

In the Company of Readers: The Digital Library Book as “Practiced Place”

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ABSTRACT

Most digital libraries (DLs) necessarily focus on the complex issues that arise when library collections are freed from their physical anchors in buildings and on paper. Typical investigations look at supporting adults in work settings, such as school or research. Much less attention has been paid to younger generations of readers. As ever more digital venues cater to youngsters' attentions, a role for the DL as a catalyst of social interactions around traditional literacy practices begins to take shape. Based on prior research on annotation systems, constructive hypertexts, and computer support for cooperative work coupled with our contextual inquiries with children, we have developed a prototype for a digital book that supports social interactions through annotations. By placing and sharing notes, groups of readers transform the book from an artifact into a living record of communal experience. A system of support for marks and notes in the context of reading for pleasure can turn the digital library book into a “practiced place,” a location that is not only accessible, but also welcoming, engaging and supportive of the activities children are interested in and therefore likely to engage in. Our experience with *Alph*, a prototype book-reader supporting a range of rhetorical marks and note-writing, suggests that future DLs need to look beyond augmenting work-based literacy practices by creating dynamic and social reading environments.

Categories and Subject Descriptors

H.3.7 [Information Storage and Retrieval]: Digital Libraries – *User issues*; H.5.2 [Information Interfaces and Presentation]: User interfaces – *Evaluation/ methodology*; H.5.3 [Information Interfaces and Presentation]: Group and Organization Interfaces – *Computer supported cooperative work*

General Terms

Design, Human Factors, Performance

Keywords

Electronic annotations, active reading, sociable literacy, digital books, children, markings, annotations system design

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1. INTRODUCTION

Although the work of understanding, building and assessing digital libraries covers an astounding range of topics and multiple disciplines, the field has focused most of its attention on the needs and tasks of knowledge workers in research libraries or workplace settings. Much less work has been devoted to looking at the needs and desires of a broader public who use today's public libraries and who read books for pleasure. Perhaps the community of DL researchers has assumed that the chief need for leisure readers and public library patrons can be summed up as convenient access to responsibly managed collections. Our research with middle-school age children, however, suggests that while access is a necessary condition for this class of patrons, it may not be sufficient in and of itself to attract users and, more importantly, to support their activities. Unmet needs and untapped opportunities lie in re-examining the social practices that constitute literacy and in re-conceptualizing the digital representation of books for a broader community of users.

Reading for school or as part of a collaborative effort is highly directed: the subject read is either assigned by an instructor or is the result of a dedicated search in a specific field of inquiry. The activities of the reader and therefore his annotations are highly goal-oriented as well, as research into the annotation habits of students and professionals demonstrates [33, 21, 20] and as our own observational research and work with children corroborates [16]. Reading for pleasure on the other hand is quite a different activity: there is no pressure to achieve a particular goal or objective and therefore the choice of reading material is likely to be more varied and more influenced by past reading experiences and the recommendation of friends than by direct instruction. Instead of expecting to achieve a specific goal such as answering an essay question, the purpose of reading is to learn about the characters, get involved with the subject of the story, experience emotions, have fun, and relax.

For the pleasure reader “the significance of the work...does not lie in the meaning sealed within the text, but in the fact that the meaning brings out what had been previously sealed within us.... we actually participate in the text...[which] is why we often have the impression, as we read, that we are living another life” [13].

The book as a physical artifact provides excellent support both for knowledge work and for pleasure reading. Its many familiar features and conventions of use inform a large number of projects exploring ways to support vital literacy practices in an age of ubiquitous online information and resources [18, 32]. Similarly, over the past two centuries, the physical library has

emerged as a locus of community, its shelves filled with recorded conversations and its reading rooms with the visible proof that even if each person reads alone, everyone there is sharing in the larger community of readers.

Both the paper book and the bricks-and-mortar library limit the ways they can represent the social activities of which they are an integral part. The limits of the paper medium have meant that a reader could not effectively share her experiences with other readers of that same book, at least not within the structure of the book itself. A personal copy of a book annotated by a reader cannot be shared with other readers except in a highly limited and limiting fashion. For a variety of obvious reasons, libraries do not permit borrowers to leave marks in their books. The physical environs of reading rooms and children's corners suggest sociability and community, but the constraints inherent in sharing a physical resource with countless others over an unknown period of time prevent patrons from exchanging their reading experiences with others through marginalia and other forms of annotation.

