

Not Just Content: Supporting Community-Building
and Collaboration in Digital Libraries

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The field of digital libraries has been considered to be divided into two camps, based on two differing concepts of what a “digital library” actually is. One definition followed by many researchers in the field considers digital libraries as “[digital] content collected on behalf of user communities,” while another followed by many practitioners considers digital libraries as “institutions or services” (Borgman, 1999, p. 227). Bearman (2007), in the context of a review of the research and practice of the digital library field, argued that *both* content *and* services were required. He maintained that digital libraries are “not mere technical constructs” (p. 251), not simply information retrieval systems or databases; instead, they are inherently social organizations and environments. This consideration was not new; Levy and Marshall had argued that digital libraries should be considered social as early as 1995 (Levy & Marshall, 1995). Based on the arguments of Bearman, Levy, Marshall, and others, digital libraries should be considered as (a) collections of digital content—information¹ in a non-physical, non-cognitive form—collected on behalf of a user community, (b) services relating to the content that are offered by or through the digital library to the user community, and (c) formal or informal organizations that manage the content and services. This parallels the roles of physical libraries (Pomerantz & Marchionini, 2007), which are not just physical collections but also physical and conceptual spaces that “link people to ideas and to each other” (p. 506).

Based on this definition, it should be clear that one of the biggest objectives of digital libraries—and indeed physical libraries as well (see e.g. Pomerantz & Marchionini, 2007)—is to support and build the differing kinds of “knowledge communities” that use their content and services (Bearman, 2007, p. 245). “Communities of practice,” a similar term originally coined

by Lave and Wenger, refers to groups of “people working together on the same or similar tasks” (Brown & Duguid, 2002, p. 141). The boundaries of such a group are usually restricted to within a particular organization. Brown and Duguid also introduced the concept of networks of practice, applying to a larger, broader group that has a practice in common but does not work as closely together (usually not in the same organization) and may not even be aware of each other’s existence. These concepts can also be extended to consider communities and networks of interest (where a topical interest is shared but not necessarily a practice) and of learning (where it is a need or desire to learn about a topic that is shared). Such communities and networks may already exist, or they may be newly created by the digital library’s efforts; they may also be organized and developed entirely online (in a digital, electronic setting), entirely offline (in a physical, face-to-face setting), or a hybrid of both of these. The “knowledge community” of users that Bearman (2007, p. 245) argued should be supported by a digital library could and should be considered to be of any and all of these types of communities or networks.

Building such a community and growing its size and strength requires serving and satisfying users’ information needs, particularly social and group information needs. It especially requires providing support for collaboration—two or more individuals working together to solve an information problem, i.e. a situation where information and/or knowledge is required to complete a task of practice, interest, or learning—within and surrounding the digital library. However, many digital libraries are not designed or developed with such a social context in mind, and often have weaker service offerings than physical libraries, especially in serving users and user communities (Gazan, 2008; Pomerantz, 2008). This leads to a practical and research problem: existing digital libraries usually do not support well, through their content and services, the social context surrounding and within them, and should improve this support of

social interactions to integrate better with social groups and communities (Lynch, 2005). The purpose of this proposed exploratory research study is to provide a step towards this goal, focusing specifically on the aspects of community-building and collaboration and examining how well existing digital libraries support them, with the intention of identifying those methods that are most successful at supporting community-building and collaboration.

Significance of the Problem

Despite differences in opinion, as evidenced by the differing definitions of digital libraries discussed by Borgman (1999), the need for digital libraries to consider and support community-building and collaboration is clearly evident and supported by both researchers and practitioners in the library and information science field. As early as 1995 Levy and Marshall noted, based on the results of research studies, that it shouldn't be assumed that digital libraries are only used by sole individuals (Levy & Marshall, 1995). Even those researchers that have focused on the information retrieval and content collection aspects of digital libraries, even those that have considered "the richer social and institutional context ... outside the scope" of a digital library (Borgman, 1999, p. 231), still presume that the "content is collected on behalf of a user community" and acknowledge that there is no digital library without that community (p. 235). Lynch (2005) also agreed, arguing that digital libraries must be "connect[ed] and integrat[ed] ... with broader individual, group, and societal activities" and must support collaboration and social interaction in general (§ 21). Pomerantz and Marchionini (2007) further contended that both physical and digital libraries, since they have a similar set of stakeholders, must serve their users and user communities. Finally, Gazan (2008) noted that content in digital libraries, particularly scholarly materials, is naturally a part of "an ongoing conversation among a community," and that digital libraries should not ignore that conversation (Introduction section, ¶ 2).

