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CASE STUDY

Connecting distance learning communities to research via virtual collaboratories: a case study from library and information science

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This case study reports on patterns of participation in a virtual collaboratory organised around goals associated with the involvement of graduate students in research and writing projects. Traditionally, distance learning classrooms have been devoted to teaching content matter (in a virtual context) yet this case study reports on the use of synchronous learning contexts to support research and professionalisation on the part of graduate students in library and information science. Focus is placed on discussing virtual collaboratories as a form of learning design that modifies the use of existing (synchronous) distance learning classrooms.

Keywords: collaboratory; design; learning; synchronous; writing; distance learning; graduate education

Introduction

Much attention has been given to developing the cyber-infrastructure needed to comprehensively and effectively support the education of undergraduate and graduate students at a distance. The gradual maturation of such technologies has resulted in a growing number of academic programmes being delivered completely online. As goals for distance education and curriculum development/delivery are imagined and re-imagined (in light of changing evidence), attention must simultaneously turn to teaching students not only content matter (in a virtual context) but conferring upon them the practices of research and professionalisation. This article responds to this need by exploring the process that emerged as part of one case: the Distributed Research & Writing Group (DRW) associated with San Jose State University's (graduate) School of Library and Information Science (SLIS). This study represents one instance of how a distance learning classroom was transformed into a virtual collaboratory. Special focus here is placed on studying patterns and strategies for participation. Following this line of research, the knowledge produced by the project has the potential to inform any school or department concerned with more fully developing their distance learning programmes to include distributed collaboration and research.

What are virtual collaboratories?

In recent years, the United States has placed great emphasis on gearing up for distributed research in the natural, applied, and engineering sciences (Finholt,

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2003). The concept *collaboratory* emerged through William Wulf's combining of the two terms collaboration and laboratory (Wulf, 1989). He defined it as a:

> … center without walls, in which the nation's researchers can perform their research without regard to geographical location – interacting with colleagues, accessing instrumentation, sharing data and computational resource, and accessing information in digital libraries. (Wulf, 1989)

Since Wulf's early work in applied scientific contexts, educational researchers have designed their own collaboratories to 'extend cooperative learning' to the virtual spaces made possible by new information and communication technologies (Lunsford & Bruce, 2001). Such an approach is consistent with the goals of the project described here.

Why should distance learning administrators and educators encourage collaboratories?

Online educators and administrators depend strongly upon collaboration to achieve diverse forms of productivity. As face-to-face communication, unmediated by new information and communication technologies, becomes more compartmentalised and limited in scope, efforts must emerge that are dedicated to creating virtual contexts for research-oriented mentoring and collaboration between faculty, graduate students, and members of the intellectual community at large. Yet, questions remain about how educators can leverage existing cyber-infrastructure to strategically support new forms of collaboration and mentoring. Research in virtual collaboratories represents one framework devoted to answering these questions and moving fields connected to distance learning and distributed research forward.

How are collaboratories used in library and information science?

The field of library and information science (LIS) has only in the last five years begun to address the potential of collaboratories.

The notion of collaboratory is still new to the LIS field

Recent calls for the development of LIS-oriented collaboratories (Ponti, 2008; Sonnenwald, 2006) have emerged from European scholars in particular. For example, in the Ponti (2008, p. 265) work the author suggests that collaboratories 'have the potential to provide researchers and practitioners the opportunity to bring in their respective knowledge, expertise and connections, as well as expand participation of practitioners in research projects'. In fact, the study of collaboratories geared explicitly toward the inclusion of geographically distributed students and new professionals in collaborative efforts with faculty and established professionals represents a new avenue for research: '[A collaboratory] can make possible to bring together teaching, learning and research, that kind of combination that should be integral part of LIS academic curricula …' (Ponti, 2008, p. 270).

The specific process of transforming distance learning classrooms into virtual collaboratories, however, has yet to be explored in the literature. Moreover, patterns (both initial and ongoing) of participation in virtual collaboratories are not well

understood. This project responds directly to these gaps in knowledge by creating a context for training in virtual, distributed collaboration and research in LIS.