Digital books, however, can easily become shared resources without the same limitations. As Landow points out, "The particular importance of network textuality, that is, textuality written, stored, and read on a computer network appears when technology transforms readers into reader-authors or "wreaders," because any contribution, any change in the web created by one reader, quickly becomes available to other readers. The ability to write within a particular web in turn transforms comments from private notes, such as one takes in margins of one's own copy of a text, into public statements" [17, p.14].

Digital libraries and digital books both attenuate the signs that others have been and are present, that the library, the book, and the reader necessarily participate in an intellectual space that exists only because it is always and already shared with others. One challenge for digital libraries, then, is to replace the spatial and visible signs of communal participation, especially in the experience of reading digital books, with functions and interfaces that convey a sense of the social. In short, we believe digital libraries and digital books can and should become what Michel de Certeau deems a "practiced place" [9], a locale in which the traces of human activities create social capital.

De Certeau uses the term "practiced place" to describe locations in which human activities accrete into meaningful patterns, configurations that capture human interactions. That is, the traces of human presence in a place create records of human practices in ways that support social bonds and communal constructions of meaning.

In order to explore the notions of an augmented book and a digital library capable of supporting and encapsulating social interactions within the books and media artifacts that make up its collection, we have developed *Alph*. An augmented book prototype, *Alph* presents the book as a succession of page images and provides five "emoticon stamps" that can be used to mark up the pages of the book. Each stamp leaves a small icon wherever it is placed on the page and it also makes a "sticky note" available for writing notes. Each note is "private" – that is visible and accessible only to its author – until the author decides to publish it.

Alph was conceived as an augmentation for the International Children's Digital Library (ICDL), a project developed at the

Human-Computer Interaction Lab at the University of Maryland. The ICDL currently houses approximately 600 books in 21 languages and has been in use for nearly two years. It has served at least 90,000 unique users about half of whom reside outside the USA. The ICDL has been designed for children between the ages of three and 13 [11, 12] but is focused primarily on pre-literate and early literate children. To explore the possible role of an augmented book in a digital library for children, a small group of children between the ages of 10 and 14 together with their parents used the prototype in their leisure time over a four-week period. The system and its field test reveal some interesting aspects of reading in the company of others.

2. RELATED WORK

The conceptual work for this project derives from three sources: contemporary theories of literacy and literature, research on shared annotations and constructive hypertexts, and participatory design with children between 10 and 14 years old working with the International Children's Digital Library.

2.1 Theories of Literacy and Literature

Since the 1920s, literacy theory has increasingly emphasized the importance of social factors in the development of literacy [4, 5, 14]. Once we have mastered the essential acts of decoding the marks that form words and letters, typically around age 6, reading becomes a much more complex activity than we often conceive it to be. And even learning the basics is preceded by years of exposure to written language in a variety of social contexts. Literacy is best understood as a multifaceted social practice rather than a single skill; it takes a wide range of forms and is highly context-dependent [4, 5]. Like all semiotic acts, literacy practices are deeply embedded in social life.

Contemporary literacy theory reminds us that the literature we read is freighted with and also constructs shared cultural meanings. Although we most often imagine reading and writing as solitary activities [2], they are best understood as part of a social system of meaning-making. Darnton, for example, considers literature "an activity, the construal of meaning within a system of communication, rather than a canon of texts" [8, p. 21].

Drawing on important theoretical positions from 20th century literacy and literary theories, we posit a role for sociable annotations that remake the space of a digital book into a practiced place [9]. For de Certeau, places are born out of exploration and recollection. They are the amalgamation of sensation and expectation. Seen in this light, annotations affixed to a book's pages turn the book into a place filled with a community's practices. Annotations allow readers to imbue books with their meanings. As a repository of a community's explorations and recorded responses, the sociable digital library book could become such a practiced place.

2.2 Annotation Systems and Constructive Hypertexts

Since the imagination of Vannevar Bush introduced the world to the idea of shared trails [3], Ted Nelson dreamt of Xanadu [24], and Michael Joyce conceived of "constructive hypertexts" [15], systems have been developed to support a variety of shared

writing spaces. The need to support collaborative work on digital documents has long been clear. Supporting a sense of the social has been a less obvious requirement for collaborative writing and other knowledge management tools. Although it is perhaps the largest artifact human culture has yet produced, the Web's representation of the social is weak as is its accommodations for collaborative work and commentary about texts. In fact, the Web offers little direct support for active reading strategies like marking and annotating a text.