Unlike many physical libraries, however, digital libraries as a rule have not focused on strongly supporting collaboration and sharing of information (Gazan, 2008) and community-building (Bearman, 2007; Pomerantz, 2008), thus effectively ignoring that conversation. Pomerantz in particular noted that services to the user community “have traditionally not been as strong” in digital libraries compared to physical library environments (p. 10). Services to user communities are (as stated earlier) part of the concept of digital library that many practitioners operate under (Borgman, 1999), so it is worrisome that these services appear to have been neglected in practice by many digital libraries. It may be that research-oriented definitions—which in the past did not often identify or determine “the scope of a user community” (p. 236)—have had more influence; still, a digital library cannot provide services successfully if the scope of who they should be provided to is not identified. That situation has improved some since 1999, as will be seen shortly. However, the body of research that specifically considers community-building and collaboration in digital libraries is still not especially strong or consistent, despite calls from Levy and Marshall (1995), Lynch (2005), and others to pursue research in this area.

Benefits

As a result of the significance of this problem, the study proposed herein examining community-building and collaboration within and surrounding digital libraries would contribute greatly to the aforementioned body of research and to the library and information science field, and should also have great benefit for digital library developers and user communities alike, especially longitudinally. For users, these benefits include (a) better services provided by digital library staff due to a deeper understanding of user, group, and community needs on their part; (b) a greater ability to collaborate with other users and discuss the digital library’s topics,

collections, and content; and (c) an improved potential to network with other users who share their topic(s) of interest, occupation / practice, or desire to learn about a given area. Digital library developers, librarians, staff, and researchers, as well as the library and information science field as a whole, will also reap a number of benefits. These include a better understanding of (a) the social communities and networks of users that they intend to have a digital library serve; (b) users' information behavior as it relates to digital libraries, particularly with regard to group / collaborative information behavior; and (c) how users, communities, and networks use (or do not use) digital library collections and services, particularly those services intended to support community-building and collaboration. While this study does not pretend to be able to bring about such changes immediately upon its completion, working to identify which methods are the most successful at supporting community-building and collaboration should allow these benefits to be reaped sooner, rather than later.

Research Questions

This proposed exploratory study will attempt to answer the following three closely related research questions:

1. How successfully do existing digital libraries support community-building by those users, communities, and networks that use their content and services?
2. How successfully do existing digital libraries support collaboration by their users?
3. Which methods are particularly successful in existing digital libraries for supporting community-building and collaboration?

Literature Review

Examining the research literature that has studied the support of community-building and collaboration by digital libraries, it becomes clear that a number of proposals and attempts have

previously been made to offer such support, using many different methods. In particular, a number of researchers and research groups have focused on developing models, theories, or frameworks for socially-aware digital library development, but not all of these researchers actually developed a functioning digital library based on the model, theory, or framework. Of those that did develop actual digital libraries, some only progressed as far as prototypes, while others have actually been partially or fully implemented. Overall, it is rather unclear from the literature which methods have been successful for supporting community-building and collaboration in digital libraries; indeed, results have been mixed and only a few projects could be called rousing successes. The literature can thus be categorized into three groups: first, those studies, projects, models, and theories that could and should be considered failures in supporting community-building and collaboration; second, those that could and should be considered successes in providing support or in showing promise; and third, those that require further study and research in order to determine how successful they might be.

Failures

Of a number of different models for collaborative, community-based digital libraries that have been proposed by researchers, three have shown great promise at first but have not been greatly successful in retrospect. While the ideas and arguments behind these models are certainly convincing, they have unfortunately not been as successful in practice; between them they have resulted in only one still-functioning digital library, one that has since dropped most of the community and collaboration-based features it was intended to have. First, a brief background of the goals and methods of each project is presented, and then the failings of all three are discussed together.

