluating Web-based hypertext projects. The research setting was a graduate level course focused on learning hypertext and designing hypertext projects in Web-based environments. The participants of this study were in-service teachers and graduate students majoring in education. There were eleven participants in this study. During the ten-week course, the participants learned how to design hypertext, studied different aspects of hypertext theories and discussed the criteria for evaluating hypertext projects.

This study describes and interprets the participants' learning process in applying hypertext theory in their Web design and evaluating Web-based hypertext. Writing hypertext is writing a story waiting to be unfolded differently for each reader. In hypertext, there are fewer conventional constraints on authors, and infinite possibilities for readers. This research captures some of the inspiring moments of how the participants learned hypertext theory, created hypertext projects and evaluated hypertext projects.

Introduction: What is Hypertext?

Hypertext refers to systems permitting electronic representation of text to take advantage of the random access capabilities of computers in order to overcome the strictly sequential medium of print on paper (Nelson, 1987; Marchionini, 1988; Bolter, 1991).

Michael Joyce (1997) defines hypertext as "reading and writing in an order you choose where your choices change the nature of what you read" (p. 580-1). Given the ever-changing nature of the World Wide Web and the enormous amount of information

on the Web, Joyce also describes hypertext on the Internet as "a representation of the text that escapes and surprises by turns" (1997, p. 580).

In *The Electronic Labyrinth*, a study of hypertext technology, Keep, McLaughlin, & Robin (1995) define hypertext in terms of the experiences of the authors and the readers rather than the technological features of hypertext. They view hypertext as a technology with the ability to offer multiple authorships, to blur the distinction between the author and reader functions, to provide different reading paths, and to enrich works with links to other works and media with expansive boundaries. Hypertext not only provides authors new ways of writing and interacting with readers, but also invites readers to explore new ways of reading, thus complicating the functions of the author and challenging the authority of the author.

Michael Joyce (1995) discusses the differences between exploratory and constructive hypertext. Exploratory hypertext lets a reader explore the text and build a path or a web of knowledge of her own. Constructive hypertext encourages a reader to construct her own learning paths, and has the capacity to visually represent the paths a reader creates. Snyder (1996) argues that constructive hypertext is meant for authors and designers to develop their ideas and creativity. Constructive hypertext is also a great means for students who learn by doing or constructing (Jonassen, Peck & Wilson, 1999). Constructive hypertext encourages the participants not only to be users of hypertext, but also designers of hypertext. The study describes the participants' experiences as designers and their thoughts on evaluating hypertext projects in Web-based environments.

Bolter (1994) states that electronic writing or writing in hypertext entails "the qualities of fluidity, multiplicity, and dispersed control" (p. 8). Odin (1997) describes hypertext aesthetics as "non-linear, multivocal, open, non-hierarchical aesthetic involving active encounters" (p. 599), as opposed to the linear, univocal, closed, authoritative aesthetic. Both Bolter and Odin see reading and writing in hypertext as fluid, free and interactive. Odin further states that, "Since hypertext reading/writing involves active encounter and traversal, the reader becomes an integral part of the topological space created by the interaction of multiple texts " (p. 604). Hypertext changes the conventional ways of reading and writing, the roles of the readers and writers and the way authors and readers interact with text.

Odin (1997) states that, "The fragmentation and discontinuity that define the hypertextual environment do not lead to a fractured reading experience. In fact, the links between the nodes promote multiple narrative trajectories" (p. 605). It is the links that connect the text together, not disperse the meanings of the text. She further describes that "The multiple readings of the text finally lie not so much in what the lexias say, but rather in the relationship they forge with one another. These relations come into existence and dissolve with each reading and unfold into different versions of the text" (p. 612). Hypertext provides a great flexibility in writing, and enables multiple readings of the text. In the hypertextual space, authors are able to write text with nonlinear or multilinear paths; readers are invited to interact with text from multiple perspectives, and weave together text and meanings in each reading of the text.