Although the research on computer support for cooperative work, hypertexts, and digital libraries is voluminous and examines many facets of shared textual environments, typically such studies situate active reading in the context of goal- and product-directed work with others [1, 20, 32, 21, 25, 26, 27, 30, 33]. Except, perhaps, in literary studies of poets' marginalia in books they owned and drew on in their own artistic practice, much less is known about how people have used or might want to use annotations in reading for pleasure. Yet writing in books is a time-honored practice among readers, both for studious and for leisure purposes.

That an annotation function for pleasure reading might have value can be gleaned from work on the social purposes many information resources apparently play. For example, in their work on the social uses of sharing clippings and other "encountered materials," Marshall and Bly observe that people share information for purposes that have little to do with the content of the shared resource: "Much of the sharing that we observed served a variety of functions in its social setting beyond simply informing" [19, p. 219]. Sending and receiving these snippets of content often served to create, strengthen, or renew social bonds, rather than to inform or to instruct the recipient.

Of course people can and do find many ways to share their experiences of reading: they talk, write letters, and these days use email, chat and Instant Messaging for many purposes. No doubt some people sometimes use these communication tools to talk about books. Yet annotations are distinguished from other forms of discussions that might take place about a text because annotations are always situated within or along side the text. Annotations, in other words, are generally tightly linked or anchored to another, primary resource. In annotations on paper, the primary text and the mark and/or note forming the annotation can be seen in the same visual field.

In practice and in the research literature, electronic annotation systems have shown varying degrees of promise and usefulness. Some researchers have observed that support for annotations in electronic documents promotes and facilitates active reading [23, 33]. In work on a digital reading appliance, researchers determined that annotations serve many functions for readers and collaborators, including reacting to or in other ways engaging the readings [21].

Moreover, personal annotations and shared annotations may have different characteristics that reflect their authors' various purposes for creating them. In one study, only a small proportion of personal annotations were ultimately shared with others. Personal annotations that were never shared often consisted of one or another mark without supporting commentary. Annotations that became the basis for shared work, however, were more likely to combine an anchoring mark with

some kind of note [20]. These observed differences suggest that active reading takes several forms and may oscillate between activities designed to support the reader personally and activities aiming to reach out to others.

Based on the ongoing literature in the field, we conceptualize the book as a place of shared experience and meaning, a social place in which creating and sustaining social bonds may be as important as sharing vital information or ideas. Our prototype, *Alph*, enables readers to record their thoughts and ideas within the fabric of the book. They can share their experiences with one another or preserve their own experiences for future recollection by leaving traces of their activities within the book's virtual pages without destroying the book's structure. *Alph* seeks to transform the book from an inert artifact into a living compendium of experiences encompassing not only the notions and ideas of its author but also the experiences and ideas of its readers.

2.3 Contextual Inquiry and Participatory Design

For the past three years, researchers at the University of Baltimore have been working as part of an Intergenerational Design Team (IDT) comprised of six to eight young people between the ages of 10 and 14 and six faculty and graduate students. Using techniques pioneered by Druin and Bederson [11], the IDT has investigated the meaning of core concepts like "reading" and the "library," the reading practices common among young people, and the formation of expectations of digital texts among children in this age cohort.

Information gleaned from more than 40 contextual interviews with youngsters at public libraries and in their homes as well as from a range of participatory design exercises suggested that people who are growing up digital [29] have already come to expect electronic documents to deliver different functions than paper-based documents can support. Our work with the interfaces and functions of the current ICDL led us to explore the possibilities of creating an annotation system to support reading for pleasure.

Results from the first two years of work show that DLs for children will need to be dynamic and to support sociability in ways that enhance the pleasures of reading [7, 16, 28, 30]. Moreover, the middle-school population with which we have been working will be the college and graduate student population within a decade and will form the next generation of professionals and researchers. Understanding the interests, needs, and desires of this population helps us gain insights into the interests, needs, and desires of library patrons in the near future.

Children in this age group are adept users of digital communication tools: those who have access to the internet routinely use Instant Messaging, email, and chat applications. Many participate in massively multiplayer games. They use search sites like Yahoo!igans and Google and are familiar with the emerging conventions of Web sites [16].