CKESS. Perhaps the most ambitious of these three models was the “Collaborative Knowledge Evolution Support System (CKESS)” proposed by Bieber and his colleagues (Bieber et al., 2002, p. 13); its goal was to allow “a [virtual] community of users ... to share and evolve their knowledge,” particularly via collaboration (p. 13). The researchers used a scenario-based design methodology, choosing to include in the infrastructure model (a) synchronous and asynchronous communication methods, (b) concept and process mapping tools, (c) hypertext / hypermedia capability, and (d) decision analysis support. In particular, support for task-based workflows and work processes was a particular emphasis of the CKESS model; the description of the use of these tools in the scenarios is, in retrospect, rather wiki-like (especially in scenario 2, pp. 17-18). Bieber and his colleagues only briefly discussed evaluation criteria for their model and proposed digital library infrastructure, but suggested rating success based on twelve propositions (p. 29), conducting usability testing, and using mixed methods including semi-structured interviews and surveys.

CYCLADES. Another digital library project being developed around the same time as CKESS was the CYCLADES digital library environment, envisioned “as a personalized collaborative working and meeting space of people sharing common interests” (Candela & Straccia, 2003, p. 156); in other words, as supportive of collaboration within a community of interest, a goal similar to but slightly narrower than that of CKESS. The model underlying the CYCLADES project was “the folder paradigm” (p. 158; a formal description of the model is provided by Renda & Straccia, 2005). Users were allowed to create their own folders of digital library content, either as private or as shared with the community. That content was often drawn from outside the system itself, from OAI-compliant archives; content could also be rated,

commented on, and discussed in a forum (Candela & Straccia, 2003), and user and content recommendations were also provided (Renda & Straccia, 2005).

Sharium. A little earlier than the CKESS and CYCLADES projects, Marchionini (1999) proposed a model of a digital library as a “sharium,” an environment “combin[ing] elements of learning communities, scientific collaboratories, and special libraries to facilitate communication and distribute the load of solving information problems” (p. 1). Much like CKESS and CYCLADES, collaboration and sharing were large parts of the sharium model. Proposed advantages included the ability for (a) experts to share their knowledge and time in digital reference, question-answering, and recommendation services; (b) easy contribution and sharing of (digital) content by library patrons and the user community; and (c) better support of learning, particularly collaborative and self-directed learning, by students, patrons, and users.

The sharium model was applied to the design and development of two different digital library projects. The first (Sonnenwald et al., 1999) was the American Front Porch (AFP) project at the University of North Carolina at Chapel Hill (UNC-CH). Its design was ambitious and focused on collaboration services, including (a) digital reference using audio and video; (b) screen sharing for information seeking with the aid of a librarian; (c) group creation of information (with strong resemblances to a wiki); and (d) synchronous and asynchronous interaction amongst users, library staff, subject experts, and project teams. The second project was the Open Video Digital Library (OVDL, now called the Open Video Project, open-video.org), a digital video library intended for education and research uses. The sharium model was one of two frameworks that informed the design and development of the OVDL.

Reasons for failure. CKESS, CYCLADES, and the “sharium” model can all be considered failures; this was at least partly due to their being overly ambitious and thus requiring

much time and effort from researchers and a high level of funding from agencies. A high and perhaps unhealthy level of idealism also seemed prevalent in the minds of all three groups of researchers. The failure of these models implies that future digital library projects that endeavor to support community-building and collaboration should probably not be so ambitious and idealistic, instead applying just a couple previously-successful methods in order to raise their chances of success.

CKESS in particular was very ambitious, and especially specific regarding the smaller models (of e.g. decision analysis) to be used within it. It also restricted itself to professional societies (an “extended” type of a community of practice; Bieber et al., 2002, p. 14) and virtual communities of learning. The users of CKESS were also expected to be able to use a “high-level process modeling language” (p. 24) and be able to fully understand and modify semantic concept maps. These issues heavily restricted the CKESS model and infrastructure’s ability to be generalized, limiting its usefulness. As well, it is possible or even likely that other researchers and practitioners in the digital library field who were looking to support community-building and collaboration were not aware of the existence of Bieber et al.’s work on CKESS, due to its publication in a management information systems (MIS) journal rather than in more common sources of digital library literature (K. Burnett, personal communication, September 16, 2009). As such, the CKESS model could and should be considered a failure at supporting community-building and collaboration in a wide variety of digital libraries.