Collaboratory as learning design

The aspect of 'newness' associated with research in collaboratories (to support learning) motivated me to employ a design experiment approach to the organising structure and exploration of a virtual collaboratory. Initially introduced by Ann Brown (1992), design experiments involve the development, implementation, and evaluation of instructional activities while contextualising interventions within localised sets of practices and contingencies. Work by the Design-based Research Collective (2003) and Dede, Nelson, Ketelhut, Clarke, and Bowman (2004) has further articulated design-based research as those methods that attempt to 'gain insight into how, when, and why innovations work in practice' (Dede et al., 2004, p. 159). Wang and Hannafin further define several characteristics of design-based research:

- Often conducted within a single setting over a long time.
- Iterative cycles of design, enactment, analysis, and redesign.
- Contextually dependent interventions.
- Document and connect outcomes with development process and the authentic setting.
- Collaboration between practitioners and researchers.
- Lead to the development of knowledge that can be used in practice and can inform practitioners and other designers. (2005, p. 7)

Like Brown and other design-based researchers, the project attempts to understand an innovation (a virtual, LIS collaboratory), and whether it 'works' to support learning and research productivity in a distributed academic community.

As an experiment in learning design, it is hoped that participation in virtual collaboratories will foster new forms of (ongoing) interaction between faculty, students, new professionals, and community members at large. The iterative process of intervention-driven change inherent to the design experiment model has the potential to contribute to theory about learning and practical considerations about developing similar virtual collaborations.

Research questions

The DRW represented a project that looked to answer questions about learning theory and design of collaboratories by following patterns of activity by participants. In studying this first implementation, the following research questions were posed:

(1) What topics and activities will members of the LIS community initiate as part of their participation in a virtual collaboratory?
(2) Through what modalities and timescales (synchronous vs. asynchronous) will participants engage in a virtual collaboratory?
(3) Can virtual collaboratories contribute to research productivity and participation in research projects by faculty, alumni, and graduate/doctoral students? Of particular interest here are joint efforts.

In attempting to answer these questions, this research contributes to conversations in the fields of LIS, distance learning administration/education, learning design, and the study of virtual organisations.

Research strategy

By taking a design experiment approach, the DRW allowed for consideration of the process of transforming existing distance learning classrooms into virtual collaboratories. Bound up in these efforts was the goal of creating sustainable contexts supportive of research and professional development for LIS community members. Collaborations of interest included joint projects between full-time faculty, part-time faculty, graduate students, alumni, and scholars affiliated with other universities and organisations. The core objects of analysis are a greater understanding of participation over time, and the various modalities and strategies of technology-mediated participation.

Lunsford (2001) identify six attributes they suggest are characteristic of collective, virtual workspaces designed to support collaborative learning. They include shared inquiry (a common set of problems or issues), intentionality (a shared consciousness of the collaboratory as a shared project), active participation and contribution, access to shared resources, technologies, and boundary crossings (moments where gaps in geography, time, institutions, and disciplines may be bridged) (Lunsford, 2001, p. 295). Along these lines, the design of an LIS virtual collaboratory was structured to include similar attributes to those described by Lunsford and Bruce.

Setting

Founded as a project in the spring of 2010 (by the author), the DRW met for one hour per week for 16 weeks using web-based, synchronous courseware (Elluminate). The project involved 58 participants, self-identified through membership in the DRW website. Participants were drawn from the San Jose State University SLIS extended community, including faculty ($n = 2$), alumni ($n = 1$), graduate students ($n = 53$) and doctoral students ($n = 2$). Communicated goals included creating a context where community members might discuss research and writing projects. Announcements of meetings were made via a community, shared listserv. Recordings of all meetings in Elluminate were made publicly available.

Data collection

The LISSTEN DRW was created as an experiment in learning design – seeking to create a virtual collaboratory for the SLIS community. Data collected included video-screen capture of synchronous meetings in Elluminate, statistics of viewings of recorded sessions, meeting minutes, group communication, and examples of research and writing (see Table 1).

Analysis

A content analysis approach was taken in the initial collection and analyses of data (in the form of meeting minutes) to more fully understand the patterns of participation in the group. The research design allowed for triangulation between

Table 1. Sources of data from the DRW.

Data source	Description of source
Elluminate screen Capture and statistics	Elluminate courseware was used to host and record synchronous meetings. Dataset includes screen capture data and participation statistics (e.g. live attendance vs. viewing of recorded sessions)
Meeting minutes	Prepared by a research assistant after each session
Documents	Products of research and shared supplementary materials
Group communication	Email correspondence originating from the project's Google Groups web presence

data collected from observations (derived from video and meeting minutes), statements participants made about themselves (via email and discussion posts), and works created by group members as part of their participation in various research projects and the group's website. Initial concerns that some discussions and activities might be missing from the minutes motivated a cross-referencing with the screen-captured recording. When the recordings were revisited, it was found that the minutes very closely matched the progress of discussion. Overall, the depth of coverage was found to be consistent, touching on all relevant topics for the weeks of the project. The resulting analyses support arguments addressing patterns of engagement in virtual collaboratories and the contingencies shaping and constraining modalities and timescales of participation.