However, hypertext aesthetics can be fragmented and discontinuous. The hypertextual experience may be temporal, deferring and constantly changing. For some that are accustomed to linear text, and/or value linear, logical thinking, the hypertextual experience seems precarious and disrupting. Therefore, this research focuses in-depth on hypertext and its implications on reading and writing, the roles of author and reader and their relationship, their interactions with each other and the text, and evaluation criteria emerging from designing and reading hypertext.

Evaluating design requires a multidisciplinary range of the criteria (Kerne, 1998; Alben, 1996). Since hypertext is a multidisciplinary field (Unsworth, 1997), criteria for evaluating hypertext design requires considerations from multidisciplinary approaches/ perspectives, including interactivity (Kristof & Satran, 1995), aesthetics (Alben, 1996; Weiman, 1999), navigation (Harpold, 1991; Jacobson & Spiro, 1995; Lawless & Brown, 1997), human-computer interface (HCI) design (Shneiderman, 1998, 2000; Kerne, 1998) and usability (Alben, 1996; Nielsen, 1995, 2000). It also depends on the purpose of the design and the intended audience. Since the main focus of this research is the study of designing hypertext in Web-based environments, criteria for evaluating hypertext design focus on the applications of hypertext theory in Web design.

Data Sources

This research employed three different methods of data collection, including observation, interviews, and document analysis. The research setting was a graduate course on hypertext and the World Wide Web at a large Mid-Western University. The class met once a week for about four hours. The first two hours were devoted to discussions about hypertext-related readings, and design problems, both theoretical and technical. The last two hours were lab time for the participants to learn Web design and to share their projects. The researcher participated in both the discussion and lab sections as a participant observer. The researcher interviewed every member of the class and collected their hypertext design projects for document analysis. The interviews were transcribed, coded and analyzed.

At the beginning of the course, the researcher distributed a consent form and a Preliminary Questionnaire to collect background information and information about students' computer skills. The researcher also described the study and asked for volunteers for full participation. All eleven students agreed to participate in the study.

The students had different kinds and levels of computer skills and different levels of hypertext literacy. Some students had never browsed the Web, and some had designed Web pages before. Six of them were full-time graduate students, and five were either full time teachers or other professionals.

During the course, the participants were exposed to hypertext fiction and Web-based hypertext documents. The participants were also required to design three Web-based hypertext projects and share their projects with the class. The main sources for this study were interview transcripts and hypertext projects produced by the participants. This data analysis paid close attention to the participants' experience in designing hypertext, and their perspectives on evaluating hypertext.

The Hypertext Projects

The students in this course were required to design three hypertext projects. Each project assignment was designed with a unique purpose [and objectives]. The first project was to subvert a linear text. Since it was the first project, most of the students were still learning about hypertext, both theoretically and technically, so the nature of the first

project was experimental. The second project was to create hypertext. Most of the students created something that was either familiar to them or was their personal interest so most of these projects were either personal or educational. The third project was to find an existing text, critique its linearity and redesign the text into a hypertext document.

Discussions and Results

Learning about Hypertext

> ...to understand hypertext, you must experience it. – Snyder (1996, p. xi)

For most of the participants, this was their first time designing web pages and learning hypertext theory. In the beginning of the course, they related the conception of hypertext mostly to hyperlinks on the World-Wide Web. Towards the end of the course, most of them said that studying and designing hypertext broadened their understanding of hypertext and made them rethink and even question some aspects of hypertext.

The participants talked about hypertext in different contexts and thought of hypertext in many different ways from their design experiences. For instance, one participant thought of hypertext as an aesthetic medium to tell stories, while another thought of hypertext as a different mode of writing and expressing self. In the beginning, some thought of hypertext in terms of Web pages with links. Throughout their learning process, most of them realized that there is more to hypertext than links. Hypertext challenges conventional ways of reading and writing, such as linearity, narrative and closure. Instead, hypertext supports non-linearity, multiple perspectives, decentering, randomness, openness, and intertextuality. Some participants used storytelling to explore the unique hypertextual narrative and interactivity. Some have become more aware of linearity in text in everyday life because of their hypertext reading and designing experiences. Most of them expressed opinions reflecting advantages and disadvantages of hypertext to traditional linear writing.

