Proceedings of the 2011 Great Lakes Connections Conference: Discourse & Illumination

May 20-21, 2011

School of Information Studies

University of Wisconsin-Milwaukee

Edited by Edward Benoit, III

Introduction

The 2011 Great Lakes Connections Conference was a conference for all Library and Information Science (LIS) doctoral students and candidates. It was a student-focused conference that was intended to provide an opportunity for LIS doctoral students to share and exchange ideas and research. The conference was open to all LIS doctoral students, and included both works in progress and full papers. The accepted papers and works in progress were selected through a double-blind review process. Special thanks go to the Programming Committee—Edward Benoit, III, Wyatt Ditzler, and Marta Magnuson; the submission reviewers, and the School of Information Studies at the University of Wisconsin-Milwaukee for their support.

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Net Neutrality Rules as Barrier to Access for the LGBTQ Community

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Abstract

In December 2010, the FCC completed an almost 4 yearlong rulemaking process related to so-called "Internet Neutrality." During this process, more than 32,000 comments and related documents were filed with the FCC, arguing for or against net neutrality regulation.

The debate over net neutrality is largely understood to be one of access providers vs. content providers. Those companies providing homes with access to the Internet want to be able to choose how to manage their networks, including the freedom to block access to sites or application providers whom they consider to be providing material that should be blocked. The most frequently used example of a type of ware to use is file sharing software. However, there are good reasons to believe that access providers will not limit themselves to software that appears to being used for illegal purposes. For example, in 2007, Verizon (now part of AT&T) blocked pro-choice text messages sent by the advocacy group NARAL Pro-Choice America. Although Verizon quickly reversed that decision, it and other ISPs maintain that they have the right to manage any and all content that travels through their networks.

At the same time, we know that access to LGBTQ information in public fora is controversial. Between 2000 – 2009, an average of three of the ten most frequently challenged library books in the US have been books with LGBTQ themes or information. There is no reason to believe there will be less pressure to limit or de-prioritize access to such information online.

I plan to examine the following question: Did the FCC consider the information needs of the LGBTQ community in the new "Internet Neutrality" regulations?

Initially, I searched the FCC net neutrality filings for the terms "gay," and "LGBT." These terms appeared a total of 60 times, suggesting at least some discussion of these issues. I plan to conduct close readings of the filings in which these terms appear, as well as the rule and Commissioner statements, in order to analyze the extent to which the information needs of the LGBTQ community were raised in the rulemaking process and final rule.

I anticipate finding that LGBTQ issues were raised as part of larger digital divide discussions, and that the documents are joint filings submitted by groups of civil rights advocacy organizations. I also anticipate finding no explicit mention of these groups in the rule or commissioner statements.

If that is the case, it means that LGBTQ-oriented content – including high-bandwidth content like videos from the It Gets Better project, designed to help prevent LGBTQ teen suicide – will be vulnerable to access limitations imposed by both broadband and wireless Internet access providers. I anticipate recommending changes to the FCC rules that will help ensure that LGBTQ content, and by implication, other politically controversial content, is not subject to this kind of corporate censorship.

Do Tags Really Provide More Semantic Concepts than LCSH Does?

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Abstract

The purpose of this study is to investigate the patterns that appear in LCSH and tags in fiction genres. After identifying the patterns, this study examines whether tags truly provide more subjects or not through semantic equivalence controlling. In library practice, subject access to fiction by such authority controlled vocabularies and/or other cataloging standard tools is more restrictive than subject access by social tagging. On the other hand, social tagging is created by larger number of different users. Taggers are more likely to create tags after reading books. There is no guideline or manual to create tags.

Many studies about social tagging have been identifying the characteristics of social tagging. The significant advantages of social tagging are; 1) to be user-friendly terms, 2) to provide larger number of terms, 3) to show latent subjects, and 4) to include non-subject related terms like personal information. As the attention about social tagging is greater, recently researchers concerned with whether social tagging can be combined with the library system. In terms of incorporating social tagging into the library system, social tagging has been criticized for its quality issues. Social tagging tends to be ambiguous, uncontrolled, and inconsistent. These natures of social tagging impede the implementation of social tagging in the library system.

Nevertheless of social tagging's quality issues, some libraries have already started to expand tagging services. In order to explore more plausible possibility of the implementation, recent studies focus on the comparison or linkage between controlled vocabularies and social tagging (Lu, Park, & Hu, 2010; Yi & Chan, 2009; Smith, 2007; Rolla, 2009; Heyman & Garcia-Molina, 2009). Most of these studies focus on tags created for academic resources or image resources rather than fiction. The problematic phenomenon in library system is that fiction has less subject access points than non-fiction like academic resources. Given that social tagging provides more subject access points than libraries do, the library environment may take advantage of social tagging to enhance the subject access to fiction. Therefore, the study about comparison between social tagging and controlled vocabularies for fiction is required.

The data collection was done during April 2011. The study selected 120 fiction recommended by RUSA (Reference & User Services Association) from 2008-2011. The RUSA suggests 8 fiction genres: Adrenaline, Fantasy, Historical fiction, Horror, Mystery, Romance, Science fiction, and Women's fiction. 15 fiction books were selected from each genre. By using books' ISBNs, LCSH was collected from Los Angeles Public Library (LAPL). Given that the collection of Library of Congress (LC) is likely to have non-fiction rather than fiction, the study decided to collect the LCSH from a public library. LAPA provides MARC records. MARC records enabled the study to distinguish whether subject headings are from LC or locally devised topical subjects. LCSH of 6XX level was collected. The ISBNs of the selected fiction was also used to collect tags from LibraryThing website. LibraryThing website shows 30 popular tags in a main webpage of each book. The collected tags come from these popular tags rather than all tags assigned by users. In total, the 120 fiction books have 3,600 tags by users and 600 Library of Congress subject terms.

This study consists of two parts: 1) explores the patterns of terms that appear in fiction from a social tagging website and LCSH, and 2) examine impact of semantic equivalent control to the number of overlapped terms between tags and LCSH. If individual tags are considered as access points, the patterns of tags will mean facets of information as metadata elements. Therefore, the study tries to contribute to suggest user-friendly metadata elements for fiction by identifying the patterns of tagging. Furthermore, the study investigates to what extent social tagging is overlapped with LCSH in fiction. While social tagging gets praised for a greater number of subject access points, it also incurs blame for being uncontrolled and inconsistent. It illustrates that there are many terms syntactically and semantically equivalent. Therefore, this study statistically shows whether there is significant difference in overlapped terms between before and after controlling terms by semantic equivalence.

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A Comparison Study of Clustering or Classification Methods for Search Results Visualization in Web Search Context

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Abstract

The amount of information on the Web is steadily growing since its beginning. The number of online information retrieval systems has increased in parallel to this amount of information. These have been designed to help the information seeking process and to perform the user final tasks from his perspective (Wilson, 1999). As a result, web search engines are massively used to allow the accomplishment of a large range of environment-dependant and goal-ended tasks (Broder, 2002; Rose & Levinson, 2004; Toms, Freund, Kopak, & Bartlett, 2003). While information retrieval techniques (indexing, organization and ranking) and interactive features have been improved since the last twenty years (Baeza-Yates & Ribeiro-Neto, 1999; Manning, Raghavan, & Schütze, 2008; Shneiderman & Plaisant, 2005), the on-line information retrieval systems still remain hard to use (Borgman, 1996; Markey, 2007a, 2007b) and don't fit the cognitive and affective processes of the information searching tasks efficiently (Ingwersen, 1996; Ingwersen & Järvelin, 2005; Kuhlthau, 2005; Kuhlthau, Heinström, & Todd, 2008). The context of the user (professionnal, scholar, or everyday life), his final tasks, his individual differences, and the Kuhlthau's stages of information-seeking process (1991) still need to be taken into account. These design problems generate a high cognitive load because of the growth of affective and cognitive uncertainty (Gwizdka, 2010) which has to be reduced to ease the learning process. Two of the reasons of this uncertainty are, on the one hand, the noise in the considered search results which overhelm the user working memory and, on the other hand, the lack of interactive features which slow down exploration, one of the critical stage of the information-seeking process (Markey 2007a; Kuhlthau 1991).

The use of information visualization could bring significant improvements to the design of information retrieval systems. Information visualization is defined as "the use of computer-supported, interactive, visual representations of abstract data to amplify cognition" (Card, Mackinlay, & Schneiderman, 1999). Information visualization, cartography for example, is known to reduce redundancy in data and to facilitate the identification of meaningful patterns through large and multidimensional data (Bertin & Barbut, 1977; Larkin & Simon, 1987; Norman, 1993; Resnikoff, 1989; Tufte, 1990). It has been mainly developed in the information retrieval field as a way to display abstract information in a graphical and logical structured form (Card et al., 1999; Chen, 2004; Jin Zhang, 2008) and as a way to interact with information in an information-seeking context (Shneiderman, 1996). In 2000, after ten years of research, the information visualization field has developed largely accepted theoretical foundations. There are yet important issues (Burkhard et al., 2007; Chen, 2005; Keller & Tergan, 2005) to be solved.

- The divorce between the logical organization of the abstract information and it representation into an understandable metaphor.
- Multidimensional scaling.
- The evaluation of usability of visual information retrieval systems (Kerren, Stasko, Fekete, & North, 2007; Lin, Kerren, & Jiaje Zhang, 2009; Plaisant, 2004).

Considering these issues of traditional and visual information retrieval, we think that the gap between the ranking structure of search results and their transformation into a meaningful graphical and interactive representation could be bridged with data mining operations. More specifically, classification and clustering algorithms could extract salient structures of the retrieved set of search results in order to shape the visual representation of the results.

In the context of information-seeking with a web search engine, the goals of our research project are the following.

- Identify the organizational factors required to make the graphical representation constructed by the display algorithm a meaningful way to present the retrieved set of search results. More specifically, we seek to answer the following questions.
  - What are the constraints imposed by the classification and clustering methods on the possible graphical and interactive visual representation of search results?
  - What are the parameters to apply for each method of clustering and

classification?

- Determine which improvements, from the end-user perspective, that are made possible by the visualization of search results, for both the clustering and classification methods. For this goal, the specific questions we want to answer are the following.
  - What are the characteristics of the web search strategies enabled by each method of clustering and classification?
  - What are the graphical and interactive characteristics of the web search strategies enabled by text-listed and visual presentation of search results?
- Establish a model of the relations between the logical organization of search results, the graphical and interactive display, the end-user, and the task.

To answer these questions, a controlled experimentation is to be conducted according to the framework for Interactive Information Retrieval, designed by Borlund (2003). In our experiment, we will compare two Web Information Retrieval Systems (herafter named WIRS); each one tested by a different sample of future librarians and domain experts. The selected end-users will have to execute a simulated search task on the Web. This comparison will take into account the variation of both organizational algorithmic method – classification and clustering – and the textual and visual presentation of the search results. The collected data will consist of the multimedia transactional logs of the web search sessions, semi-controlled user interview, and quantitative measures of subjective relevance assessment. These transactional logs will be used to determine the interactive patterns and deduce the users web search strategies, which are to be confirmed by a semi-controlled user interview. The users will be interviewed about their satisfaction, more specifically on their subjective assessment of the relevance of the graphical and interactive presentation of search results. And, relative relevance and ranked-life relevance will be the quantitative measures to compare the WIRS performance (Borlund 2003).

At Connections 2011, we would like to present in details our research design, the methodological framework used and our preliminaries results.

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Pathways of Teen Content Creators through Information Experiences: Exploring Information Practices of Teen Content Creators in Digital Communities

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Abstract

We live in an increasingly global community of networked participation. Teens are active members of this community. Over half of American teens have created and shared content online such as blogs, art, websites, videos, and game design (Lenhart & Madden, 2005). Teens learn to participate in the sharing of content primarily in an informal manner, through the use of a variety of information sources and formats.

This research asks 'how do teens experience information and engage information practices in creating content' seeking to express the ways in which teen's experience information and to describe the information practices as they participate in content creation.

The study uses a relational approach to information literacy as a theoretical framework. It takes the position that information literacy is "experiencing different ways of using information to learn" (Bruce, 2008, p. 5), and that information practices are situated within contexts (Lupton, 2008). The context of this research is teens' experiences in digital participatory communities. A participatory culture has been defined as "a culture with relatively low barriers to artistic expression and civic engagement, strong support for creating and sharing one's creations, and some type of informal mentorship" (Jenkins, Clinton, Purushotma, Robison, & Weigel, 2006, p.3). While not all participatory cultures are online, this research focuses on online content including blogs, art, videos, music, programming (games), story-telling forums, and web sites. Asking the question how teens experience information and engage in information practices allows the researcher to explore information literacy situated within the context of a digital participatory culture.

This research uses a constructivist theoretical framework of applying grounded theory methods as outlined by Kathy Charmaz in Constructing Grounded Theory (2006). Data were collected through semi-structured interviews with teens that participate in diverse forms of content creation including art, video, writing, and programming. Interviews occurred both to gather initial data and to theoretically sample teen content creators after initial analysis. Data were analyzed using the principles of grounded theory: constant comparison of collected data, a coding focus on process, theoretical saturation, and the practice of constructing a theory grounded in collected data.

This research has preliminary found that participants experience information in a variety of ways that can be categorized as information as community, information as inspiration, information as tools, information as skills, information as artifact. The information practices could be categorized as gathering, thinking, and using information and included serendipitous finding, focused browsing, direct searching, musing, studying, planning, copying, modeling, and composing. Participants entered the process of creating content in different ways and took a variety of pathways through information experiences but the moving parts were generalizable across the small group of participants.