First implementation findings

Coding of meeting minutes revealed that, over the 16 weeks that the group met, there were roughly 56 participant-driven topics and activities that enjoyed group discussion in synchronous Elluminate sessions. It was determined that the landscape of discussion could be categorised into two main themes: scholarly production and academic advising.

Activities of scholarly production (see Appendix 1, Table A1) enjoyed 38 discussions. Not surprisingly, in keeping with the description and mission of the group, discussions were twice as likely to address scholarly research and writing. When analysed with greater depth, several subcategories began to emerge (rounded values): current or potential opportunities for collaboration (34%), defining/sharing scholarly literature (24%), strategies for conference presentation (18%), strategies for journal publication (16%), research opportunities (3%), research methods (3%), and grant writing (3%). The categories for scholarly production were fairly easy to distinguish from topics relating to academic advising in that they focused on projects related to scholarship/research outside what was needed to complete a master's or doctoral degree in one of SLIS's programmes.

Conversations relating to academic advising (see Appendix 1, Table A2) were also highly relevant, receiving extended discussion in 18 topics. These results were somewhat surprising in that the group was touted as being more focused on research than on coursework. Perhaps the networking aspect of the group, when combined with easy access to a faculty member, created a positive context for advising. Topics related to advising included (rounded values): thesis ideas (44%), e-portfolio development (22%), editing papers for coursework (17%), class recommendations (11%), and general discussions about coursework (6%).

Modalities and timescales of participation

Although the group comprised 58 members (as indicated by individuals registered with the group's website), participation was spread not only between those that joined the collaboratory as an online member of the group but also those that either attended live sessions in Elluminate or viewed recordings. See Figure 1 for full participation rates. There were 115 total synchronous (or live) participants in the group's 16 weeks of meetings in Elluminate. It should be noted, however, that there were several meetings when only two or three live participants were in attendance. Several meetings involved eight or nine participants. The value of 115 represents the total number of live participants over the 16 weeks.

Asynchronous participation was significant. Fifty-one participants viewed recordings of group meetings. It is important to note that several members never viewed recordings or joined the group for live sessions, participating exclusively via the group's Google Groups website. Exact numbers on this are difficult to derive because individuals did not always sign-in to the live meetings or recordings with their full names or official accounts (often preferring guest logins). Cross-referencing these data to get an exact count of members participating solely via the website was (unfortunately) impossible. It should be mentioned, however, that the Google Groups page enjoyed its own sharing of documents and discussion of research and writing – yet another dimension of interaction that a virtual collaboratory can cultivate.

New collaborations

Although the representation of faculty and alumni was limited, the DRW was productive in that one collaborative research project emerged as a result of the study. Three students, one alumna and the faculty member collaborated on a (peer-reviewed) virtual conference presentation. Sharing of information/data, creation of the narrated PowerPoint, and presentation at the (virtual) conference was accomplished completely at a distance.
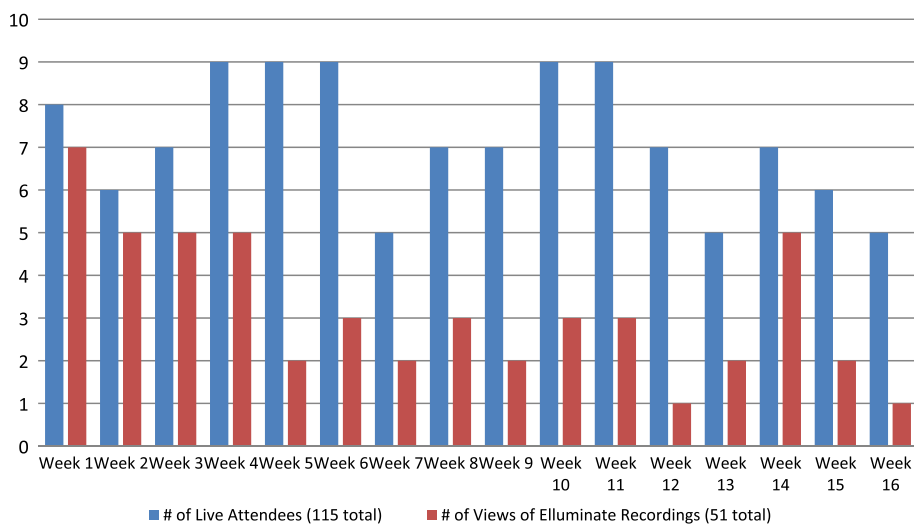

Figure 1.   Synchronous and asynchronous participation in the DRW.