CYCLADES, on the other hand, was actually implemented as a beta or prototype version (as mentioned on its Web site; CYCLADES, n.d.). However, there is no longer an actual functioning system online; in particular the login page noted by Renda and Straccia (2005, p. 12) is no longer active. CYCLADES was not quite as ambitious, however, as CKESS or as the

sharium framework of Marchionini, so its lack of success was most likely tied to a lack of funding; it was funded through the end of August 2003 by the European Union (CYCLADES, n.d.), and any effort to secure funding after that date may not have been successful. However, CYCLADES and the methods it used were still more successful than the CKESS infrastructure; this does not mean it could or should be considered successful in supporting community-building and collaboration, however.

Unfortunately, neither of the digital library projects associated with Marchionini's sharium model could be considered successful either. Indeed, the American Front Porch (AFP) project has apparently been abandoned; it is deemed a past project by UNC-CH's Interaction Design Lab (2003) and its home page ("American Front Porch," n.d.) is very incomplete and is missing all of the collaboration services that were promised during its planning and that were inherent in the sharium model. Much like CKESS, the AFP project was likely a victim of its overly ambitious planning. As for the Open Video Digital Library (OVDL), it, at least, is still in existence (as the Open Video Project, open-video.org). However, while developing the OVDL Marchionini, Wildemuth, and Geisler (2006) attempted to learn from the failure of the AFP project and noted the concept of sharium, while an appealing idea, was constrained by "several practical issues," in particular how to handle a large number of user contributions of potential videos for the collection (p. 1641). As a result, videos were only accepted as part of already existing collections and only from universities and government agencies, precisely those who would have likely been able to contribute to the OVDL anyway if the sharium model hadn't been used as its underpinnings. As well, an examination of the Open Video Project today shows that support for collaboration is minimal and contributions are not currently being accepted, at least not by most potential contributors (Open Video Project, n.d.). Overly ambitious and idealistic

planning led to severe neutering of the social aspects of the OVDL, to the point that it too cannot be considered successful at supporting community-building and collaboration by its users.

Before moving on, however, it is important to note that there might be information systems (albeit probably not strictly digital libraries as defined herein) that have used some of the concepts inherent in the sharium model and have been successful. Pomerantz and Marchionini (2007) suggested open-source software communities and Wikipedia (wikipedia.org) as possible examples of web-based shariums; it is possible that other examples of wikis may also feature some of the elements of the sharium model. As well, information commons were described by Pomerantz and Marchionini as bringing some of the elements of the sharium model to physical libraries, combining technology (computers), information (library collections), and people (librarians, staff, and users). However, the model of shariums as extensions or additions to digital libraries has not come to much fruition, at least not yet.

Relative Successes

Two more digital library projects actually did come to at least a level of fruition; the COLLATE and DeLiver systems. While neither of these could perhaps be called entirely successful (and COLLATE only made it as far as a prototype), they did provide some level of support via various methods for community-building and collaboration within a digital library, and as such are discussed here. The COLLATE prototype used social annotations, a technique also used by some Web sites; a successful site with many similarities to digital libraries is included in the discussion below. The DeLiver system used a promising methodological approach and framework termed situated context, which is also discussed below.

Social annotations: COLLATE and AnswerBag. The COLLATE system was intended for scholars in the humanities—specifically film studies—where “scientific discussions about the

material might grant more insight than the documents themselves” (Frommholz et al., 2003, p. 434). It was based on the OAIS reference model, rather than the OAI model used by CYCLADES, because the OAIS model “explicitly addresses organizational needs” (p. 435). COLLATE was designed, based on the needs of film studies scholars, to allow collaboration to take place in the context of metadata generation through the use of annotations, keywords, and collaborative cataloging of digital content. These annotations and keywords were then used, in addition to metadata, by the retrieval system in determining relevance.