The research contributes to an emerging field of interdisciplinary research that investigates the contributions of teens to the participatory culture of the digital communities and an emerging focus in LIS on information literacy within a variety of social contexts. It may provide practitioners including teachers, librarians, and youth advocates insight into the information practices of teens that will be helpful developing programming and academic learning experiences.

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Identifying Digital Libraries Author Publication Pattern Using Visualization Clustering Analysis

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Abstract

Information retrieval visualization (IRV) is a powerful tool in transforming the invisible abstract data along with their semantic relationships in a data collection into a visible display and provides visualization of the internal retrieval processes for users. It assists individual to make full use of his/her own creativity and imagination to search for information from an interactive system. One of the important features of IRV is to provide an intuitive way to recognize cluster pattern in the retrieved data. The purpose of this project is to employ information visualization method to explore and perform an author clustering analysis in an online citation database.

The visualization environment for this project is the Multidimensional Scale (MDS), which is a set of related statistical techniques often used in information retrieval visualization for exploring similarities or dissimilarities in data. The technique is applied to discover relationships among information retrieval objects by visualizing them and presenting their geographic representations in a low dimensional display space. Web of Science® was chosen to serve as data source for this project for the reasons of authoritative and reliable concern. Data were collected using "digital library" as the subject field being used to search for target authors in Web of Science. In order to make the scale of the project much more manageable, the number of the most influential authors in the selected area was set to range from fifty to one hundred. Filtered by the number of publications, 70 researchers were qualified as the target authors, whose record counts in Web of Science ranging from twelve to four. Since the analysis is about the proximity of the authors, this analysis incorporates the entire publications of target authors, not limiting to the subject field of digital library. In terms of the proximity between any two authors in the visual analysis, it is primarily defined by the similarity of their publication keywords. The keywords were parsed into single words and formed a keyword-author frequency table. Then another author-author proximity matrix was constructed. The proximity matrix of the target authors was accordingly applied to perform similarity measures, including Pearson coefficient, overlap coefficient, Jaccard coefficient, and Dice coefficient.

This project is still in the exploratory phase. The stress values derived from the first phase are all lower than 0.15 with the lowest value of 0.13271 and all values of Squared Correlation Index (RSQ) are close to or larger than 0.9. The data of the MDS results were transformed into a multimeida file with vitality colors and in three-dimensional displays. The visualization result using similarity measure of the of this project clearly demonstrates the relationships between the target authors. Four clusters can be easily identified, namely red cluster (author #9, 28, 48) on the top, light green cluster (author #10, 35, 42, 64) on the left, yellow cluster (author # 52, 62) on the right, and blue cluster (author # 47, 55, 40) at the bottom.

In the second phase of the project, results of MDS visualization are to be confirmed using two different traditional clustering methods to improve the quality of the analysis. The two methods used to confirm the visual analysis result are hierarchical clustering algorithm and K-Means. The advantage of combining the visual-clustering analysis and the traditional clustering method is that it cannot only visually display the clusters in a flexible and intuitive way, but also demonstrate the clear grouping boundaries among the clusters. The two could be complemented with each other. The hierarchical clustering algorithm yields a multiple level categorical tree structure, dendrogram. It demonstrates the clusters of nearest neighbor in the data. The four clusters in MDS also appear to be the nearest neighbors in the dendrogram. The second clustering method, K-Means, identifies relatively homogeneous groups of cases based on selected characteristics. In this project, the target authors were partitioned into six categories. The previous MDS clusters also belong to the same categories. Although the groupings of the two methods are different from each other, the pattern of the MDS clusters remains the same. It can be concluded that results of the two traditional clustering analyses confirm the similarity patterns of MDS.

Several limitations of the projects are reported. Firstly, the stress value is slightly over 0.1. Secondly, the authority control of authors in Web of Science is problematic. Thirdly, the selection of the key words employed in this project includes only Keyword Plus in Web of Science. Future research could compare the similarities and differences among retrieved data using different analysis strategies, authority control, and combination of keywords to ex-

plore more possibilities of the visual representation method.

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Understanding how Objectives Transform into Outcomes: Activity Theory and its use in Analyzing Web 2.0 Assignments in an Information Literacy Instruction Course

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Abstract

Today in our schools and universities there is disconnect between education and technology (Collins & Halverson, 2009). Technology grants are given out and computers are set up, but simply placing computers in a school is not enough. Issues related to educational technology implementation and teacher training must also be discussed and rectified in order for education and technology to align. Technology education is not only about knowing how to use the technologies, but also needs to be rooted in outcomes and sound pedagogy (Roland, 2010). Fishman and Pinkard (2001) put it this way, "The problem, in short, is that schools make technology plans without carefully planning for how technology will be used!" (p.63).

This case study takes place in a Master's course on information literacy instruction. The purpose of this study is to (1) analyze how students use Web 2.0 tools for specific assignments and (2) analyze how these Web 2.0 activities shape student perceptions about (a) Web 2.0 use in education and information literacy instruction and (b) the role of technology in information literacy instruction.

In many studies on technology, emphasis has been put on whether students learn, but when using these technologies to teach future educators it is also important to look at how these tools are used and if they found them useful. Only then will they use them in their own classrooms and be open to new technologies as they progress in their careers. Therefore, more specific questions that stem out of my research statement include: What are the students' perceptions of these Web 2.0 tools? Do they think they are useful for their own learning? Do they think they would be useful for their own teaching? Do these views change as the semester progresses? What features do they like the best? Which ones do they dislike? What issues are raised when they discuss Web 2.0 activities? How do they see them being used in information literacy? Do they see these as useful tools for instruction? How are they using these tools?

This study is currently in the final analysis and writing stage. A qualitative approach was used for data collection and analysis. The course being studied was done online which had an impact on the types of methods that were used for data collection. Observations are being done on chats, discussion postings, and emails. Students used a variety of Web 2.0 tools during the semester and their use of these tools was observed as well. Documents that were analyzed include assignments and papers as well as course resources such as the syllabus, readings, and lectures. Surveys include a pre-survey given out the first week of class and a post-survey during the last week of class. Both surveys had open-ended questions that relate to Web 2.0, education, and information literacy.

For this study the educational theory of constructivism and its adherence to reflection, active learning, and social interaction are being used to guide the research (Vygotsky, 1978). Activity Theory (Engeström, Meirttinen, & Punamäki, 1999; Nardi, 1996) was used to help with data analysis and interpretation. The final product will be a case study with rich, thick descriptions of the activities and perceptions of the participants in order to provide insight into how library students use Web 2.0 and what they think about technology's role in education and information literacy.

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The Everyday Life Information Seeking Behaviour of Urban Homeless Youth: Preliminary Findings

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Abstract

Youth homelessness, or the issue of street children, is a growing phenomenon in cities across the world including Sub-Saharan Africa. Homeless youth, like all adolescents, are transitioning from childhood to adulthood and it is imperative that they have access to sufficient relevant information for mastery of their developmental challenges. However, their immediate living circumstances, especially their state of homelessness makes it extremely difficult for them to access information for workable solutions to many of those challenges. Ammerman et. al. (2004) also ascribe homeless youth's lack of access to information to their inexperience and lack of knowledge of service systems and resources which are primarily tailored for adults, and lack of understanding of how to access such service systems. Clearly they need an information service tailored to their needs. Provision of quality information services, according to Agosto and Hughes-Hassel (2005), requires an understanding of the natural or day to day human information seeking behavior, that is, their everyday life information seeking behaviour (ELIS). Thus an investigation into the everyday life information needs and seeking of homeless youth is necessary if their information needs are to be met in an efficient manner. The purpose of the study was to investigate the everyday life information seeking behaviour of homeless youth in the city of Accra, Ghana to highlight their information needs in order to inform stakeholders such as public libraries and other agencies, both governmental and non-governmental, that work with homeless youth, to facilitate effective information service to this disadvantaged group.

The study is significant in many ways. The findings of the study increase the knowledge base and understanding of youth information seeking behaviour and everyday life information seeking (ELIS) behaviour of youth, especially homeless youth in the Library and Information Science Literature (LIS). A review of the literature revealed that little attention has been paid to youth information seeking behaviour outside the library and school context, that is, their ELIS behaviour. They also reveal ELIS behaviour of homeless youth in an environment of limited services and information resources. A review of the literature also shows that it is the first study of ELIS behaviour of homeless youth in Africa, and one of only a few studies of information needs of homeless youth worldwide.

The main objectives of the study was to investigate their information needs, sources of information, patterns in their information seeking, problems they encounter in their information seeking, and how libraries and other stakeholders can meet their information needs.

The study was conducted within the theoretical framework of Dervin's (1983b) Sense-making approach, Chatman's (1996) theory of information poverty, Chatman's (1999) theory of life in the round, and Savolainen (1995) concepts of 'way of life' and 'mastery of life'.

The study adopted the interpretive tradition and the ethnographic methodology. The city of Accra was chosen as the location of the study. The snowball sampling procedure was used to recruit 40 homeless youth, 20 boys and 20 girls between the ages of 15 to 18 years to participate in the study. Observations, the critical incidence technique and in-depth interviews were used for the collection of data.

The preliminary findings appear to confirm Wilson's (2000) assertion that the motive of any search for information is ultimately to satisfy one or more of the human basic needs namely physiological, affective and cognitive needs. The patterns in their information seeking behaviour also conforms to Chatman's (1999) theory of life in the round, Chatman's (1991) theory of gratification, and Savolainen (1995) concepts of 'way of life' and 'mastery of life'. The barriers to meeting their information needs include, poverty, lack of opportunities for self development, lack of access to relevant information.

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Investigating Learning Outcomes through Game Design in Information Literacy Classes

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Abstract

The use of games are being explored in many domains, why not libraries? Games as learning tools, has potential use in instructional activities such as the teaching of information literacy. The concentration of literature on the educative value of games has escalated since the late 1990s and has been generated in the areas of entertainment, military, academic, and business sectors acclaiming its positive effect on learning and its potential as an instructional tool (Bonk & Dennen, 2005; Bowen & Morrison, 2005; Chappell & Stitt, 2005; Foreman, 2003; Halverson, 2005; Jenkins & Squire, 2003; Oblinger, 2004; Oreovicz & Wankat, 2005; Prensky, 2000, 2001; Stafford, 2005). Books, and scholarly think pieces tout other benefits of the use of games such as knowledge acquisition, retention, recall of factual content, creative and critical thought, decision making, the development of strategic skills, and problem solving (Aldrich, 2004, 2005; Gee, 2003, 2005a, 2005b; Jenkins & Squire, 2003; Johnson, 2005; Lieberman, 2006; Prensky, 2000).

For most libraries, a primary component of their service missions is to educate users on information literacy concepts and skills. Information literacy has become a centerpiece for the continuing discourse on the role that librarians should assume in the educational spheres of instruction, curriculum and faculty development (Breivik, 1999). This type of instruction often occurs either in a face-to-face workshop setting or online. Ultimately, the goal of information literacy instruction is to encourage library users to be independent researchers confident in their abilities to locate and use valid information both in physical and digital formats (Eisenberg and Berkowitz, 1990). With the new philosophies and modified spaces in libraries there have also been changes in the delivery of instructional sessions over the years. Specifically, there has been interest and incorporation of experiential and collaborative learning techniques (Mabry, 1995).With the focus on information literacy there has been a heightened interest in the theoretical approaches to instruction. For example, Grassian and Kaplowitz, 2009 has an entire chapter in their book about learning theories. They cover specific theories from Piaget, Bruner, Bandura, Ausubel and Keller along with summaries about the cognitive science movement, behaviorist theory etc. There is also focus on research on learning styles such as Keefe's categorization of styles and Kolb's experiential learning. The interest of theoretical underpinnings is also seen in journal articles. Complementing the interest of learning theory among instructional librarians is the push for learner centered instruction. The terms active learning and experiential learning are being seen more frequently. Grassian and Kaplowitz, 2009 equate this type of learning to participatory learning activities (group discussions, collaborative learning and learning communities).

Learning-by-design is neither a new concept nor one that is limited to constructing computer games. The idea of "design" represents a broad class of experiences, but a key experience is that of learning by engaging in design-and-build challenges (Kolodner et al., 2003), culminating in the production of an "artifact" that represents underlying understanding (Kafai, 2005). Scratch is a one of the media rich programming environment available that can facilitate the design activity. It was developed by the Media Lib and Massachusetts Institute of Technology and makes it easy to create interactive stories, animations, games, music, and art and allows students to share their creations on the web.

The goal of this study is to explore how undergraduates collaborate to design educational games (using Scratch) that explore how to identify what information is needed, understand how the information is organized, identify the best sources of information for a given need, locate the sources needed, evaluate the sources critically, and share that information. It examines if the use of game design has an impact on learning and retention of knowledge of content that was taught. The study investigates the types of learning processes in three teaching strategies (lecture with gaming, lecture with game design and traditional lecture/discussion) and outcomes that resulted. Learning processes focused on how students represented their understanding in the three teaching strategies and in the context of developing an educational game as well as the collaborative influences in the process of developing and revising their games. A quasi experimental approach will be used to measure the variable(s) of interest. Observations, game artifacts, and interviews would be used as qualitative data sources. Quantitative data from the quasi experiment will linked to the qualitative data to corroborate and extend the qualitative approach. The unit of analysis for study will be individual students, student

groups and artifacts centered collaboration. Learning outcomes will document what types of learning and retention gains occurred in the three teaching scenarios.