Design outcomes

This study implemented a virtual collaboratory design model to connect geographically distributed graduate students, alumni, and faculty to research and writing. Questions were answered regarding patterns of participation in a virtual collaboratory, including the topics of discussion that interested members of the group, as well as when (and how) they interacted. Several things were learned from the first implementation:

- *Once the collaboratory became established, modalities and patterns of participation were diverse and changeable*. Participation in the group was diverse, in that there was significant interest in participating both live as well as asynchronously via recordings of sessions. The website drew many members that were not interested or able to follow the Elluminate sessions. It is uncertain why this is the case. One might speculate that the collaboratory was successful in that it created a community where individuals felt connected in many ways to each other and to the activities of the group.
- *In addition to research and writing scholarship, advising issues emerged as a popular topic of conversation by the group*. This is not really surprising considering that most of the participants were students. It might be worthwhile to consider that the role of a collaboratory for graduate education should integrate academic goal-achievement with other intellectual goals as an important way of connecting students to research and community-members to each other.
- *Participants were engaged in more active participation (with more substantial contributions made) when a particular project was organising activity*. Informal, participant-driven discussion was fruitful but did not seem compelling enough to contribute to sustained participation. In short, ties were loose when activity was not purposeful.

Changes to next iteration

Based on the findings above, the next iteration of the group began during the spring of 2012. Although the analysis of this iteration is beyond the scope of discussion here, it is important to mention several alterations that have been made to the structure of activity in the current cycle.

- *The group was re-initiated in a way that was resource and project-centred*. In this implementation, participants worked to identify several projects to drive activity in weekly meetings. Integral to this was the introduction of a web-based dataset for possible collaborative analysis. Several participants (two alumni in Canada and three students in the United States) are working with these as part of the process of preparing a manuscript for publication.
- *The group nominated a liaison that worked with/between the group and the parent alumni/student organisation, SLISConnect (formerly LISSTEN)*. Group activities are now reported to the community at large in more formal ways through this development – this seems to have raised the profile of the group among alumni as well as students.
- *Many design components were preserved*. Weekly meetings continued via Blackboard Collaborate software (after a departmental changeover from Elluminate). As before, time is set aside for informal discussion in all meet-

ings. Synchronous participation via recordings of meetings and interaction via Google Sites and Google Groups was also preserved. It is hoped that that these improvements will contribute to the cultivation of those characteristics of successful collaboratories (Lunsford, 2001).

Conclusion

Wulf's idea of a collaboratory captures the ideas of sharing knowledge objects and collaborative inquiry in a virtual space. Although his original notion emphasises aspects that are more prominent in the natural and applied sciences (e.g. instrumentation and sharing of computational resources), the elements of distributed inquiry and the sharing of intellectual resources at a distance are common to LIS and other fields. The experience of this group demonstrates how distance classrooms might be re-imagined or 'bent' for purposes other than delivering instruction. Collaboratories have the potential to respond to critical needs in the research mentoring of distance graduate students – particularly those residing in rural or remote locales. Distance education programmes serving (or hoping to attract) international students might also benefit from establishing a virtual collaboratory or distributed research centre as part of their efforts to reach these goals.

Acknowledgements

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Appendix 1

Table A1. Activities and discussion relating to scholarly production (Weeks 1–16; $n = 38$).

Week	Collaboration opportunities	Research opportunities	Scholarly literature	Journal publication	Conference presentation	Research methods	Grant writing	Totals
1	1	1						2
2	5							5
3			1					1
4	1		1					2
5	2		1					3
6	1							1
7				1				1
8			1		1			2
9			1		1			2
10				1	1			2
11			1		1	1		3
12	2		1		1			4
13	1		2	2				5
14					1			1
15				1	1			2
16				1			1	2
	13 (34.2%)	1 (2.6%)	9 (23.7%)	6 (15.8%)	7 (18.4%)	1 (2.6%)	1 (2.6%)	38 (100%)

Table A2.   Activities and discussion relating to academic advising (Weeks 1–16; *n* = 18).

Week	e-Portfolio	Thesis ideas	Editing papers	Class recommendations	Course work	Totals (all weeks)
1	1	1	1			3
2						
3	1	1	1			3
4		1				1
5		3				3
6	1			1		2
7						
8		1				1
9		1		1		2
10	1					1
11					1	1
12						
13						
14			1			1
15						
16						
	4 (22.2%)	8 (44.4%)	3 (16.7%)	2 (11.1%)	1 (5.6%)	18 (100%)