In exercises designed to explore concepts of reading in digital environments, the teens and 'tweens with whom we have worked consistently imagine imbuing digital books with features drawn from their knowledge of and experience with other online

communication tools. They express interest, to be sure, in having books become more like the computer games they love to play, but they are keenly interested in finding ways to preserve the central experience of reading a story while at the same time finding a sense of connection to family members and friends who might share experiences of a book with them.

3. ALPH

Alph is conceived as an ecosystem in which patrons and media elements cohabit in a digital environment. The ecosystem is made up of any number of media elements such as digital books, maps, video files, etc., each of which may have any number of consumers among the library patrons. In theory the ecosystem can contain any number of other libraries as well. The library acts as the facilitator for the interactions between the media elements and the patrons and in principle could mediate between a patron and other libraries as well.

3.1 System Overview

As a prototype of an interface for interacting with books in a library, *Alph* should be able to support many kinds of relationships between patrons and a range of media elements. Ideally, the system ought to be composed of an interface through which a patron accesses and interacts with one or more libraries and a server based system which acts as the central data repository for the library.

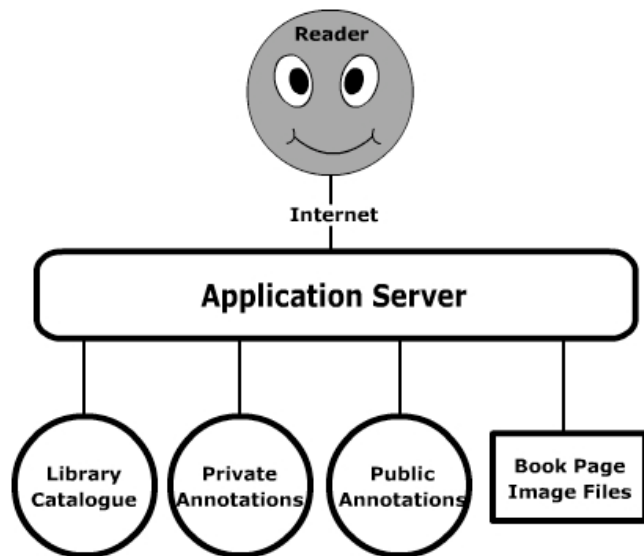


Figure 1. A general diagram of the *Alph* system.

This first prototype, however, focuses on the book interface. It utilizes a database system constructed of three separate databases. One stores the library catalogue containing records of all the books in the library collection. A second contains information on all the patrons with access to the library as well as the records of all their private annotations. A third stores all of the public annotations that have been added to the books in the library collection (see Figure 1). A fourth database containing reference information on other libraries could be added to support a multi-library environment. To limit the scope of our endeavor at this time we have restricted our explorations and implementation to the domain of books and to

the scope of a single library. However, we believe the design to be extensible to other forms of media and to a multiple library configuration.

The books in *Alph*'s library collection are presented to the reader as scanned images of pages from a physical book. The image files representing book pages are stored as flat files and are served to the book-reader interface as they are requested, in true web fashion. We have used scanned images rather than text files for two reasons. First, scanned pages allow us to faithfully represent not just the verbal content but also many aspects of the appearance of the original artifact. Books written and designed for children are often richly illustrated and sometimes depend on viewing facing pages at the same time. A large number of the books in the ICDL collection, the DL on which *Alph* is based, are early illustrated editions of classic works for children. A true appreciation of these kinds of books can only be achieved through a faithful representation of the original.

Second, scanned page images provide a stable spatial structure rather than a dynamic display of digital text. Text presented in digital format can be displayed in numerous forms depending on the font, size, color and other layout elements chosen for the display. While this approach has its advantages and does not alter the actual content of the text, just its presentation, it does alter the reader's perception of the page and the mental image he or she may form of it in much the same way that a visitor to a city will perceive its streets and structures in markedly different ways if visited during the day than if visited during the night.

Alph is designed to rely on spatial relations among the marks and annotations readers might leave. Thus a key goal is to ensure that every reader of a particular book sees every mark and annotation in the same location on a page, an issue much easier to address when the page is represented as a static image rather than as a dynamically changeable surface. *Alph* is designed to construct a shared landscape among all readers by supporting an image of the social geography that the collective activities of all readers create on the page's surface. Since the position of the annotation forms part and parcel of its meaning, we have used images of scanned pages as a means of preserving the structure and spatial context of the page.