The theoretical framework looks at the external process of constructionism, which emphasizes design and sharing of artifacts. Papert was instrumental in developing educational theory and pedagogy associated with young children as game or computer programmers, namely that of constructionism. One of the most distinguishing features of constructionism is programming or designing artifacts. Designing sharable artifacts reflect students' different styles of thinking and learning make that principle of the theory most important. Papert, 1991 stated that in order for students to gain a deeper understanding of something, students have to create it, construct it and build it. Collaboration is another component of constructionist learning environments in which students share ideas and not only receive feedback, but also gain assistance. Interaction among individuals and collective activities are of critical importance in for learning and development in social context. Intersubjectivity involves cognitive processes consistent with Piaget's, Vygotsky and Lave and Wenger view of constructivism (Koschmann, 1996, Koschmann, Zemel, Conlee-Stevens, Young, Robbs, & Barnhart, 2005). Intersubjective space in which the students operate act as the "glue" that holds the collaborative learning activity together. It is what makes possible the functioning of the group (Koschmann et. al., 2005). This study will also explore meaning and practices of meaning-making in the context of intersubjectivity and the ways in which these practices are mediated through collaborative designed artifacts (in this case game artifacts).

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Sub-field Visualization: A Multidimensional Analysis of Web 2.0 Authors

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Scholars often consider Library and Information Science as an interdisciplinary field. While most in the field focus on Information Science specifically, many enter the field from outside disciplines including the sciences, the social sciences, and the humanities. Similarly, research within Library and Information Science has vast implications throughout academic disciplines. Although this has always been the case, recent emerging trends within technological developments increased the interdisciplinary tendencies. Research and use of new Internet based applications comes from many areas, and its implications reach to equal varieties.

Internet technologies continuously grow at a rapid rate. The past decade saw the emergence of Web 2.0, a change in the ways the internet applied to its users. Applications such as Facebook, Flickr, Wikipedia, and blogging software illustrate just some of the uses of Web 2.0 technologies. Since Web 2.0 applications range across disciplines, could their development and research be interdisciplinary? Furthermore, what relationships connect researchers from this field?

Similarly, multidimensional scaling (MDS) as an analytical tool began increasing in popularity over the past decades. Used throughout the sciences and social sciences, MDS allows researchers a unique visualization technique for determining relationships. Although widespread in use, additional MDS applications exist. Multidimensional scaling could explore the relationships between authors within a given field. This case study tests such an application, through an exploration of Web 2.0's most published authors.

Literature Review

The field of psychology developed and initiated the use of multidimensional scaling as a methodology over several decades. One of the earliest works investigated the use of MDS as a comparison technique between two or more psychophysical scales (Young & Householder, 1941). Another study introduced MDS as a solution to the problems of unknown dimensional numbers. As Torgerson states, "In many stimulus domains, however, the dimensions themselves, or even the number of relevant dimensions, are not known. What might appear intuitively to be a single dimension may in fact be a complex of several" (Torgerson, 1952, p. 401). Further development of MDS culminated in Guttman's application of the method to represent similarities within a coordinated space (1968).

Although originated in psychology, MDS expanded through the sciences and social sciences as a method for the visualization of similarities, distances, and relationships. The method translates "proximities" into a coordinated, low-dimensional space, thus allowing user manipulation and analysis. As Zhang summarizes:

> Input data for MDS analysis is usually a measure of proximity (similarity or dissimilarity) of investigated objects in a high dimensional space, while its output is a spatial object configuration in a low dimensional space where users may perceive and analyze the relationships among the displayed objects. It is apparent that in such a MDS display space the more similar two objects, the closer to each other they are, and vice versa (2008, p. 143).

Recent Library and Information Science MDS applications focus on query analysis. These include an analysis of frequently used query terms within a health services setting (Zhang, Wolfram, Wang et al., 2008), and the comparison of sport related queries between term assisted and non-assisted applications (Zhang, Wolfram & Wang, 2009). MDS outside of Library and Information Science vary in both application and field. Pardoe, for example, proposes MDS to assist in grouping college students based on schedule availability (2004). In archaeology, MDS confirms the validity of "late period phases in the Central Mississippi Valley" (Mainfort, 2003, p. 176). The applications continue from social relationships among baboons (Easley, 1990) to tourism research (Fenton, 1988).

Another development within MDS applications is its use as a field exploration tool. Specifically, both existing and emerging academic fields. Biglan compared the similarities between 36 different academic fields as judged by 168 faculty members at the University of Illinois (1973) and 54 faculty members from a small liberal arts college. His analysis found three distinct divisions within academia: the hard science-soft science division; a division based on the application of research; and a division between fields studying animate versus inanimate objects. Another study applied co-citation analysis and MDS

Table 1 Sample Population by Number of Publications (Author [Assigned Number])

5 Publications	**2 Publications**	LANKES, RD (49)
BEER, D (4)	AL-SHAHROUR, F (17)	LARSON, EL (50)
4 Publications	ALLISON, M (18)	LIU, Y (51)
AHARONY, N (1)	ALLOZA, E (19)	LUCKMAN, S (52)
CHEUNG, KH (3)	BAEZA-YATES, R (20)	LUDVIGSSON, J (53)
3 Publications	BECVAR, KM (21)	LUGMAYR, A (54)
BAWDEN, D (2)	BOAST, R (22)	MAJCHRZAK, A (55)
BOULOS, MNK (23)	BUCKLEY, N (24)	MCCLURE, M (56)
COOKE, M (6)	BURNHAM, JF (25)	MEDINA, I (57)
DELLAVALLE, RP (34)	CARBONELL, J (26)	MIKA, P (58)
GUALLAR, J (41)	CHAPMAN, S (27)	MINGUEZ, P (59)
HANBERGER, L (7)	CHAWNER, B (28)	MONTANER, D (60)
HARDEY, M (42)	CHIANG, IP (29)	NGO, CW (61)
HUGHES, B (5)	CHU, HT (30)	SETHI, SK (62)
LI, Q (8)	CHURCHILL, D (31)	SILVERSTEIN, J (63)
NORDFELDT, S (9)	CONESA, A (32)	SO, HJ (64)
PARK, J (10)	DELGADO-LOPEZ-COZAR, E (33)	SRINIVASAN, R (65)
PRECIADO, JC (11)	DOPAZO, J (35)	TORRE, I (66)
SANCHEZ-FIGUEROA, F (12)	EKBERG, J (36)	TOWNSEND, JP (67)
SANDARS, J (13)	ERIKSSON, H (37)	TSAI, CC (68)
SCOTCH, M (14)	FREEMAN, B (38)	WAGNER, C (69)
TIMPKA, T (15)	FURNER, J (39)	WAREHAM, J (70)
TORRES-SALINAS, D (16)	GOETZ, S (40)	WEIKUM, G (71)
	HUANG, YM (43)	WUSTEMAN, J (72)
	JONES, J (44)	XU, C (73)
	JONES, N (45)	YIP, KY (74)
	JOSHI, I (46)	ZHUGE, H (75)
	KIM, S (47)	ZUMER, M (76)
	KIND, T (48)	

for an investigation of the development of management information systems (Culnan, 1986). The analysis found nine groupings and concluded the system development lacked organizational theory. Similar to the current study, exploration of an emerging field, the academic discipline of Urban Studies underwent a MDS analysis in an attempt to define itself (Bowen, Dunn & Kasdan, 2010). The study found an internal, three-dimensional structure in Urban Studies, based on survey data.

Overall, MDS developed over the past century as a visualization and exploratory methodology out of psychological analysis. During the past thirty years, its application spread throughout the social and hard sciences. Despite its widespread nature, MDS receives only limited use as an academic field analytical tool. The few previous studies used either quali-

tative data, such as surveys, or co-citation analysis. Multidimensional scaling's use for discovering the relationships between the most published authors within an emerging field remains an innovative technique, whose results may indicate further applications.

Methodology

The multidimensional scaling analysis requires four sequential stages: sampling, keyword matrix, author similarity matrix, and MDS. Discussed separately below, each of the stages requires the implementation of variable parameters.

Sampling

Identification of the most published authors within the subfield of Web 2.0 used ISI Web of Knowledge's topic search feature. The query "Web 2.0" found 580 publications from 1219 different authors. Internal result analysis identified 76 authors who published more than one article (excluding anonymous authors, conference proceedings/papers, and book reviews). Extracting the authors' names and publishing count created the final sample population. Table 1 lists the authors, publishing count, and assigned number used for tracking authors within the study.

The authors' current academic department or company determined their assigned general research field. Final analysis of the MDS results interpreted clusters based on these research fields. The sample population consisted of the following research fields: Medicine/Health (26.3%), Biomedicine (5.3%), Bioinformatics (13.2%), Library/Information Science (26.3%), Computer Science (19.7%), Education (3.9%), Sociology (1.3%), Communication (2.6%), and Business (1.3%).

Keyword Matrix

The creation of a keyword matrix, representing each authors research profile (not limited to Web 2.0), required the compilation of all published journal articles for each author. Web of Knowledge limited the included articles to those published within ISI indexed journals. An author search within Web of Knowledge produced a comprehensive listing of ISI ranked publications. After the exclusion of conference proceedings/papers and book reviews, an aggregated compilation of each entry's Subject Category and KeyWords Plus (both assigned by ISI) set the research profile for each author. Although some authors provided additional keywords for articles, the study excluded them due to their uncontrolled nature and variability. The creation of a keyword/index term frequency matrix used the aggregated list of terms.

$$\begin{pmatrix} & T_1 & T_2 & \cdots & T_{5411} \\ a_1 & 0 & 0 & ... & 0 \\ a_2 & 0 & 0 & ... & 0 \\ \vdots & \vdots & \vdots & ... & \vdots \\ a_{76} & 0 & 0 & \cdots & 0 \end{pmatrix}$$

Author Similarity Matrix

Constructed using the keyword matrix, the author similarity matrix compares the similarities between authors based on the absolute value of a Pearson's correlation coefficient between authors. Pearson's correlation coefficients apply normalization standards, required for MDS, thus its use rather than non-normalized similarity measurement techniques.

$$\begin{pmatrix} & a_1 & a_2 & \cdots & a_{76} \\ a_1 & 1 & 0.572 & ... & 0.328 \\ a_2 & 0.572 & 1 & ... & 0.585 \\ \vdots & \vdots & \vdots & ... & \vdots \\ a_{76} & 0.328 & 0.585 & \cdots & 1 \end{pmatrix}$$

Multidimensional Scale Analysis

Using the author similarity matrix, a MDS analysis was conducted through the SPSS statistical software. The analysis used the Minkowski interval measure at a power of two, calculated Kruskal stress values, and created a three dimensional model. A hierarchical cluster analysis confirmed the MDS analysis. Additional visualization of the model used the Graphis software platform with the MDS dimensional coordinates. Authors' research field identification (assigned during the sampling stage) added another dimension to the coordinates to explore further relationships between points within clusters.

Results

Initial MDS Model

The three-dimensional model resulted from the MDS analysis, with a stress value of 0.089 and a squared correlation of 0.96. Since the stress value falls under 0.10, the analysis meets goodness of fit measures, indicating the low-dimensional space project faithfully configures to the high-dimensional space. Figure 1 illustrates the MDS findings, and the colorization of points indicates additional research field information. The image demonstrates a strong vertical column of authors from the Medicine/Health, Biomedical, and Bioinformatics. Although this grouping appears obvious, the extension of several of the group's authors into the area populated by Computer Science and Library/Information Science suggests occasional topical overlap.

The initial MDS model (Fig. 1) also illuminates the relationship between computer science and Library and Information Science. While both fields populate the center of the three-dimensional space, a closer examination notes the Library and Information Science authors occur in more condensed pockets.