Some aspects of hypertext theory were more important and inspiring for some particular participants. In the following section, I will discuss some of the hypertext

aesthetics/characteristics the participants took on in their hypertext design and their reading of hypertext.

Hypertext Aesthetics: Writing Hypertext

In writing hypertext, non-linearity and/or multi-linearity is the essence of hypertext, and most participants' projects worked to subvert the linearity of text. With non-linearity or multi-linearity, multiple perspectives were fostered. Issues surrounding multiple voices and points of views were also raised.

Non-linearity

Hypertext is defined as non-linear, non-sequential writing (Nelson, 1980). Students of hypertext usually realize quickly that they can either really speak through non-linearity and find their voices, or they loathe the non-linearity and long for the clarity and the comfort of linear narrative.

Multiple Perspectives / Voices / Multi-linearity

Multiple perspectives and voices are one of the distinguishing characteristics of hypertext. Nonlinearity and/or multi-linearity of hypertext supports and encourages multiple perspective and voices. In constructing hypertext, there are always contesting voices and perspectives in the text. Authors can include different voices and perspectives through links, paths, multiple sequences, and juxtaposition.

Randomness

Randomness is another feature of hypertext. Hypertext provides readers with random access to information and enables authors to present text, information and stories in a random order.

Overall, the participants subverted linearity by disrupting the sequence to tell different kinds of stories, and/or adding forking paths to present either more in-depth or broader information.

The process of creating hypertext allowed the participants to construct their personal narratives. Although a purpose of hypertext is to subvert linearity, somehow, in these projects, the participants as hypertext authors were able to weave their personal experiences into hypertext narrative that was neither linear nor sequential, yet told stories that conveyed a sense of personal feelings. The participants as hypertext readers, on the other hand, also were able to read from nonlinear text and weave together stories and construct individual narrative from the hypertextual text.

In writing and reading hypertext, hypertext readers and writers invested themselves in the text and created their own individual narrative, even though it was not linear. Hypertext authors used non-linearity of the hypertext medium as an unconventional way for storytelling and created their own personal narrative. Hypertext readers followed the hypertextual narrative and constructed their own understanding of the stories.

Hypertext Aesthetics: Reading Hypertext

In reading hypertext, hypertext opens up possibilities and simultaneously poses challenges to readers. Writing hypertext is like trying to tell stories with many beginnings and endings. Reading hypertext is like trying to piece together thousands of puzzles or to find your favorite storyline to follow from countless threads. With hypertext, readers are presented with openness, intertextualiity, decentering and interactivity. Hypertext readers have more freedom as well as responsibility to explore and connect in order to understand nonlinear text.

Openness, Decentering and Intertextuality

Openness indicates text with open endings, or ever revolving, never-ending stories. On the World Wide Web, readers can click a link, jump to other sites, and never come back to the page where they start. Sometimes readers may not be aware that they have left one page and gone to pages that are made by different authors.

With hypertext narrative, each link could start another center, another story. Every time a reader reads a story and links the one story to another story, the center of the story and characters are recentered again. It is constant decentering and recentering.

Closure

Some participants argued that hypertext did not have to always be open-ended. Some did not expect hypertext with only one ending, but would prefer hypertext with some sort of ending, such as multiple endings or multiple ways to an ending. Just as different authors write different kinds of hypertext, different readers offer different kinds of readings. Different readers also look for different features. Some readers look for interactivity; some prefer hypertext narrative; some insist on having closure.

In this study, some of the participants as hypertext readers still look for narrative and coherence in hypertext. However, as hypertext authors, most of the participants are fond of non-linearity, and embrace hypertext narratives when it comes to writing without definitive beginnings or endings. Some of the participants even express that it is difficult for them to go back to writing linearly.