The books in *Alph*'s collection are presented to the reader via an internet connection in an application developed using Macromedia Flash™ which in turn communicates to the server where both the canned images of the books and the annotations created by readers are stored. As a prototype environment for the client (book-reader), Flash allows us to reach the largest audience while minimizing both download time and compatibility issues. Given the young age of our target population and given the current technological offerings, Flash offered a better solution in that regard than Java or DHTML in the form of JavaScript and CSS. The server is composed of a MySQL database and a Cold Fusion application server from Macromedia.

3.2 Using *Alph*

When readers launch the system they are required to login to gain access. This is done for two reasons. First, we needed to provide a protected environment for the children in our study group so they would feel free to engage in social interactions with all members of the library without fear of encountering

unsavory characters. Second, *Alph* needs to know about the identity of individual readers so their private annotations could be made visible to them. Without a login system there will be no way of distinguishing users and thus no way to assure privacy. However the login mechanism allows us to support anonymous users so access to the library can be granted to anonymous users if necessary or desirable.

Currently all registered patrons of *Alph* belong to an Internet Reading Group (IRG). This allows us to separate readers into different groups and thus control what is visible to them. A specific group can operate independently within the context of the library which in a larger implementation will allow us to support adult readers, anonymous readers and children without encroaching on the interests or security of any reader group.

Once they have successfully logged on readers are presented with a selection of available books. When they have made a selection, they can read it, view the annotations that were added to it, comment on those annotations, and also add their own annotations. Readers can add their annotations anywhere on the surface of the page and are not restricted to the margins (see figure 2). Thus they can place the annotation at the most relevant position to them. A set of tools allows readers to control the opacity of the annotations so they will be able to read text that might otherwise be occluded. They can also filter the displayed annotations by a number of parameters such as type, date, creator etc.



Figure 2: Interface with Marks and Annotations

Annotations are represented by an emoticon which can also contain text. When it is first created, an annotation is private and stored as part of the records of all that reader's activities in all books and possibly in all libraries. When the reader decides to share the note, i.e. make it public, it is also recorded in the appropriate book table in the public annotations database and thus available to all other readers. Each instance of a stamp has the ability to store comments. A private note is in effect a nanowiki storing previous versions of the note created by the reader and preserving the structure and evolution of his train of thought. Public notes can be commented on in a similar fashion to comments in blogs allowing for a free form discussion [6].

Employing principles from research into spatial hypertexts [27], each comment is a free standing node anchored to a specific point on the page and may entail its own set of comments. The coalescence of annotations on a page will suggest areas of high interest or contention while notes with lots of comments will have sparked the liveliest discussion. This follows Tobler's

First Law of Geography which stipulates that all things are related but closer things are more related than others [31, 27].

4. ALPH IN ACTION

Participatory design processes provided the general framework for creating the *Alph* prototype. We constructed the first field test to explore four key questions:

- would participants enjoy using a sociable digital library book?
- would we be able to see signs of sociable literacy practices in this first use of the system?
- what would evidence of social interaction look like?
- would the activities of making marks and notes be able to tell us anything about reading as a social practice?

4.1 Field Test Design

To test an initial version of *Alph*, we formed six Internet Reading Groups (IRGs) comprised of children in our intergenerational design team, their family members, and a few of their friends. The IRGs used *Alph* for a period of one month beginning on November 22, 2004 and ending on December 20, 2004. Participants were provided with a few simple directions for logging into the system and using the features for managing the reading environment (page-turning, magnification, and adjusting the opacity of marks so that they could be "read through"), three tools for managing the annotation markers (pointer-selector, eraser, and move tool), and the five emotive rubber stamps together with sticky notes. After some attrition by some groups due to opting out and hardware failures in the participants' homes, we were left with two all but inactive groups, two moderately active groups, and two highly active groups active (see Table 1). Two senior researchers were (largely silent) members of all six groups.

We collected three kinds of data about the use of the system:

- Passive data indicating time logged on the system; pages viewed; marks and notes made (together with the locations of the marks); marks and notes deleted; private and public designations for marks and notes; and the substance of all comments.
- Results from a sticky-note session with participants in the field test. The exercise consists of free-form written responses to a request to jot down three things participants found fun about *Alph*, three things they found challenging, and three suggestions for improving or enhancing *Alph*. Each response is recorded on a separate note and all notes from all participants are collected and clustered.
- Notes taken during a group discussion with all participants.