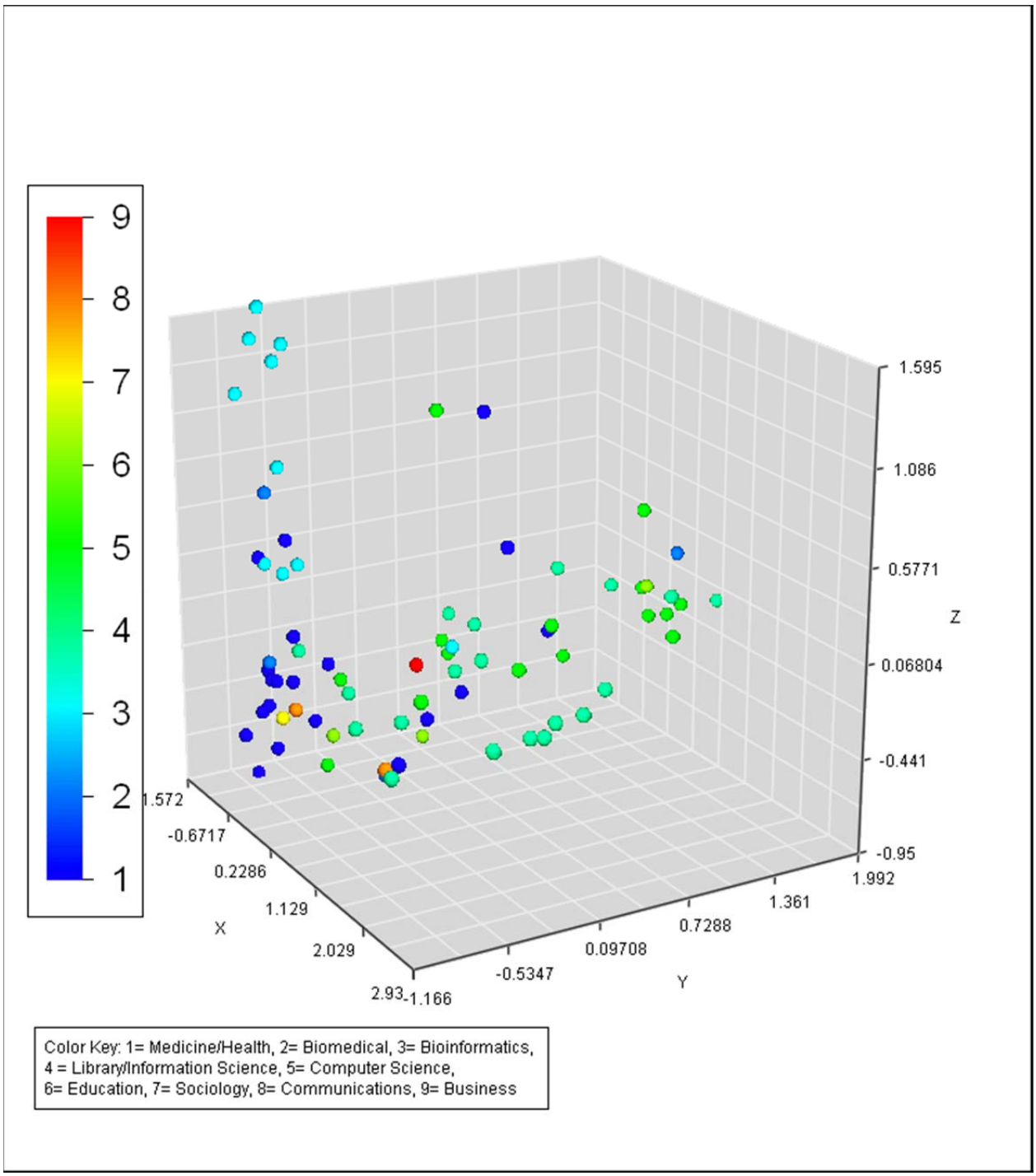

Figure 1 MDS Model with Research Field Colorization

This suggests Computer Science authors are more diverse in their research than Library and Information Science. Figure 2 better highlights these differences.

Finally, the initial model places the remaining fields of Education, Sociology, Communications, and Business within close proximity to the most densly populated region of the scatterplot. These locations still include small differences based on their proximity to the Medical/Biomedical/Bioinformatic column described earlier or the Computer Science/Library and Information Science grouping. Either instance indicates the authors' close relationship

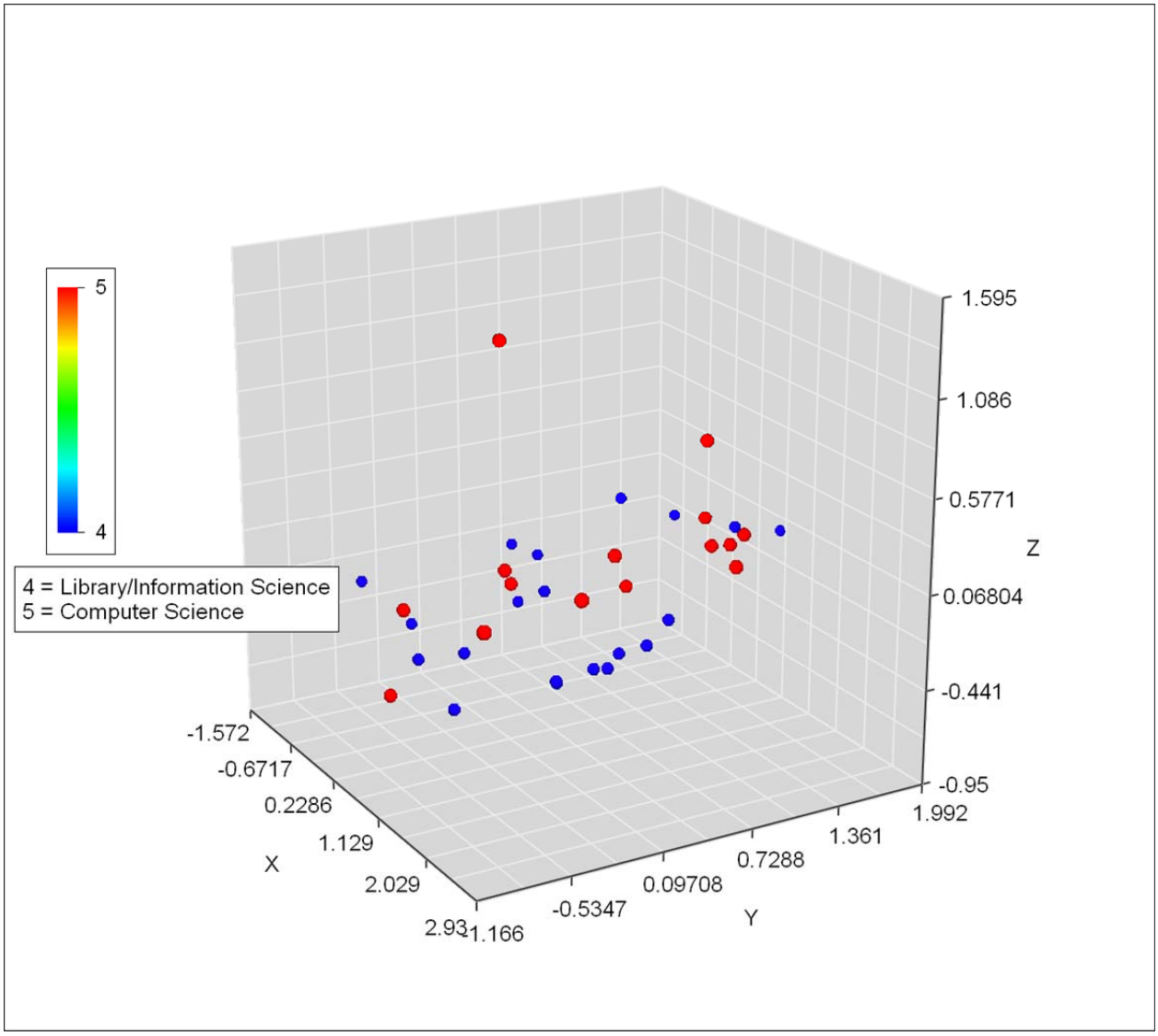

Figure 2 MDS Model with Computer Science and Library/Information Science Colorized

with outside disciplines, also suggesting possible topical overlap between fields.

Hierarchical Cluster Analysis

A second three-dimensional scatter plot using the MDS analysis results and colorized with the hierarchical cluster analysis indicates 18 distinct clusters, ranging between 2 and 13 members. The model displays the hierarchical structure due to the colorization of clusters in numerical order (Fig. 3), whereas clusters similar in color fall close within the hierarchy. Figure 4 outlines and identifies each cluster while Table 2 lists the membership of the groupings.

Cluster Analysis versus Research Field Analysis

A comparison of the cluster analysis model (Fig. 4) and the original MDS model highlighting the authors' research fields (Fig. 1) indicate several interesting anomalies. Although a majority of the clusters fall within one or two closely related fields (such as Biomedical and Medicine/Health), some do not follow this trend. The overlaid model (Fig. 5) shows seven different clusters (C1, C6, C8, C13, C14, C15, and C17) with mixed memberships of unaligned fields. The largest, cluster 1, contains authors from five fields, for example. The existence of clusters with multiple research fields suggests possible t between authors. Additionally, the overlaid model indicates possible subfields within each discipline (e.g. a pediatrics specialty within the Medicine/Health field).