For the participants who seek for narrative and closure, reading hypertext fiction such as *its name was Penelope* is somehow frustrating. Most hypertext fiction contains pieces of story that are read randomly or multi-linearly. Some readers can't help feeling lost and frustrated because hypertext fiction discards the conventions of fiction and "narrative is how we explain the world to ourselves." (Gibson, 1996, p. 7)

Interactivity

Interactivity is another promise of hypertext. Hypertext is said to encourage interactivity. What is interactivity? Do authors and readers interact? How do readers interact with text? There are different levels of interactions between authors, readers and text. Some authors use links to add voices, possibilities and depth, some use network connectivity such as email to connect and/or interact with readers. Some authors hope to let readers interact with the text by having the ability to add and/or change the text / content freely. Some of the participants' expectations of interactivity from the readers are just as one of the participants stated "like the way any author would, to reflect upon or draw in personal experiences as they were reading and to connect to the text in a meaningful way." Interactions between readers, authors, and the text are highly expected, but hard to achieve. Jay Bolter (1991) argues "readers cannot avoid writing the text itself,

since every choice they make is an act of writing" (p. 144). While some authors agree with Bolter and think that while readers are making links, they are already (re)writing the text. Some authors and readers would only consider real time conversation in cyberspace as interactions.

Criteria for Evaluating Hypertext

The participants not only learned about hypertext theory, and designing hypertext, they also learned about evaluating hypertext. In addition to their roles as designers, the participants are readers, users and critics of other participants' projects.

In my interview, I'd ask my participants which project(s) from the class or on the Internet they liked best and what criteria they considered for good web design. They were asked to talk about their own projects and design processes as well.

At the end of the course, the participants created about 33 hypertext web-based projects. There were some projects that got mentioned more often by the participants, including *The Kent State project*, *The Quilt project*, Julia's *Untitled* projects, and *The 40-day project.*

The Kent State project was created by a middle school teacher. She talked about her college experience in Kent State in the 1970s and the shooting incident that happened on the campus. The project was done in black and white. She tried to mix different perspectives and voices in her project so her own voice wouldn't come out too strong, but she felt that the author's voice came out anyway.

The Quilt project was created by a Masters student. She created the project to teach her daughter about the history of Ohio by integrating stories about the Freedom Trail and quilt-making. It was also part of her Masters degree project.

Julia's *Untitled* projects were about her own experience on the day that she had the surgery to remove her liver cancer. She created a hypertext project that weaved together the experiences of her best friend's, her mother's, her doctor's and her own on that single day.

The 40-day project was created by a middle school teacher. She had spent 25 years in Sierra Leone. She returned to the state after her husband's death. Her project was about the ritual that people performed upon her husband's death in Sierra Leone.

When the participants were asked to create hypertext projects, some of them chose something that was really close to their heart. Some of the participants noted that the non-linearity of hypertext helped them sort through complex emotions about their theme, and the notion of creating something also invited / encouraged them to write about their emotions and personal experiences.

Some of the participants who read the projects were touched by the personal feelings as well. The projects were mentioned by the participants tend to have personal narratives in them. The participants also commented on the well-designed text, graphics and overall quality of these projects.

The participants were also asked to read a hypertext fiction titled *its name was Penelope* by Judy Malloy. It's about an artist, a photographer's life. The story is presented in snapshot fashion and is about the photographer's life. Readers will read different moments of her life randomly. Some of the participants were really inspired by the nonlinearity of the text, but some were really distraught by the randomness of the text and really longed for linear narrative, closures and endings.

In summary, different participants had different takes on hypertext aesthetics. Some participants were fond of hypertext narratives; some were still looking for closures and endings. The participants either really liked hypertext, or missed the traditional text with definitive openings and endings. When it comes to select their favorite projects, different participants had different favorite projects, but they tended to remember and/or choose the ones that had personal feelings and meanings in them, such as *The Quilt project, the Kent State project,* Julia's *Untitled project and The 40-day project.*

When the participants were asked about their criteria for evaluating hypertext Web projects in general, the following criteria were mentioned:

1. Well-designed navigation: simple and clear, not too much, too overpowering, easy to work with, easy to find things and download. The heart of hypertext is nonlinearity, but readers still try to piece together something that is nonlinear in order to understand the text. Therefore, well-designed navigation is very important to readers. Pure randomness is fun for experiments, but not as widely appreciated by the readers.