A prototype of COLLATE was developed, and was “used at ... three film archive’s [sic] sites”; as such the system could already be considered more successful than CYCLADES, CKESS, or the AFP project. However, there was little discussion by Frommholz and his colleagues, in this and further literature, of how successful the COLLATE system and these archives sites were in practice. This was despite a promise that they would conduct user studies to “collect feedback from the users in order to evaluate the acceptance of [their] approaches” (Frommholz et al., 2003, p. 444). Instead, their later research focused mostly on non-social aspects of annotations (see e.g. Agosti, Ferro, Frommholz, & Thield, 2004), apparently leaving the COLLATE system behind. This lack of further study, combined with the system and study being restricted to film studies scholars, limits the ability to generalize the COLLATE system to other disciplines, settings, and digital libraries. However, as an actual system that was put into practice (albeit in prototype form), presumably with its social annotation and collaboration features intact, it could and probably should be considered more successful than the CKESS, CYCLADES, AFP, and OVDL projects.

A more recent study by Gazan (2008) looked, rather than at a digital library per se, at AnswerBag (answerbag.com), a Web 2.0 social question and answer site that has faced (per

Gazan) much the same set of community-building and collaboration challenges that digital libraries face. His study consisted of a longitudinal observation of AnswerBag, examining the use of comments and ratings as social annotations on individual questions and answers. Through analysis of this observation, Gazan identified eight major decision points he felt were important to social annotations in digital libraries: “display; ease of annotation; anonymity; control of [digital] content; harvesting annotation content; ease of retrieval; traffic and network effects; [and] notification and sharing” (Analysis and discussion section, ¶ 2).

Unlike COLLATE, AnswerBag has been highly successful, with over a million users (AnswerBag, 2009). While AnswerBag is not strictly a digital library, this does indicate how important it is any information system or service using social annotations has enough traffic and a large enough user community / network base to ensure the annotations are indeed social. AnswerBag’s success also lends credence and generalizability—including with regard to digital libraries—to the other seven decision points Gazan identified; further research would clearly be necessary, however, to be sure there is nothing particular about the AnswerBag community and setting that would limit applicability of these decision points in studies of digital libraries. It is clear, though, that successful use of social annotations is possible, and as such this method bears a lot of promise for community-building and collaboration in digital library environments.

Situated context: DeLIver. Community-building and collaboration are, by their very nature, situated in some context; information behavior in a digital library rarely lacks such context, and taking it into account usually provides for “a more holistic picture of ‘user meets infrastructure’” (Bishop, Neumann, Star, Merkel, Ignacio, and Sandusky, 2000, p. 402). Of course, different types, communities, and groups of users will find the ‘infrastructure’ more helpful for their information needs than others. Still, the framework of situated context attempts

to examine how users use a digital library in the context of not just individual information needs, but also the interactions that take place between them and others in the user community (Bishop et al., 2000).

The DeLiver system, intended for physicists, engineers, and computer scientists at the University of Illinois, was studied using the situated context framework by Bishop and her colleagues (Bishop et al., 2000). It is notable that the researchers gathered a particularly large amount of data for a digital library user study, using both qualitative and quantitative methods to examine use of the DeLiver system. Most of these methods, unfortunately, considered users more individually than in groups, but the use of focus groups and “situated usability” tests that measured usability in “the context of use (how and why people used [the] system)” (p. 402) make the study relevant to the study of social collaboration and user communities. The ability to generalize the study was a little limited by the academic setting and limited range of disciplines studied, but the size of the study’s various samples cannot be easily ignored. While the DeLiver system was not found to be particularly useful for established professors, graduate students were the heaviest users of the system. The professors already had other methods of accessing the content the digital library provided (mostly e-journal articles) and were already established in other scholarly communities and communication environments; the graduate students were only just becoming part of a community and network of practice, and thus were served better by the DeLiver system.