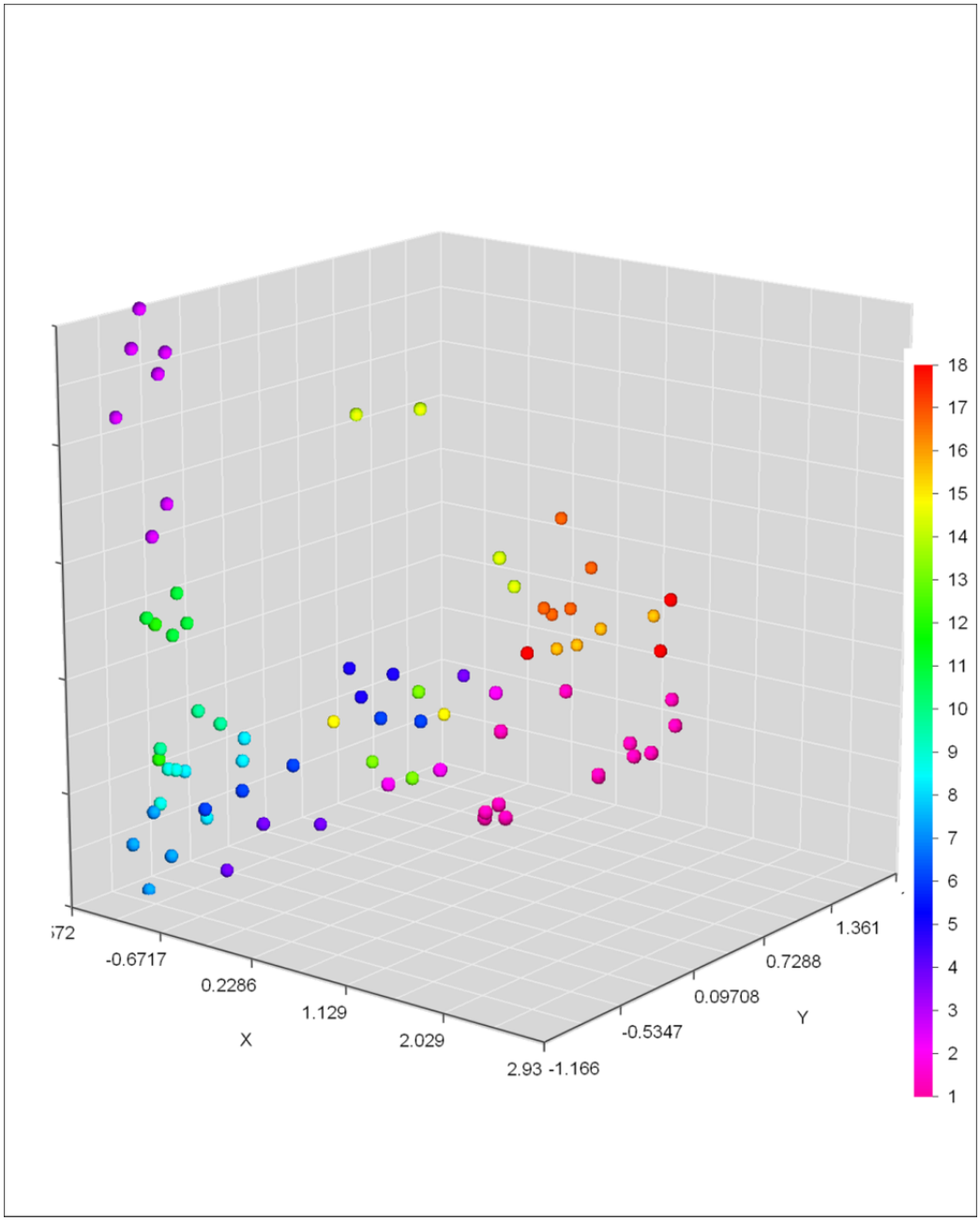

Figure 3 MDS Model with Cluster Colorization

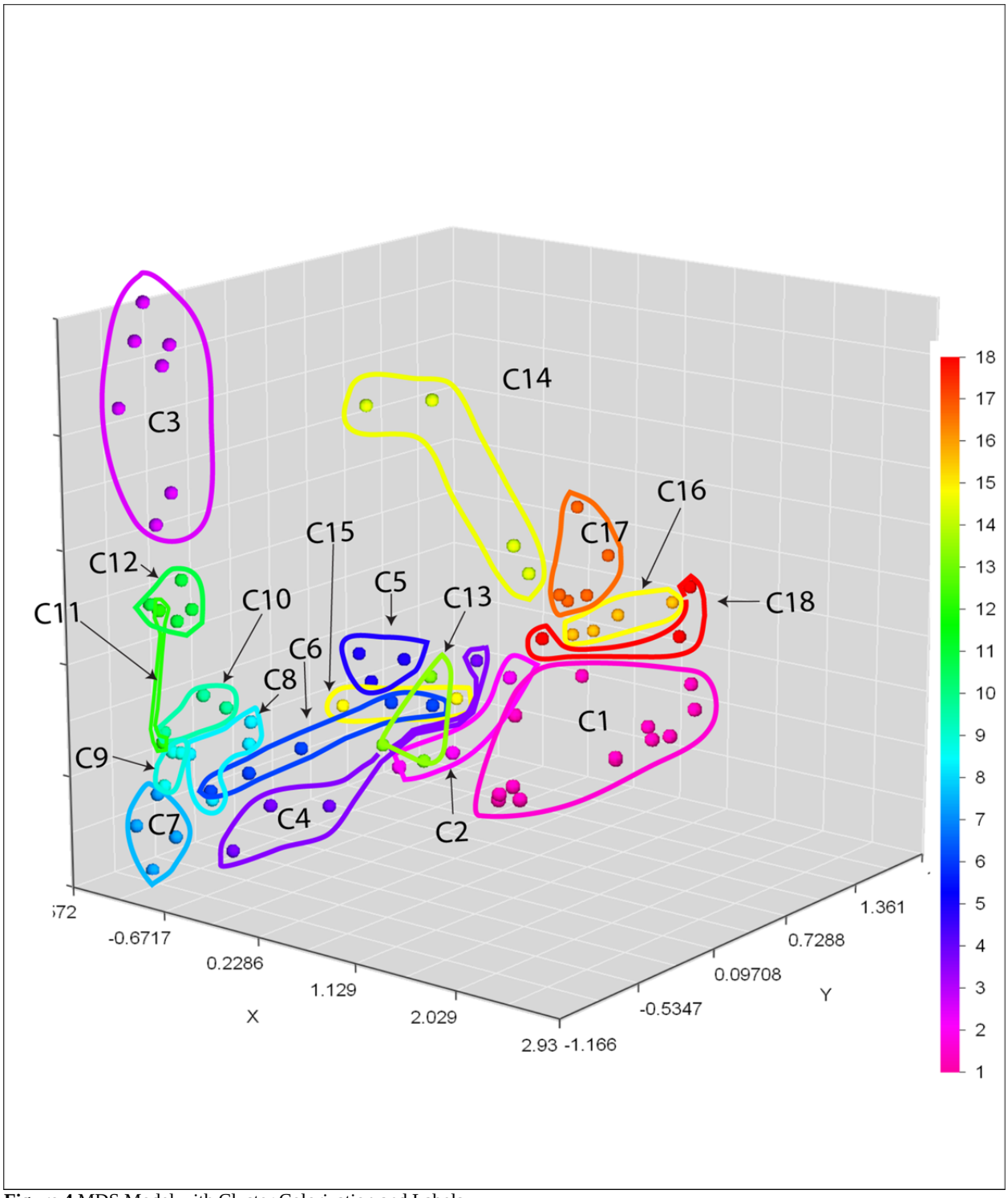

Figure 4 MDS Model with Cluster Colorization and Labels

Table 2 Cluster Identification and Membership by Author

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Bawden, D	Aharony, N	Al-Shahrour, F	Churchill, D	Hughes, B
Torres-Salinas, D	Guallar, J	Alloza, E	Jones, J	Mika, P
Becvar, K	Zumer, M	Conesa, A	So, HJ	Torre, I
Burnham, JF		Dopazo, J	Tsai, CC	
Chawner, B		Minguez, P		
Chu, HT		Montaner, D		
Delgado-Lopez-Cozar, E		Townsend, JP		
Furner, J				
Lankes, RD				
McClure, M				
Silverstein, J				
Wusteman, J				
Xu, C				
Cluster 6	**Cluster 7**	**Cluster 8**	**Cluster 9**	**Cluster 10**
Beer, D	Hanberger, L	Cooke, M	Chapman, S	Buckley, N
Boast, R	Nordfeldt, S	Sandars, J	Hardey, M	Chiang, IP
Luckman, S	Ludvigsson, J	Allison, M	Larson, EL	Joshi, I
Majchrzak, A	Sethi, SK	Freeman, B		
Wareham, J				
Cluster 11	**Cluster 12**	**Cluster 13**	**Cluster 14**	**Cluster 15**
Carbonell, J	Dellavalle, RP	Scotch, M	Cheung, KH	Preciado, JC
Ekberg, J	Medina, I	Timpka, T	Jones, N	Sanchez-Figueroa, F
Goetz, S		Boulos, MNK	Srinivasan, R	
Kind, T			Yip, KY	
Cluster 16	**Cluster 17**	**Cluster 18**		
Park, J	Li, Q	Baeza-Yates, R		
Lugmayr, A	Eriksson, H	Liu, Y		
Weikum, G	Huang, YM	Wagner, C		
Zhuge, H	Kim, S			
	Ngo, CW			

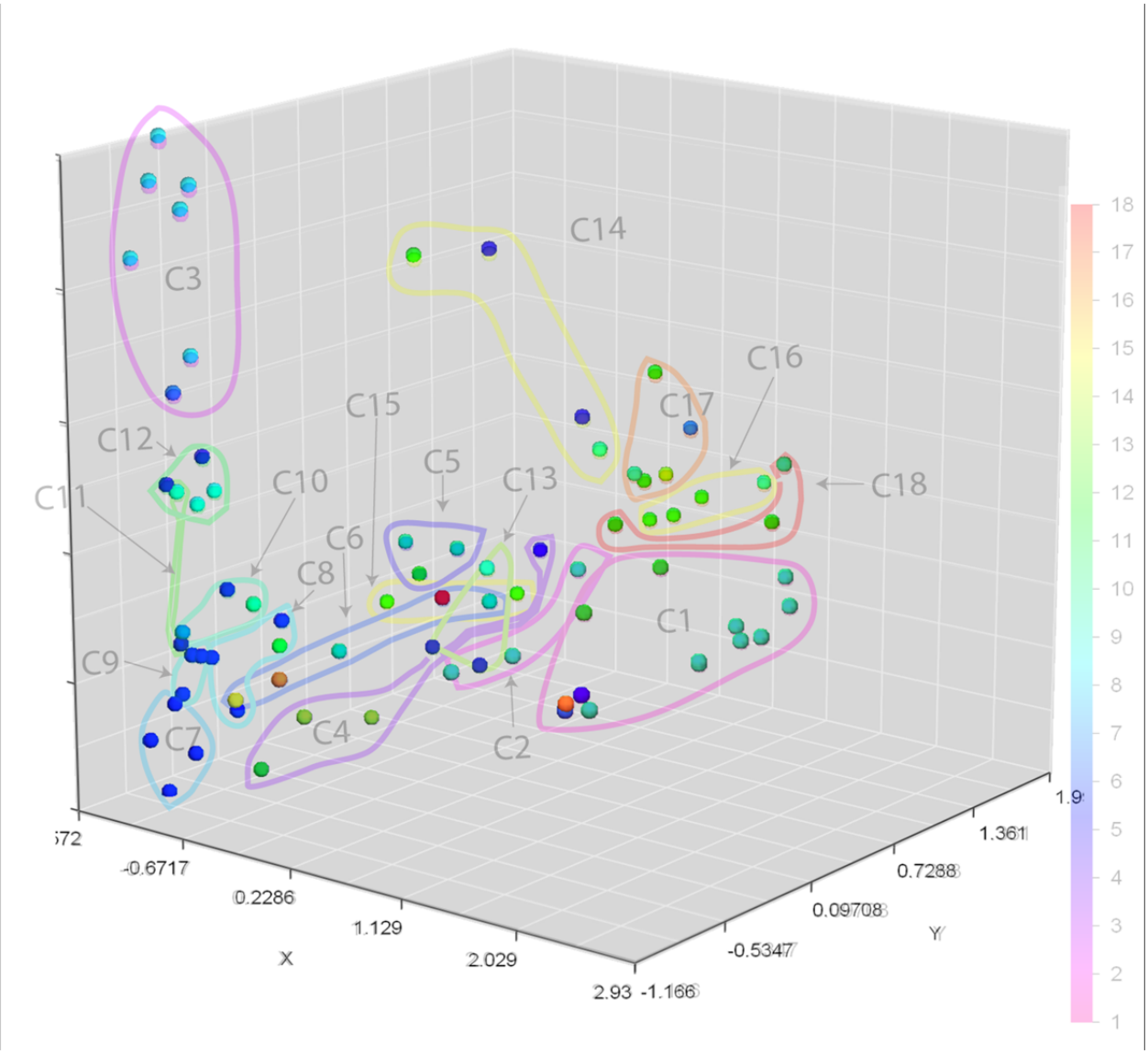

Figure 5 Research Field and Cluster Overlaid Model

Discussion and Conclusion

Multidimensional Scaling, used as a methodological tool, provides constructive analysis of the relationships between the most published authors in a given field (Web 2.0). The findings confirm a foundation within the Computer Science and Library and Information Science fields, however also displayed a significant community of authors within the Medicine/Health, Biomedical, and Bioinformatics fields. Unlike the intertwined relationship of the Medicine/Biomedical/ Bioinformatics, Computer Science/Library and Information Science do not appear as tangled. A clustering analysis found 18 subgroupings within a hierarchical framework. Some of the clusters included authors from unaligned fields, displaying the interdisciplinary nature of those authors.

Overall, the case study successfully demonstrates the use of MDS as a methodology. The resulting visualization illuminates unanticipated relationships, and provides unseen information. Furthermore, the inclusion of three-dimensional modeling tools allows better manipulation of the low-dimensional space. While the study highlighted the interdisciplinary nature of Web 2.0 technologies, its relative newness limited a more robust understanding. The sample population required using authors with as few as two publications on Web 2.0, thus limiting the authors' relationship to Web 2.0. Future research on more established subjects would best illustrate the limitation. Additionally, the limitation to only ISI ranked journals, due to the use of Web of Knowledge, may preclude some authors from inclusion in the study. The addition of non-ISI journals,

however, requires extensive additional variables, such as the selecting which journals to include/exclude, thus making the task ineffective.

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Email: A History of Syntax

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Abstract

Email is important. Email has been and remains a "killer app" for personal and corporate correspondence. To date, no academic or exhaustive history of email exists, and likewise, very few authors have attempted to understand critical issues of email. This paper *explores the history of email syntax*: from its origins in time-sharing computers through Request for Comments (RFCs) standardization. In this historical capacity, this paper addresses several prevalent historical mistakes, but does not attempt an exhaustive historiography. Further, as part of the rejection of "mainstream" historiographical methodologies this paper *explores a critical theory of email syntax.* It is argued that the ontology of email syntax is material, but contingent and obligatory—and in a techno–social assemblage. Email was instrumental in shifting computers from computation machines to text machines. Cryptography reappears throughout the theoretical and historical picture, as do love emails and postcards.

Introduction

This paper is an exploration of email technology,[1] which has received almost no academic interest. Some social scientists and management scientists have researched email, but these studies tend to take the technology as an unproblematic given. A central challenge of studying email technology is that it is many things and has grown and shifted through the forty years of its history. Proto–email performed some of the same functions email does today. The origin of email as the unintended application of file transfer protocols for communication (on time–sharing computers and across early networks) led to email technology that has a highly standardized syntax, for both communication protocols and header (or "routing") information.

The term "syntax" is especially problematic. Syntax has a relationship to order, but it is not clear how all of the uses in different fields articulate this orderliness. As I will use it, "email syntax" refers to the arrangement of word tokens in an appropriate (orderly) manner for processing by computers. Perhaps "computers" refers to syntactical processing, making my definition circular. So be it, I will hide behind the engineer's keystone of pragmatism. Email systems work (usually), because syntax is arranged such that messages can be passed.

This paper demonstrates the centrality of syntax to the history of email, and investigates interesting socio–technical issues that arise from the particular development of email syntax. Syntax is an important constraint for contemporary computers, perhaps even a definitional quality. Additionally, as machines, computers are physically constructed. Thus, email syntax is material. This is a radical view for the academy, but (I believe), unproblematic for the engineer. In fact, the methodology of this paper is radically empirical: it is historiography, and scarcely more.

Email is widely considered the original "killer app" and is of equal (or greater) importance to the most lauded computer technologies, such as networking, graphical user interfaces, or web browsers. Yet, despite the obvious importance, outside of software engineering email is poorly understood. Beyond anecdotes and a poorly–researched Masters thesis there is no email historiography. Email technology is ripe for critical theoretical research, like that being done on virtual reality, social networks, Web 2.0 and other topics.

In the past, ubiquitous (*i.e.,* important) technologies have succumbed to hagiography or falsehoods as neither "side" ("technical" or "critical") has managed to properly bridge the gap. On the one hand, part of the challenge of doing research on email technology has been to wrest control of technical domains from the technicians (engineers, designers, managers). Critical (social or philosophical) studies have often come from well outside of the technical field, and suffer from a lack of detail and technical clarity. Science Studies has arisen in recent decades as a considerable redress in this regard, and has sought to understand and problematize the issues. I see Science Studies as a methodological ally.

This paper is exploratory. There are limitations to the historiographical method employed, and the critical philosophy is speculative. Speculative, however, in the sense closer to that intended by the Speculative Realists. For example, F.W.J. Schelling sought to upend Fichte's transcendental philosophy

[1] There is no good term for this type of technology. I do not think that this analysis must be restricted to electrical computing and networks (fiber optics do not seem to obviate any of the claims), but simply "mail" is too broad (since I *do* want to distinguish between mail and email).

by seeing nature as producing the ideal. The appeal is that Schelling's position enjoys a kind of humility towards nature and the limits of human transcendental grounding. Technology is not just physics, but working out how we can sensibly talk about a theory of technology is very much the challenge here. As an empirical subject, there are limitations with a predominately documentary methodology. The proto–email history draws from a fairly wide documentary corpus (manuals, technical notes, and dubious secondary historical sources), while the later history draws almost exclusively from Request for Comments (RFCs).

My methodological commitments are: the acceptance of the explanatory power of exterior relations (and the rejection of interior relations), the recognition that technical decisions are (often) contingently obligatory, and a methodological reductionism to material reality. According to Michel Foucault, Gilles Deleuze and others, abstract concepts do not explain, but instead require explanation (*i.e.*, these thinkers espouse a form of nominalism). This is in contradistinction to Hegelian historiography, where any relations that happen to obtain between objects are extraneous and do not concern their nature. Hegel describes interior relations as such:

> This is what constitutes the character of mechanism, namely, that whatever relation obtains between the things combined, this relation is *extraneous* to them that does not concern their nature at all, and even if it is accompanied by a semblance of unity it remains nothing more than *composition, mixture, aggregation,* and the like (DeLanda, 2006, p. 9).