2. Visual presentation: aesthetically pleasing, and eye-catching design. Readers appreciate visually pleasing graphics and layouts, but not too much flashy multimedia.

Although graphics and multimedia can help authors to tell part of the story and/or present information, the practice of simplicity is still a virtue.

3. Personal, meaningful, mood-setting: The purpose of the project set the tone for its audience. In this study, there are some touching personal experiences and stories; readers appreciate and are moved by the sharing of experiences. As one of the participant stated: He was very moved by some of the authors and designers who created a very personal narrative by using an impersonal media.

4. Coherence, harmony: Some participants look for coherence within nonlinear and multi-linear text. Multi-linearity is part of non-linearity, but emphasizes the multiple-linear approaches and de-emphasizes the randomness in hypertext. It opens up the limits of linearity, and connects the randomness of hypertext with some coherence, and provides different possibilities and different perspectives. Some look for coherence and harmony in design, text and graphics. Hypertext offers readers different paths, however, the coherence of text, graphics, and interface is important to some participants.

5. Types of interactivity: There are different ways to interact with authors, other readers and the content. Links are perceived as common mechanism for interactivity. However, some readers expect to change and/or add to others' work and request real time author-reader interactivity; some are perfectly satisfactory just reading some profound text by a good writer.

6. Levels of difficulty: uses of advanced Web authoring techniques and multimedia.

When the participants were asked about their favorite projects and what their criteria are, for some, the criteria were drawn from their favorite projects, such as simple and easy, easy to use, visual, personal and meaningful, etc. For some participants, the criteria they gave were more general. They usually don't like the sites that are too

complex and too overpowering. They like to feel in control. Some were attracted to visual effects, but realized that they definitely would not want too much.

Overall, the ease of use, and simplicity were the most desired features of web design. Things that the participants didn't like were too much text, too much graphics, web sites that take too long to download, too overpowering, and the feeling of losing control. To novice designers, they tend not to be impressed by complicated interactive features and advanced levels of difficulty in Web authoring.

Hypertext narratives also play an important role in participants choosing their favorite projects. They like projects that blend text and graphics well and carry meaningful stories; stories are that either based on personal experience or are woven together by history and culture. Coherence and harmony were important to some as well.

However, interactivity is not a word that has definite meaning for every participant. Mostly, the participants pondered upon the degrees of interactivity that technology and hypertext would allow them as authors and readers. The participants as designers and readers thus look for different kinds of interactivity and redefined the concept of interactivity.

Levels of difficulty were also not most participants' top concern. Sometimes the sites that use too many advanced features, such as multimedia and complicated links get less appreciated. Some participants actually found sites that demonstrate a great deal of author control by using advanced web authoring techniques, irritable.

In conclusion, the participants had different takes on hypertext aesthetics. Some were fond of hypertext narratives; some were still looking for closures and endings. The participants seek different levels of interactivity. Some designed their project to express; some to invite interactions. The participants formed more situated criteria. For most participants reading each other's projects, the criteria were more situated. There were no universal criteria that would describe everyone's favorite project.

However, while the participants were asked for the criteria in general, they expressed that navigation plays an important role in hypertext design. Most participants appreciate well-designed navigation. Despite the importance of visual presentation, the practice of simplicity in design is a virtue that cannot be over-emphasized due to the

bandwidth on the Internet. Personal interests are crucial in reading and evaluating hypertext as well.

Importance of the Study

Working in hypertext fosters different kinds of creating as well as different kinds of reading and evaluating. Hypertext authors/designers create in order to connect with the readers, just as the reader would like to connect with the author/designer. For some of the participants that find hypertext as their creative and inspiring media, there is no linearity to subvert, and there is no closure to work against. It is the openness, intertexuality, and plurality in hypertext that invites authors and readers to walk in the world of possibilities, to explore and experience the fluid space that hypertext opens up to them. Criteria for evaluating hypertext thus reside in a more situated context that fosters creativity and understanding.

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