4.2 Field Test Results

In all the participants created 106 annotations, 17 of which were deleted. In all likelihood, these deletions occurred during an exploratory stage with using the software since all but two of the

Table 1: Participation Data by IRG

participants		sessions						marks and notes			
Group	# kids	# parents	# kid sessions	mean duration (kids)	# parent sessions	mean duration (parents)	total sessions	total public	total private	total deleted	total marks
A	1	2	2	4	3	9	5	0	2	0	2
B	1	1	1	12	1	19	2	2	0	1	3
C	2	0	2	30.5	0	0	2	6	4	1	11
D	1	0	2	25.5	0	0	2	11	0	1	12
E	1	2	6	8.8	6	21.8	12	29	1	7	37
F	2	1	10	19.1	3	7	13	24	10	7	41
totals	8	6	23	12.3	13	11.4	36	72	17	17	106

deleted marks had no text or note attached to them and all were deleted soon after they were created.

Table 1 shows the relative levels of activity among the six IRGs involved in the field test as measured by number of marks and notes created overall as well as by the total number of sessions recorded by each groups’ participants. The groups fall into roughly three bands by level of activity: ‘A’ and ‘B’ barely registered any activity; ‘C’ and ‘D’ registered moderate activity (having created a total of 11 and 12 marks, respectively); ‘E’ and ‘F’ were significantly more active than the other groups, with a total of 37 and 41 marks, respectively. The two most active groups created a total of 78 notes of which 11 were private and 14 were deleted. In other words, the two most active groups accounted for 73.5% of all marks, 64.7% of all private annotations, and 82.4% of all deleted marks.

The participation data reveal that children were more active with *Alph* than their parents, both in terms of number of sessions and in terms of durations. In the group labeled ‘F’ in Table 1, for example, the youngsters logged a total of 10 sessions with a mean duration of 19.1 minutes while the adult signed on to *Alph* only 3 times and spent an average of only 7 minutes in each session. In only one group, labeled ‘E’ in Table 1, did the number of the child’s sessions equal the number of adult sessions. And even in that group, with only one child but two adults, the child logged in twice as often as either parent, although her reading sessions—at a mean duration of 8.8 minutes—were shorter than her parents’ (mean duration 21.8 minutes).

5. DISCUSSION

The data clearly lead to one over-arching observation. The participants used the tool to be sociable and to situate their reading of the novel within a social context. Of the 89 annotations that became public, 72 (80.8%) were shared with others and only 17 (19.1%) remained private. (A careful look at the contents of some private marks suggests that a few of them

might actually have been intended for sharing, since they appear to address others in the group. It is possible that the author of these notes did not know how to make her contributions public or that she forgot this step.) This pattern of sharing differs markedly from the results exhibited in Marshall and Brush [20] where “only a small fraction of personal annotations are made public online.”

We hypothesize that the difference between the two studies reflects the differences between the contexts of these studies and especially differences in the motivations of their participants. The Marshall and Brush study looks at college students engaged in a collaborative effort where participants are expected to make useful contributions to the shared effort. The goals for the group thus encourage participants to be highly selective and self-reflective in their commentary—even if they are highly comfortable with one another—in order to make sure their comments are important enough to constitute a reasonable use of others’ time.

In the context of our study the reverse is actually the case. There is a perceived social benefit (rather than a material, status, or academic benefit) for adding any kind of annotation. The annotations form a social practice, more akin to chatting than to accomplishing a shared production goal. In other words, the marks and notes are more likely to indicate an interest in the process of participating and less likely to show evidence that participants are trying to achieve some shared goal or endpoint. Because participants are interested in keeping the conversation going rather than getting a product to closure, the notes tend to show a kind of general banter rather than cohesive thought.

In the two most active IRGs, there were eight note “clusters,” four in each IRG. Clusters were defined by proximity and clear rhetorical signs of connection (direct reference) to another note.

Annotations showed authors’ awareness that they were acting in a social space in a number of ways. Two of the young readers used the note space to ask for help with definitions of words and

two others used the feature to remark on the length of the book and/or how many chapters there were still to read. This last sort of remark seems intended to provoke a response from parents or other adults who happen across it, or perhaps to signal a somewhat “cool” and detached attitude towards reading.