Instead, Deleuze's famous example of the wasp and orchid suggests that the assemblage of the wasp and orchid are obligatory but empirical. The wasp is accidently related to the orchid, but in a narrow Aristotelian sense. Parts may be exchanged between and among assemblages and change interactions, but the properties of the parts cannot explain the whole assemblage because the assemblage is not the sum of the interior relations, rather, it is the exercise of the parts. While some relations are occasional and circumstantial, some come to be obligatory through forces of coevolution or codevelopment.

These parts are not logically necessary (since interior relations have been rejected), instead, they are seen as *contingently obligatory* (DeLanda, 2006, p. 11). Contingently obligatory assemblages are empirical and historical (unlike logically necessary ones). According to Manuel DeLanda these relations of exteriority vacillate between a purely material role and a purely expressive role, where each part plays some role in the assemblage, aiding territorialisation or deterritorialisation (DeLanda, 2006, p. 12). This methodology is synthetic, but requires a *coding* process in which parts are (typically) held in hierarchies. The parts of the assemblage transform through steps adjusting to local conditions. Graham Harman argues that these parts conspire at each step to determine "where the possible variations can be addressed or ignored" (Harman, 2009, p. 15). Each step mediates non–neutral layers, what Bruno Latour calls a mediator. Harman describes the process of the mediator as such:

> A mediator is not some sycophantic eunuch fanning its masters with palm-leaves, but always does new work of its own to shape the translation of forces from one point of reality to the next. (Harman, 2009, p. 15)

The mediator contests. And, email *syntax* is, I will argue, one such mediator that has a will to power. Commitments to material reductionism are now brought to logical force, since nominalism, exterior relations, and coded layers of mediation do not require significant interaction of immaterial realities to function. Whether immaterial reality exists is *not* determined by these methodological commitments (I am agnostic on the existence of immateriality).

Hannah Arendt describes these technologies as a "loud voice for escape from earth." Not silent, these technologies scream as human and technology become one, cyborg–like. Mark Coeckelbergh argues that there is no longer an assembly of things distinct from an assembly of humans (Coeckelbergh, 2009, p. 3). Despite the scream, as technology goes through foldings with each step, the parts become more ubiquitous and banal.

Deriving a politics of artefacts is difficult. Revealing the politics of Patriot missiles or automobile seatbelts is the first step, but speaking politically about cupboards, stopwatches, alternating currents, or email is a much deeper challenge. There appears to be a gradation of politics with respect to artefacts, as Coeckelbergh admits,

> Consider companion robots, pet robots, household robots, care robots, sex robots, military robots, etc. Although such robots are only just emerging, they provide an interesting case, since they are more explicitly 'political' than many other artifacts. (Coeckelbergh, 2009, p. 3)

With no (necessary) distinction between humans and technology, what is it that permits gradations of the political? For the study of humans, it's a perennial question. More troubling still, how do ethics intersect with politics? A posthumanist answer, or at least an artefactual answer cannot involve claims to agency or intentionality. Coeckelbergh gives artefacts "speech", which he argues is sufficient for political engagement

but kills off the subject, leaving humans to wallow in *angst* (Coeckelbergh, 2009, p. 4).

But, discourse constructs categories and concepts. Social Constructivism is problematic because the constructed thing is not material or a subject, but rather, a concept. Ian Hacking argues that, for example, the social construction of women refugees is not women, but instead it is the category of women refugee (Hacking, 1999, p. 10). These categories, however, require explaining since they are not free of politics. Logically prior to these categories there exists a plane of immanence that, according to Deleuze, separates virtual and actual.

The plane of immanence is contested, for "before being there is politics" (Deleuze and Guattari quoted in Patton, *Deleuze and the Political*, 9). An assemblage may be the exercise of the parts, but politics comes before this exercise. We cannot study intentional practices to understand politics. Latour locates ethics or politics in the mediator, and calls all artefacts actants. Deleuze locates ethics or politics in lines of flight, and the interplay of territorialisation and deterritorialisation. Unlike a "scientific" analysis of the politics of email syntax, here, the reference and representation of email syntax is not important. Rather, on a plane of immanence social forces and natural or "machinic" forces stabilize identity, with each component of the assemblage working to do or undo actual identities. Both the molar and the molecular are written into the history, since it is necessary to understand both the military industrial complex that birthed email as well as the arbitrary decision to use the "commercial at" (@) symbol for dividing the username and hostname. The historical components interact as the assemblage called "email" permits and defines.

Writing Machines & Killer Apps

The proto–history of email testifies to the materiality of its syntax. From typewriters to computers to DARPA–funded networks, email formed a kind of 'fast text'. The problem is big, in fact, since "cyberculture cannot be understood without reference to the history of writing" (Milne, 2000, p. 100).

Email communication forms many assemblages, each territorialising or deterritorialising. Corporate email necessarily contains a legal appendage: a foot of legalese declaring privacy and confidentiality and non–culpability of the corporation is always included at bottom of the sent email. These corporate emails territorialise the chain letter or the link to a funny cat video getting passed on corporate time (and dime). Personal email also territorialises and deterritorialises, as different assemblages of technology get plugged in. Replace corporate legalese with a Google AdSense advertisement reading your love letters and you *feel* the territorialisation. It shocks you in to recognition of your capitalist consumption. Personal email deterritorialises through history, as email syntax changes to allow the sender to create new assemblages: first across time (time sharing computers), then eventually across global space and time. As standardization occurs, and new syntax is created to form new parts of email the process of territorialisation begins again. The material conditions of email are important, since, across time and space the collective assemblage of email technology *is* women, and war, and more. Esther Milne's argues that one ought to

> take seriously the work of theorists such as Friedrich Kittler, Katherine Hayles, and Donna Haraway, who focus attention on the material conditions of textual production and consumption by putting into question the idea of transparent unmediated communication. (Milne, 2000, p. 106)

Kittler argues that the technologizing of the body produced, initially, women as "the white sheet of nature or virginity onto which a very male stylus could then inscribe the glory of its authorship", then, women as *literally* "Type–Writer" (Kittler, 1999, pp. 186-187). This transubstantiation of woman to typewriter replaces sense perception and memory with inscription. Milne argues that Plato's *Phaedrus* was the first example of this techno–fear, soon followed by all literate societies (Milne, 2000, p. 101). With the typewriter's origins in war production by, among others, Remington and Son the "typewriter became a discursive machine–gun," ever quickly producing text (Kittler, 1999, p. 191). As women/typewriters were trained and made dexterous the speed of text increased.

In war, the speed of killing has increased: Roman's "decimated" (it's enough to kill $1/10^{th}$ the population), medieval city–dwellers outlived multi–year siege tactics, modern infantry sat in trenches dodging machine–gun fire, and today, smart bombs and drones nearly instantly vaporize the target. In text, speed has also increased. Speed is not a unique quality to email, yet it may occur that the speed of text and the speed of war continue in lock–step, as a couple tied to the same set of desires. Deleuze and Guattari state that "every machine, in the first place, is related to a continual material flow (*hyle*) that it cuts into" (Deleuze & Guattari, 2009, p. 36). For the typewriter, women are *hyle*. For war, cryptography is *hyle*. Underneath the *hyle*, as Aristotle realized in his own way, the changing 'substance' is the virtual, pushed along by desiring machines. Women and war are the desiring machines underneath email.

The Second World War moved text rapidly. Remington and Son's ersatz machine–guns were far

too slow for most communication, but the rapid medium of the day was broadcasted radio or too–easily tapped electrical communication cable (teleprinter). Like most wars, encryption was used.

Although the first encrypted messages were likely priestly, the first identifiably cryptologic system (kryptós) was, according to Thucydides, the *skytale* used by the Spartans for war–time messaging (Wrixon, 2005, p. 21). By World War Two encryption was using symmetric/secret–key algorithms that encoded messages on electrically wired rotor machines. The first of these rotor machines were invented in circa 1919, with the famous ENIGMA machine being commercially produced (but unsuccessful at first) in the early 1920s (Wrixon, 2005, p. 260). The American military begun encryption with the Electronic Cipher Machine (1925) that through many iterations was never subject to successful cryptanalysis. Conventional wisdom is that at Bletchley Park Alan Turing,[2] following Babbage's cryptanalysis techniques against polyalphabetic cyphers from the Crimean War, developed the "bombe" technique of cryptanalysis against the ENIGMA machine (Kittler, 1999, p. 255). The conventional story continues, that Turing was instrumental in the development of the modern computer, providing even faster text processing than the bombe drums developed in Bletchley Park.

Email is a war machine for many historical reasons. Remington and Son produced weapons and typewriters, and typewriters became computers (through cryptologic tools in war). Through cryptography war bodies (states and institutions) gain secret power. Deleuze and Guattari argue that

> it is the secret power (*puissance*), or strength of solidarity, and the corresponding genealogical mobility that determine its eminence in a war body. (Deleuze & Guattari, 1987, p. 366)

The tools of cryptography erase meaning (plaintext to cyphertext), but with private keys or cryptanalysis (exempting public–key cryptography for the moment) meaning can be re–inscribed. Political strength comes with the ability to create an *episteme* (in Foucault's sense) from cyphertext. The war machine is not external to the apparatus (Deleuze & Guattari, 1987, p. 354).

Text processing and communication are obligatory parts of war. The proto–history of email suggests that text processing was an odd twist to early 'computing', and propelled by the networks developed within the war efforts of DARPA. Deleuze and Guattari use a theory of games to understand war and the directionality of the game pieces neatly reflect the strategy of email. The coded pieces in chess and Go display relations of interiority and exteriority, respectively (Deleuze & Guattari, 1987, p. 353). Go functions as "pure strategy" in an open space, "without aim or destination". Go is a smooth space of *nomos*, while chess is striated like *polis* (Deleuze & Guattari, 1987, p. 353). In the end, chess codes and decodes, while Go territorialises and deterritorialises. Email has parts that function "without aim or destination" (such as Bayesian spam filtering), but most parts function like the coded pieces of chess, constantly territorialising.

To understand how the parts of email technology territorialise we must look at the development of the parts, starting with the proto–history of email as a form of communication on time–sharing computers. By the 1960s contemporary computers were available at military and university institutions (as well as private research organizations such as Bolt, Beranek and Newman). In 1965 Thomas Merrill and Lawrence Roberts at DARPA used Leonard Kleinrock's earlier packet–switching research to network computers using packets instead of switches (Leiner et al., 1997, p. 103). By 1967 the computers were being connected together under a DARPA initiative to create the ARPANET,[3] with BBN to supply the Interface Message Switchers (IMPs) (Leiner et al., 1997, p. 103).

The initial DARPA requirement for the ARPANET was to provide networking capabilities for resource sharing (Flichy, 2000, p. 3). A pioneering spirit for the ARPANET was Joseph Licklider who,

[2] It is quite well known that the "*bomba kryptologiczna*" technique for breaking ENIGMA encryption was developed in 1932 by Marian Rejewski, a Polish mathematician and cryptanalyst. The Polish Cipher Bureau (with the assistance of a French spy) kept their cryptanalysis current as the Germans changed rotors and introduced further complexity, until in 1939 when the Germans introduced two new rotors. The cryptanalysis problem was still qualitatively the same, but increased in difficulty substantially (jumping from 6 to 60 cryptanalysis drums). At this point the Polish shared their cryptanalysis techniques with the French and British allies. Turing and Welchman improved the techniques inherited by the Polish to break the new and more difficult ENIGMA machines. More complete histories exist, but this conventional wisdom with Turing as the candle in the wind pervades nonetheless.

[3] The Defense Advanced Research Projects Agency (DARPA) has been renamed several times; it started as ARPA but then in 1972 was renamed DARPA, then again renamed ARPA (1993), and DARPA (1996).

in 1962[4] argued that computers could be used for more than resource sharing. Licklider wanted "to improve man–machine interaction in teaching and learning, in planning and design, and in visualizing the internal processes of computers", in short, Licklider was a posthumanist in search of mind/brain augmentation through computing communication. Licklider later argued, "I wanted interactive computing, I wanted time-sharing. I wanted themes like: computers are as much for communication as they are for calculation" (Licklider quoted in Flichy, "Internet or the ideal scientific community," 3). Time–sharing for communication, not resource sharing, became the new computing prerogative.

While Licklider was laying the groundwork at DARPA for what would eventually become the ARPANET (which email would function across), Douglas Engelbart was developing the On Line System (NLS) Teleconferencing System at the Augmentation Research Center (ARC) in Stanford Research Institute (SRI). NLS was a very early implementation of networked computers that, in 1971, joined the ARPANET. Before the existence of the ARPANET, NLS was a system of networked communication that, unlike later ARPANET implementations used closed–circuit television to display terminals remotely (Englebart & English, n d, p. 5c3a). The Journal subsystem made NLS a unique and important precursor to email. The Journal subsystem was conceived in 1966 for the purposes of keeping a "log" of events, and performing a document–oriented communication system, described as "direct distribution". Direct distribution could send documents (memos, messages, data records, *etc*.) directly to invited participants through the use of a personal IDENT code (Engelbart's code was his initials, DCE) (Engelbart, 1975, p. 7c). IDENT codes were stored in a directory for lookup and were organized by group memberships (with multiple memberships possible). Documents were sent to a "mail box" and marked with a status, such as "For Action" or "For Information" (Engelbart, 1975, p. 7d). Depending on the length of the document, either a "citation" was displayed to the recipient (for later retrieval of the full document), or the entire document was displayed. The Journal began in 1966, a full five years before the accepted "official" start–date of email,[5] yet the Journal remained, co–developing alongside other systems of email. Many parts of the system were shared with proto–email systems, such as the IDENT codes, directory lookup and mailing lists (mirroring similar functionality developed later in email).