The use of and results from the use of situated context to study the DeLiver system imply at least two possible conclusions for digital library design and development. First, digital libraries might need to consider the differences between smaller groups when it comes to supporting community-building and collaboration; simply because one is no longer focusing on

individual users does not mean there won't be *individual groups* using the digital content and services provided that have their own peculiarities, and have to be considered separately—like the professors and graduate students in the DeLIver study. Even individual differences may need to be considered, despite the need to focus on communities and networks. Second, digital libraries should take into account the context (and particularly the social context) of users' information behavior, using approaches like the situated context framework that Bishop and her colleagues used. Ignoring the interactions that take place in the process of solving information problems does not paint a complete picture of a user's information behavior, either individually or as part of a group, community, or network. The social, situated context is important, and must be studied to successfully build a digital library community and successfully support collaboration by users. As such, the situated context framework is a promising method to use while designing and developing a social digital library.

Further Study Required

Two other approaches and methods to community-building and collaboration in digital libraries cannot really be considered either “failures” or “successes” just yet, due to a lack of significant study of these approaches. The first is social constructionism theory, which has been used to develop a prototype digital library, ScholOnto, but requires more study before it can be considered successful as a theoretical foundation for social digital library development. The second, the use of wikis for social digital library development, has also received surprisingly little study. Both approaches and methods are discussed below.

Social constructionism. Social constructionism theory—placing “the primary emphasis on *discourse* [emphasis added] as the vehicle through which the self and the world are articulated” (Tuominen, Talja, & Savolainen, 2003, p. 564)—has potential for use in developing

digital libraries that support community-building and collaboration. While they did not perform an actual research study, Tuominen et al. did look at a digital library prototype that was based on social constructionist theory, called ScholOnto. As hinted at in the name, ScholOnto used the idea of ontologies to create “networks of contestable ideas” where digital content could have more than one perspective expressed about it within the collection; new perspectives were often based on previous contributions, providing for collaboration (p. 566). Unfortunately, the researchers did not discuss the relative success of the ScholOnto project, nor apparently did they (or anyone else involved in the ScholOnto project) conduct any user studies of its use; the project now appears moribund for reasons that are unclear (Knowledge Media Institute, 2004). ScholOnto is thus less successful as a project than DeLiver, the COLLATE project, and AnswerBag; however, it still developed a prototype that appears to have supported community-building and collaboration, and thus could still be considered more successful than CKESS, CYCLADES, the AFP project, or the OVDL.

More generally regarding social constructionism theory, Tuominen et al. (2003) argued that digital libraries should be considered “conversation visualization and conversation supporting systems” (p. 562); in other words, they should support communication, collaboration, and the visualization of these activities. They also admitted that further research and study of social constructionist digital libraries is needed to see how willing users are to collaborate and the level of collection quality (or lack thereof) that results. The ideas of Tuominen et al. could be seen as controversial to some, as they clearly felt and stated that the library and information science field should study conversations, rather than information as is traditionally considered (see e.g. Raber, 2003). Not all information, and not all of the digital content in a digital library, is actually part of a conversation; however it is fair to say that most of the objects in digital and

physical collections are or were part of some form of discussion, be it scholarly, colloquial, or somewhere in between. Web sites like FriendFeed (friendfeed.com), Twitter (twitter.com), and Facebook (facebook.com), as well as systems in development such as Google Wave (Google, 2009), are also focusing on the centrality of social conversations to users' information behavior. Despite the mixed success of ScholOnto, building and maintaining digital libraries that better support community-building and collaboration could, in many ways, be aided by the ideas and methods inherent in social constructionist theory, as well as the practical implications of conversation-based tools, information systems, and Web sites. Further research to ascertain whether such a theoretical basis works for designing and developing social digital libraries in practice is clearly needed, however.

Wikis. Wikis, such as used by Wikipedia (wikipedia.org), may seem a natural fit for providing at least some elements of community-building and collaboration to digital libraries. As noted earlier, both the CKESS model and infrastructure and the AFP project had elements of wikis in their design, but unfortunately both should be considered failures. As well, the idea of wikis having some of the features of Marchionini's sharium model was, as discussed earlier, suggested by Pomerantz and Marchionini (2007). However, a literature search reveals there have been remarkably few research studies or articles published that specifically apply wikis to the design and development of digital libraries, or mention their use in this context. Bearman's recent review of digital library literature (Bearman, 2007) echoed this, only mentioning wikis briefly in the context of an exploratory article published by Frumkin (2005). Frumkin mostly considered wikis as tools to support collaboration by library staff behind the scenes, rather than involving users in such collaboration as well. He did briefly note the potential of wikis for social annotations, particularly in the context of finding aids, but did not develop that idea any further.