In the eight clusters we found, exchanges usually consisted of two notes: a query or remark followed some hours or days later by a response. Given the small size of the IRGs, the short period of time we had, and the general constraints of the system (no choices of reading material, for example), we don’t find this result surprising. The exchanges themselves provide intriguing glimpses into relationships. For example, in one group a daughter and mother create two clusters. In the first, fairly early in the book (p. 11), the mother makes a comment about the story and then asks, “Am I supposed to make comments like this or am I missing the point??? Someone help.” About six hours later, her daughter leaves a reply: “yes ... make comments about the text not about random stuff.” Eight days and 29 pages further into the book, the daughter writes, “beer yuck that is soo nasty.” Five days after the daughter’s note was recorded, the mother responds, “How would you know what beer tastes like?”

A strong inclination toward sociable practices also emerged in the written and oral feedback we got from the users. In both the sticky-note session and the general group discussion of the *Alph* experience, a high proportion of the responses indicated that participants greatly enjoyed both the act of writing the notes and the ability to read what others had written. Of the 40 notes responding to the prompt about what made *Alph* fun, 7.5% specified reading others’ notes, 12.5% mentioned the opportunity to communicate with others, and 17.5% focused on the ability to write thoughts and responses to the book. Comments about the sociable features of *Alph* accounted for 37.5% of all the feedback about fun from the sticky-note session. The results suggest that participants saw *Alph* as a potential stimulant for reading literature written for young adults. As one young reader indicated, “Even if I’m not reading my favorite book, reading someone else’s comment might zone me in, get my attention.”

The group discussion showed that participants who had logged in several times divided their attention between reading further in the story and looking for and reading the notes others had left. This oscillation between focus on the experience of reading an imaginative work and the experience of feeling oneself to be in the company of others was reported to be sustaining and engaging.

Feedback, however, also indicated a need for additional supports for social interactions. For example, in the prototype available for the field test, there was no notification system in place (many of our younger participants did not have their own email addresses at that point). As a result, in providing information about challenges and ideas for enhancement, notification processes were suggested and have since been implemented. Participants also wanted improved support for locating marks and notes and for returning to the place where they had last been reading.

Future development of the system will include revising the interface to make more aspects of human activity available to the system’s users. Some obvious additions include a utility for sorting public marks by author and highlighting activity that has

occurred since a particular user last visited the book. Our young design partners have also expressed interest in having bookmarks and in a function for storing a collection of their favorite books—a personal bookshelf, as it were.

As we work on elaborations of *Alph*, we are also planning a more extensive field test and case study with a school-based group and also one with the summer reading program sponsored by the public library system in Baltimore. These trials will enable us to begin to examine some of the wider questions about social activities we have been unable to test in our very limited first trial.

6. IMPLICATIONS AND FUTURE WORK

Although the results of the first field trial of *Alph* are encouraging in many ways, the construction of the trial itself leads us to be cautious in drawing conclusions. The composition of the IRGs, for example, may well have shaped the behavior of many participants. The social behaviors we could detect might have been significantly different if the IRGs had been composed only of young adults or if the members of reading groups had not already been part of the kind of tightly structured social network nuclear families represent.

Questions also remain about how future DLs might construct viable reading groups or allow patrons to construct their own. We don’t know whether participants in a system like *Alph* will feel inclined to freely share their responses to a text with a host of others they do not know, whether “fans” of a particular book will become intolerant of “newbies,” or whether something resembling communities might form around popular works and authors. Our experience with systems like the one Amazon uses to publish readers’ reviews suggests that both writers and readers of these postings make use of and appreciated the opportunities they afford but we do not yet know enough about how to configure useful and acceptable social systems, applications that will foster genuine communities of interest and practice.

Because the groups in our field test were very small, no IRG achieved the kind of density of traces that seems requisite to support truly sociable features over a longer period of time. Our field experience demonstrated that access issues can become a significant barrier to use. Having to change their reading habits—positioning reading for pleasure in front of a computer instead of in more habitual locations—also seemed to be something of an impediment as did the various competing activities busy families must juggle, especially in the month before the Christmas.

Despite the hurdles and distractions our users experienced, however, our field test suggests that participants did enjoy the opportunity to explore a sociable digital library book. The activities of readers were evident in the data collected and were visible in the representations of the book each IRG could see. Participants reported going to the prototype to look for the traces of others’ presence and they expressed pleasure at finding the notes others had left and at having the ability to leave notes they believed others would find and savor.