In 1961 Programmed Logic for Automated Teaching Operations (PLATO) II and Compatible Time-Sharing System (CTSS) introduced time–shared computing. Time–sharing quickly became popular and through the 1960s it was common to pass notes to other users by leaving a file for another user by placing it in a common directory. Tom Van Vleck suggests that it was common to title the file left in the common directory with a person's name, such as to tom (Vleck, n d). The first system to formalize a mail command occurred on CTSS running on an IBM 7094 at Massachusetts Institute of Technology (MIT). Between December 14, 1964 and January 8, 1965 the undated Programming Staff Note 39 for CTSS was written and distributed by Crisman, Schroeder, and Pouzin (Saltzer, 2010). In February 1965 Van Vleck joined the programming staff at MIT, along with Noel Morris shortly thereafter, and read Programming Staff Note 39. Programming Staff Notes did not describe implemented functionality for CTSS, instead they contained directives or ideas for future implementation.

Over the spring of 1965 Van Vleck and Morris read Programming Staff Note 39 and over the weekend of July 4th, 1965 they implemented the MAIL subsystem for CTSS using privileged commands on the problem number M1416 (Vleck, 2010). In December 1969, in the CTSS Programmer's Guide MAIL functionality is officially described, mirroring the syntax suggested in Programming Staff Note 39.[6]

[4] In 1962 Licklider joined two ARPA departments, *Behavioral Sciences* and *Command and Control Research Department*. In 1964 Licklider left ARPA, after *Command and Control Research Department* was renamed *Information Processing Techniques Office* (IPTO), reflecting Licklider's influence on time-sharing computers and communication processing. Flichy incorrectly argues that Licklider went from the publication of "Man-Computer Symbiosis" in 1962 (at ARPA, but previously at BBN since 1957, although Flichy does not mention this) to IPTO in 1964.

[5] This date, as we will see, is incorrect (or at least requires some subtlety to understand). Most people place the start of email with Ray Tomlinson's enhancements to SNDMSG in late 1971.

[6] Programming Staff Note 39 MAIL syntax is: MAIL LETTER FILE USER1 USER2 USER3 … . CTSS Programmer's Guide MAIL syntax is: MAIL NAME1 NAME2 PROB1 PROG1 … –PROBn– –PROGn–. NAME is the name of the file to be mailed, and PROB and PROG are, according to the CTSS Programmer's Guide, the "users to which mail will be sent", while the 1969 CTSS source code describes PROB and PROG as "DIRECTORIES TO WHICH IT IS TO BE SENT". The CTSS Programmer's Guide also includes the LIST option as well as * for recipients, meaning "all".

On COM5 of the 1969 CTSS source code listing the MAIL subsystem is in place, last modified by R. Roach on March 17, 1969. At this point no to: syntax had been developed, but the combination of PROB and PROG (the recipient's problem number and program number) mark a destination. The delivered mail includes FROM syntax in the form of FROM USRPB USRPG DATE TIME on the first line, thus identifying the sender's problem number, programmer number, and the date and time of transmission. In circa 1969 Vleck re–implemented MAIL for the Multiplexed Information and Computing Service (Multics) time–sharing operating system (Vleck, n d). The Multics MAIL syntax was slightly different (*e.g.*, mail VanVleck.Multics), and growing closer to the familiar username@host identification system developed by Ray Tomlinson in late 1971. These systems were not networked, so while they shared some of the features of later systems, they cannot be called email in the sense used today.

In many ways, networked email systems originated simultaneous to the formation of ARPANET and the RFC documentation structure formed to document ARPANET. The critical function and popularity of email ensured simultaneous development with ARPANET. RFCs are an interesting (and seldom studied) historical source: they are immutable, published in completed form with co–citations, and obsolete or update each other. RFCs also have varying statuses, and tend to describe completed (working) systems, rather than document "standards" to be developed. Finally, RFCs were developed somewhat organically and fell into a discernable style with rules only as they developed. The first 30 years of RFCs were "edited" by Jon Postel, where "edited" means shepherd, alter, develop, limit, and generally (benevolently) rule over. Since Postel's death (in 1998) the RFCs have been managed by a more democratic and formal body (under the auspices of the Internet Engineering Task Force).[7] Most of this paper is, in a sense, medieval. I start the "modern era" of email with the rupture at RFC 821 and RFC 822, that splits email systems in to two logically separate (but technologically inseparable) systems.

On April 16, 1971 RFC 114 was published to specify the File Transfer Protocol (FTP). FTP was instantly used to send email across a network using a mechanism very similar to mail passed on time–shared computers prior to Van Vleck's CTSS MAIL subsystem implementation. FTP relied on the early HOST protocols developed for the ARPANET–connected computers and if a user wanted to send email to a user of another networked computer he or she would log into the remote computer and leave a file for the user, just as the time–sharing users did previously.[8] As described in RFC 414, by November 29, 1972 "User–FTP" had come to encompass mail features including SNDMSG and a CALICO subsystem.

On July 20, 1971 Richard W. Watson proposed a networked email system in RFC 196, but this system was never developed. The significant advance in networked email came with the development of SNDMSG and READMAIL for the TENEX system on Digital Equipment Corporation's (DEC) Programmed Data Processor (PDP) 10 machine. The TENEX system was developed by BBN starting in 1969, and was made commercially available in 1973 (Murphy, 1989). According to M.A. Padlipsky, before Ray Tomlinson augmented SNDMSG in late 1971 some programmers had already "done a TENEX to TENEX mail hack"(Padlipsky, 2000). By the summer of 1971 Tomlinson had begun work on incorporating CYPNET[9] code in to SNDMSG, an existing non–networked mail program (Tomlinson, n d). Previously, SNDMSG was used to send local messages, or even used to send local messages from a remote Telnet connection. It is unclear when the corresponding email viewer READMSG was developed. RFC 369 "Evaluation of ARPANET Services: January through March, 1972" specifically mentions the use of SNDMSG for "Inter–personal communication", presumably across the ARPANET.

For the first five years TENEX machines and its header syntax dominated email traffic on the ARPANET (Crocker, Pogran, Vittal, & D. A. Henderson, 1977). RFC 524 proposed a networked and direct system of mail delivery, not dissimilar to Telnet (*i.e.*, remote) or FTP mail delivery. Although the system described in RFC 524 was almost certainly never developed, it was proposed that a series of commands would be invoked to facilitate direct login and delivery of email (as command and response). There was no logical separation between header syntax (destination and origin, *etc*.) and communication syntax (encoding and technical capabilities, *etc*.). Like the NLS Journal system, an IDENT code identi-

[7] A fuller study would be required to properly understand RFCs. This is a task for future research.

[8] M.A. Padlipsky argues that a decision was made in 1971 to "add mail to the [FTP] protocol". RFC 114, published on April 16, 1971 first describes FTP but makes no mention of any mail capabilities. RFC 171, published June 23, 1971, makes reference to mail systems using HOST capabilities, and thereafter references to FTP and the MAIL command become frequent throughout the RFCs.

[9] CYPNET appears to be an experimental FTP implementation, although I have been unable to locate any solid evidence on its construction or use.

fied the recipient, but using RECI syntax (for "recipient"). RFC 543 specified a mechanism to send email directly to the NLS Journal system (using either SNDMSG or FTP or Telnet). The SNDMSG syntax was "author(s), slash, recipient(s), optional semicolon and conversion algorithm," for example jew/mdk rww cr (Meyer, 1973, p. 2).

RFC 561 was published on September 5, 1973 as a stopgap measure to bring some order and interconnectivity to heterogeneous email systems, and to address obvious problems with the proposal suggested in RFC 524. Again, the proposed system was similar to Telnet or FTP mail delivery, even suggesting that existing MAIL commands or MLFL commands should be used to handle the data and login requirements. A header, or envelope metaphor was introduced, including FROM: DATE: SUBJECT: syntax, and room for a miscellaneous keyword.

There has been much debate over Tomlinson's decision to use the "commercial at" symbol (@) to divide username and host for his networked version of SNDMSG, but this decision was a trivial, although very visible, delimiter to distinguish local SNDMSG mail from networked SNDMSG mail. At this early stage in email's history the system was monolithic; SNDMSG was a basically a network application designed to send a specific type of file, not much different from the FTP MAIL command developed shortly thereafter. Later, as described in RFCs 821 and 822 the email system was split in to two logically distinct pieces.

RFC 821 and RFC 822 are arguably the most important RFCs for the history of email, marking a virtual schism. Prior to these two RFCs email is hodge–podge and entrenched in implementation, after these two RFCs email was *abstracted*. With abstraction, however, considerable documentary (and technological) complexity arose. While the "modern" era of email (after RFCs 821 and RFC 822) is characterized by two interconnected technologies (MIME and SMTP), the "medieval" era saw warring factions setting up fiefdoms. It took a more sophisticated documentary system (and various institutional organizations behind it) to set up an administration sufficiently robust to tie together all the pieces of email technology. To be sure, there are "medieval" attempts at the RFC 821 and RFC 822 split (MIME extensions were conceived in 1977), but the assemblage of socio–technical parts were not ready for the split (D. A. J. Henderson & Myer, 1977, p. 1).

By 1971–72 the 'envelope and letter' metaphor was still nascent, and email was conceptualized more like Engelbart's Journal system, taking its cue from libraries and publishing. Email had directionality due to the network communications systems, but little syntax beyond its destination. The to: header would finally be standardized with RFC 561, published September 5, 1973, although the syntax was almost certainly in use prior to this. The @ symbol to separate IDENT codes from host names (and signal a 'networked' email) was in use long before the to: syntax, destinations being specified interactively using MAIL commands, FTP, Telnet, or other mechanisms. Computers had finally come to mean much more than 'computation'.

Co–developing with email, the shift from 'number cruncher' that simply 'computes' to a 'text' machine was initially made possible by the invention of symbolic programming languages in 1947 (instead of 'direct programming') that allowed programmers to forget the materiality of code as well as the sense of 'instructing' for computation (Chun, 2005, p. 28). The new form was not just email, simultaneously it became letter writing in a foreign language.

Soon, the new model became string.h. Data typing reflects the shift from 'number crunchers' to 'text' machines (and eventually networked text machines). No historiography of data types exists, but of the first symbolic programming language (Fortran [1958], Lisp [1958], ALGOL [1958] and IBM RPG [1959]), quite significantly, none contained direct means for manipulating character or string data. Fortran contained Hollerith constants that were typeless, but the original *Fortran: Automatic Coding System for the IBM 704* manual omits mention of these constants, yet provides *two* numerical constants: fixed point and floating point.[10] Iterations of character and string data types (and functions) were to follow, including char, character, 'write text', printf and so on. These early machines were 'number crunchers', but by the late 1960s the model had shifted to fast text, formed as letters in foreign languages, and eventually in native languages as interactive programs replaced punch cards.

With war and rapid text machines, word processing became processors of sexuality, but not romance. The exclusion of women from "discursive technologies" prevents the "romantic love" of word processing, instead, "it is the business of couples who write, instead of sleep [sexually] with one another"(Kittler, 1999, p. 214). Mirroring the desiring machines of war, Deleuze and Guattari describe the desiring–production machines of email precisely:

> It is at work everywhere, functioning smoothly at times, at other times in fits and starts. It breathes, it heats, it eats. It shits and fucks. (Deleuze & Guattari, 2009, p. 1)

[10] The syntax for Hollerith constants was made explicit by Fortran 66, and is as follows: <*number of characters*>h<*characters*>.

The result of word processing is that "typed love letters… aren't love letters" (Kittler, 1999, p. 214). Word processors do not love, they fuck.

Email syntax is part of larger assemblages, both molecular and molar, interacting with extensional relations. The relations can be seen on the right side of the to: delimiter—sending an email to your boss, your lover, your friend. As Deleuze and Guattari note, "something on the order of a *subject* can be discerned on the recording surface," that is, email syntax is to:, from:, cc:, or Authentication-Results: (marking for spam), *etc*. (Deleuze & Guattari, 2009, p. 16). The recording surface of email is not like a stenograph, sent to anyone, like the game of Go "without aim or destination". Instead, email has an inescapable syntax that codes communication even when not desired. The coding is sexual:

> Just as a part of the libido as energy or production was transformed into energy of recording (Numen), a part of this energy of recording is transformed into energy of consummation (Voluptas). (Deleuze & Guattari, 2009, p. 17)

Email sent in love is not mere transcription, but a form of communication more procedural than love, perhaps something closer to consummation. As Kafka noted about his first love letter, the I, or the "nothingness that I am," disappeared under deletions or abbreviations (Elias, 2005, p. 5). The polished mirror of prose remains, only the to: or from: but not the subject. With so much lucidity in love email the Google AdSense algorithm that parses it scarcely seems out of place. Eventually, all love email turns in to AdSense, as the human relationship changes (from erotic to missionary) but the medium of communication does not; sexting is replaced by "remember the milk".