PlanetMath. Krowne (2003), however, did not only consider the ideas behind wikis for building a digital library, but actually went ahead and used them in an approach he called “commons-based peer production (CBPP)” (Introduction section, ¶ 1). Krowne noted some of the challenges for such an approach were the problems of (a) integrating all contributions together; (b) integrating different individuals and subgroups into a useful community and network; (c) preserving continuity in a volunteer setting; (d) making updates available appropriately; and (e) minimizing the load for administrative staff. The methods used in Krowne’s PlanetMath digital library (planetmath.org), which had (and has) many of the elements of a wiki, to attempt to solve the challenges he noted are interesting. For continuity, an authority system was implemented for digital content and corrections; to solve a lack of administration, an anarchistic approach to community moderation was adopted; to provide better integration of content, the system automatically inserted links to related articles when they were referenced in the content; and to support quick updates, a cache system was implemented to speed up views of unchanged content (Krowne, 2003). Also, three community services were implemented as part of PlanetMath: (a) a requests service, listing content that users would like to see added or improved on by others in the community; (b) a discussion service, providing asynchronous forums attached to almost all content items; and (c) a notification service, making users aware of changes to content or of discussion of content and/or corrections. PlanetMath had over 2,500 entries as of June 2003 (Krowne, 2003), and so can be considered a successful, collaborative, community-driven digital library using a wiki model. The challenges noted by Krowne, and the solutions used in PlanetMath, could and should provide lessons for digital library projects to note if they plan to use a wiki model and/or method to support community-building and collaboration.

Problems and issues with wikis. Despite the success of PlanetMath, however, wikis are not without further problems and issues. Bejune (2007) more recently studied the use of wikis in libraries—mostly traditional physical libraries—and found that they were not often used for patron collaboration, either with library staff or with each other. As possible reasons why, Bejune noted the attitudes of patrons and librarians may not allow for libraries to be considered collaborative work environments; the librarians in particular may not want their perceived authority and responsibility being interfered with by patrons and users. Bejune also suggested that perhaps wikis simply did not mesh well with patron collaboration—particularly due to the particular relationships involved in the communities and networks libraries serve—or that wiki technology and ideas were too new for patrons to feel comfortable with them. While Bejune’s study looked at wikis attached to mostly physical libraries, rather than digital libraries, his study still has applicability for the latter. All of his points taken together argue and imply that digital libraries that want to support community-building and collaboration, especially via a wiki model or method, must be sure to educate users about the advantages of community and collaborative information problem solving and to use a socio-technical approach to designing the system to ensure the technology is appropriate to the social and individual context of the users, librarians, and the relationships between the two.

Summary

It should be clear from the previous discussion of the various methods, models, and theories above that no one particular approach or method has already been determined to be the best way to support community-building and collaboration in digital libraries. Integration of social annotations may be one possible way to provide that support; wikis might also prove useful, given further study of their advantages and disadvantages. Furthermore, the approaches

taken by situated context framework and social constructionism theory could also be useful from a methodological standpoint in developing a digital library that supports community-building and collaboration. While all of these methods could be successful, the lessons learned from the CKESS, CYCLADES, and AFP projects imply that digital libraries should perhaps not be too ambitious and try all of them, but instead stick to a couple of the best methods. However, because it is still somewhat unclear which of these approaches are likely to produce successful results, this proposed research study will examine existing digital libraries to see how well they support community-building and collaboration, identify those methods that are seen to work best in practice, and relate them back to the literature and the potential approaches identified within.

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Footnotes

¹ One should note that defining information itself is an ongoing discussion in information science (see e.g. Raber, 2003). This proposed study, under the umbrella of digital content, necessarily restricts itself to non-physical, non-cognitive information. This is not to say that digital libraries should not consider cognitive information or physical information as possible content, but these forms first have to be converted to a form that can be used as digital content (e.g. verbalize, write down, or type up cognitive information, or digitize physical information) before they can be used as content.