A more fundamental conceptual issue may be found in an inherent tension between reading a story and reading the signs of community presence. When most people pick up a book they have been reading for over a period of time and when they are

engaging that book as a leisure activity, most people probably do not flip through portions of the novel they have already finished. The sociable practices *Alph* is designed to support, however, require participants to create a new model of the activity they are engaged in, one that finds the already-traversed sections of the book interesting enough to re-visit. The absence of marks and notes in a newly published book might discourage its first readers from “seeding” the community, while readers who come later are likely to have a richer experience and to understand themselves to be in the company of other readers. This sense of the book as a practiced place, then, is likely to depend on its ability to attract enough signs of a community’s presence to make looking for notes an exciting and rewarding experience.

Our first use of *Alph* with a group of participants suggests that tools like this one can shed some light on reading as a social practice and that if such functions were widely available, the practices that make up reading for pleasure might well change. At least for ‘tweens and teens, sharing the experience of reading with parents, siblings and friends holds some appeal. Children in this age range are deeply social beings. Providing a way to socialize around a work of the imagination, as opposed to the myriad ways children can socialize online without any reference to a shared text, may help support a valued cultural practice now under some threat [23]. Even if no Cassandra were insistently warning about the demise of reading, we should not ignore the potential of digital texts to enhance and amplify the pleasure of reading.

Beyond its application to DLs for young adults, moreover, tools like *Alph* may make interesting contributions to the functions public libraries have traditionally served. Digital spaces are known to attenuate participants’ awareness of the social context of their activities [10]. Within the digital space there are no natural indications that others have either visited a place or are currently present within it. Insofar as literacy practices depend on various forms of social context for their full power and attractiveness, our work suggests that many DLs can benefit from and may well need to explore many ways to make the social manifest within their spaces. Books that permit personal and social annotations for communities of readers may well prove valuable for some library patrons and for some literacy purposes.

7. CONCLUSION

A space is turned into a place when it is imbued with meaning through social interactions. If we take a large vibrant city, we can see how the environment and social interactions played together to form the place we know today as the city. First came the good location around a river allowing boats to cross and meetings to take place, then a bridge is built, which in turns leads to the evolution of a more permanent market place which attracts more people and more social interactions until a vibrant multi-faceted city emerges. A city is an example of a practiced place, a space defined both by its structure and by the interactions that occur within it.

Similar notions can be applied to a book. A newly published book fresh in the library collection is like an open space, a new environment waiting for its first discoverers. As the first readers are attracted to the book and become engrossed in it, their annotations will start to lay the foundations for the complex

social interactions that will occur within the context of the book as newly arrived readers will become engrossed not only with the story of the book but also with the annotations that have been imbedded into it. The book and the activities of its readers together create a community of interest and a company of readers. The success or failure of the community will be a reflection of the social interactions within it and the fertility of the environment in which it is based. A failure in either one will lead to the decline of the community in much the same way as an environmental catastrophe or social factors will lead to the decline of an urban environment.

The emergence of digital technology over the past few decades has led to the evolution of new forms of literacy and new forms of interaction as more and more people use e-mail and Instant Messaging, participate in online communities and games, visit digital libraries, and publish their thoughts and ruminations in a bevy of blogs. In this sense digital media have truly become the extension of man [22]. Children have been especially quick to adapt to the new knowledge order in part due to the natural curiosity of the young mind and also to the freedom the new forms of communication offer them. Children often lack the means to contribute to larger cultural conversations beyond the circle of their friends and the members of their own families. Providing them with opportunities to share their experiences with the cultural tradition they have inherited may help traditional and valued forms of literacy remain engaging to them.

Although the ubiquity of the printed book still overshadows the growing availability of digital technologies, there is growing concern that as digital environments become more and more attractive to the young hearts and minds of children, traditional reading practices will be increasingly affiliated only with the domain of (school) work. If we wish to preserve the values we perceive in the notions of reading for pleasure, and if we consider these practices important precursors to the most advanced literacy skills necessary for future knowledge work, we need to explore more fully how to devise DLs so that they become more than simply access points to information. Our support for collaboration should not be confined to the realm of work. Our online environments need to attune themselves just as fully to the opportunities social life presents.

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