Territorializing & Deterritorializing: MIME & SMTP

History is dynamic and non–linear; this is especially the case with the history of technology. The history of catapults, for example, shows that rather than linear development from simple to complex, from small to large (or large to small), the catapult developed according to an assemblage of historical needs and accidents. Despite what older scholarship suggests, the catapult did not develop from non–torsion 'arrow–throwers' to more sophisticated torsion 'stone–throwers', and nor did the invention of a 'technologically superior' design obsolete older forms. For catapults, heavy stone throwers required administrative and labour organization to sort appropriate sized stones, and with the invention of the *trace italienne* and its low walls the trebuchet was useful for hurling fetid materials into enclosed water supplies, as the gunpowder cannon was for directly attacking low, strong walls. Social, political, and material relations—and *sheer chance*—all contributed to the assemblage. When reading early RFCs I was struck with how much of the development was backwards–looking and accommodating to interconnection with existing systems. It was widely recognized that email was an important system for any networked computers, but with ARPANET, BITNET, FidoNet, X.25 or even X.400 all offering competing technologies (at various times)—some including email replacements, some offering interconnectivity, and some completely foreign—we see historical traces of differing email technologies interacting on many different technical and communication substrates.

N. Katherine Hayles has imported from archaeology two useful concepts for understanding technological development: skeuomorphs and seriation charts. As Hayles describes it, a skeuomorph is "is a design feature, no longer functional in itself, that refers back to an avatar that was functional at an earlier time" (N. Katherine Hayles, 1994, p. 446). Further,

> skeuomorphs visibly testify to the social or psychological necessity for innovation to be tempered by replication. Like anachronisms, their pejorative first cousins, skeuomorphs are not unusual. (N. Katherine Hayles, 1994, p. 446)

In fact, once you are made aware of skeuomorphs their existence is pretty boring. Skeuomorphs act as cognitive crutches for humans, or as Hayles puts it, "skeuomorphs act… as threshold devices, smoothing the transition between one conceptual constellation and another" (N. Katherine Hayles, 1994, p. 447). In this sense, they are similar to seriation charts, which "depict… changes in an artifact's attributes [that] reveal patterns of overlapping innovation and replication" (N. Katherine Hayles, 1994, p. 445). A skeuomorph is a physical artefact testifying to an earlier design requirement (Hayles gives the example of the fake stitching on her car's vinyl dashboard), and a seriation chart is the dynamic morphology of the artefact, or, "overlapping innovation and replication" when a seemingly necessary design arises out of contingency (N. Katherine Hayles, 1994, p. 446). Seriation charts are the archeological term for those artefacts that come to be "contingently obligatory".

For email, many early design decisions seem obligatory, but to completely different systems: for example, the SOML command that maintained appearances of direct "instant messaging" (common when multiple terminals were in a centralized and local system). Likewise, email syntax was frequently delimited by special keys (CRLFs for ending lines, or

the @ symbol being repurposed from the kill command in Multics), this points back to time when control of computers was more direct—if not quite direct programming—and before the widespread use of daemons and store and forward systems. A pervasive seriation is the reoccurring use of the keyword syntax, from the NLS Journal system's model of library and publication systems, which came and went in different forms as email syntax developed. keyword syntax points to the cognitive and political challenges regarding the use of email—its widespread use as a personal communication system but its funding as a corporate or research memorandum and document system. The challenge was that research required categorization for information retrieval, yet categorization hardly made sense for personal communication. Many of the email skeuomorphs signal a pre–computer era, such as cc: (carbon–copy), bcc: (blind carbon–copy), POSTMASTER as a reserved name, and the HELO command for initiating a new MAIL connection.

Conceptualizing email systems as material helps understand the importance of skeuomorphs and seriation charts. If email developed in the noumenal world, as immaterial bits, the seriation chart no longer has the gravitas of the contingently obligatory. In fact, as Hayles argues with respect to Foucault's panopticon—that the panopticon abstracts power out of the bodies of disciplinarians to give the panopticon its force—the perception that email is an immaterial and dematerializing system is what gives email its force (N. Katherine Hayles, 1993, p. 153). The materiality of email syntax exposes lines of flight and robs email of its power. According to Hayles, a media–specific analysis is required, for failing to recognize the electronic materiality of digital texts "impedes the development of theoretical frameworks capable of understanding electronic literature as media–specific practices that require new modes of analysis and criticism" (N. Katherine Hayles, 2004, p. 71).

Yet, when Hayles calls for a "media–specific analysis" she appears to have in mind the new sense of media, from the Oxford English Dictionary: "The main means of mass communication, *esp.* newspapers, radio, and television, regarded collectively; the reporters, journalists, etc., working for organizations engaged in such communication." But, a much older sense of the word highlights a different specificity, "An intervening substance through which a force acts on objects at a distance or through which impressions are conveyed to the senses." It is this latter sense that I think highlights materially specific, radically empirical, historical aspects. Hayles' (1993) position *blocks* the possibility of (strong) posthumanism, since she rejects the material combination of human body and technological artefact. Of the phrase "He is *into* computers" she argues that it "implies that the body can flow into and occupy objects or even concepts as if they were spaces—a feat hard to imagine if the body is a material structure, but commonsensical if it is an informational pattern" (N. Katherine Hayles, 1993, p. 167). Hayles reduces technological systems to information systems. Hayles seems to have been seduced by the power of electronic systems, thinking that they dematerialize everything, leading her to postulate that

> With word processing, the touch grows lighter and the friction of textuality decreases almost to zero. The smallest keystroke can completely reformat the text, move it to a new location, or erase it altogether. (N. Katherine Hayles, 1993, p. 165)

If only the development of computer systems was so easy! From the perspective of the end–user the system does seem immaterial, as Clark's Third Law suggests: "any sufficiently advanced technology is indistinguishable from magic." Yet, a more subtle analysis reveals an assemblage of the techno–social, requiring considerable effort to stabilize identities that are contingently obligatory.

Hayles is partially correct—email is an information and communication system. But, rather than being so light to the touch as to appear immaterial, email is closer to the appearance of a postcard. Header syntax is always exposed, even in the case of encrypted messages, so unlike an anonymous letter (or even an enveloped letter), email shares qualities of mass communication. Godard compares television and film, for example, to "the sending of 25 postcards per second" (Elias, 2005, p. 5). Email is a kind of rapid postcard, like film. As an electronic postcard, email might offer an updated version of the Beat Poets' project of "open secrecy". Said to "declassify the secrets of the human body and soul" open secrecy was associated with the "the Romantic idealization of spontaneity, the letter promised to extend the originally oral, intimate, and mutual confessions of the early Beat circle" (Harris, 2006, p. 59). As communication technologies become more cyborg–like communication is likely to become less "private" in the increasingly outmoded sense of "secret", but instead more like a postcard or an open secret, simultaneously subversive and informative. Truly secret communication is more like terrorism (by the state or otherwise), whereas an open secret has political relevancy and potency.

Derrida recognized that postcards are especially open–ended communication media, since, without a stamp the postcard will never reach its destination, and words that never arrive are "rendered unreliable" (Derrida, 1987). Yet, truth can transcend media, since it does not require a stamp to arrive.

Email, like the postcard, is a media with "double potential": it can transmit a message or it can interrupt a message (if the card never reaches its destination). This is unlike the telephone or instant messaging, which is interactive and supplies contextual clues to the sender when the message has been or has not been received. Elias writes, "when the message is original, it has a textual structure; when the message is potential, it has hermeneutic structure" (Elias, 2005, p. 9). Love emails, more than any other kind,[11] are hermeneutical because context has been robbed. The material substrate is clean, almost hermetic, and directional, since to: and from: sit right at the top—perhaps spoofed, but never "your secret admirer."

The codings of technological relationships are more than just signification and discourse. Hayles argues that the "relation between assembly and compiler languages is specified by a coding arrangement, as is the relation of the compiler language to the programming commands that the user manipulates" (N. Katherine Hayles, 1993, p. 166). Indeed, the coding is a techno–social assemblage.

Cryptanalysis broke the mechanical coding of war, just as some future technology will break the coding of global networks. Already, sophisticated search engines seem poised to render seemingly intractable topological relationships visible. The black box of technology never completely opens, however, just as cryptanalysis today is exceedingly difficult against well designed algorithms of sufficient key length. With the correct key, however, the meaning is always available, just obfuscated.

Obfuscation is available by other means. The existence of spam helps hide messages from network analysis, and when combined with other stenographic techniques email can facilitate anonymous communication. New stenography techniques, such as "chaffing and winnowing" allow information that has been packetized (by TCP/IP) to hide; it takes a secret key and the complete transmission to be able to sniff the message. All stenography must be indistinguishable from the "noise floor" of the carrier, so there must be redundancy in the carrier message for stenography to hide. Cryptography and stenography may offer lines of flight, but "open secrets" might also. Any privacy enhancing technologies should be viewed with suspicion, since they enclose meaning and politics.

Summary & Future Work

This paper set out to explore a critical theory of email syntax using a historical methodology. This paper showed that from cryptography and women and war, email became a dominant communication technology. Email has its origins in time–shared computers (notably the TENEX operating system) and the NLS Journal system. Email co–developed with other computing technologies to shift from "number crunching" to a fast text machine. These machines are not just discursive, but are desiring: that is, they make love and war. Skeuomorphs and seriations identified the materiality of email syntax. Email is metaphorically associated with postcards, which were used by Beat poets as "open secrets" to subversive and political ends. Cryptography, stenography, and other codings can provide communication subversion and lines of flight, but since these communications eradicate meaning (even temporarily), we should be suspicious of the political effects of these technologies.

Further research on this topic is required. The history of computing technology in general is still very poorly understood. This paper did not trace the history into the "modern" era (past RFC 821 and RFC 822), but interesting developments have been made and are worth studying. Although figures such as Latour have been developing capable ethical and political understandings of artefacts, further research is required, especially as becoming cyborg is increasingly a real possibility.

[11] Second to love email in terms of hermeneutical structure is surely the sending of emails to bosses or PhD advisors.

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Getting Online with Student Satisfaction: An Exploratory Study

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Background

Since its early beginnings, distance education in a variety of formats has provided students with opportunities that may otherwise be unavailable. The explosion of the Internet and information age within the past two decades has encouraged more university programs to offer diverse forms of distance education. In 2008, the National Center for Education Statistics reported 82 percent of public four-year degree-granting institutions offered graduate courses in a nontraditional format (Parsad, Lewis, & Tice, 2008, p. 5). This access is not only advantageous for the students but to the community as well because it allows for the creation of a diverse workforce, often specially crafted to fulfill specific shortages within the community.

A series of reports from the Virginia Department of Education (VDoE) and the Virginia Educational Media Association (VEMA) identified such a need for licensed school librarians in Virginia. School librarians were listed on the state's "Top 10 Critical Shortage Teaching Endorsement Areas in Virginia" for the 2003-2004 and 2008-2009 school years (VDoE, 2005; 2008a). A critical shortage area is defined by VDoE as: "(1) shortages by subject matter as designated from the top ten academic disciplines identified in an annual survey of school divisions; or, (2) a school personnel vacancy for which a school division receives three or fewer qualified candidates" (VDoE, 2008a). VDoE uses a survey to collect data regarding personnel licenses from its 132 school divisions each year. The need for critical shortage educators is so great that in 2001, the Virginia General Assembly passed legislation allowing retired teachers to be hired for these positions with process revisions made in 2008 (VDoE, 2001; 2008b). VEMA, the professional organization for school librarians in Virginia, echoed the need for licensed school librarians with a 2000 survey report drafting a timeline of current librarians' expected retirements (Wilson, 2000). This report estimated that over half of surveyed school librarians were planning to retire by 2010. Data from this report identified two specific regions of the state as having greater need than others in Virginia. These regions included isolated, rural areas of southwestern Virginia and more heavily populated, urban areas in northern Virginia.

In order to address this need for licensed school librarians in Virginia, Library Science faculty in the Darden College of Education at Old Dominion University (ODU) received a three year grant from the Institute of Museum and Library Services (IMLS) to develop and implement an online program to educate school librarians. The program was designed specifically for licensed teachers to earn their endorsement as school librarians in the two regions of Virginia labeled as critical shortage areas. Program recruitment began in 2005 with the first cohort of students starting classes in the spring of 2006. Recruitment continued throughout this time with the second cohort of students beginning coursework in the spring of 2007. The endorsement program consisted of eight classes with students taking two each semester and finishing coursework in approximately a year and a half, or four semesters. Students had the option of earning the degree of Master's of Science in Elementary or Secondary Education with ten credits of additional coursework.

Purpose

The main purpose of this study was to research student satisfaction in an online program in an effort to influence and develop best practices in distance education. This research documents the satisfaction of two separate cohorts of licensed and working teachers enrolled in the same online program to earn their school library endorsement. The first cohort of students finished the program in the spring of 2007, and their satisfaction with the online program was measured at that time (Reed, 2007). Pribesh, Dickinson, and Bucher (2006) also studied this first cohort of students and compared their course performance with face-to-face students enrolled in the same course the same semester. The study reported here specifically measured the graduate student satisfaction of the second cohort of students to progress through the online program; these students reached program completion one year after the first cohort in spring of 2008. Then, the research compared the satisfaction levels of both cohorts. Based on the high levels of student satisfaction documented for the first cohort and the duplication of coursework, procedures, and instruction, it was anticipated that the results from this study would reveal high levels of satisfaction for the second cohort of students in the online program. The researcher also predicted the second cohort would exhibit lower levels of satisfaction in the same areas as the first cohort, mainly those

relating to course workload, study environment, and comparisons with face-to-face modalities.

Research Questions

Research questions focused on three areas of satisfaction addressed by the testing instrument, in addition to differences between the satisfaction levels of the two cohorts of online students. These questions included: (a) What was the level of student satisfaction concerning communication in the online program?; (b) What was the level of student satisfaction concerning the quality of courses in the online program?; (c) What was the level of student satisfaction concerning the online delivery of courses in the online program?; and (d) Are there statistically significant differences between the satisfaction levels of the first and second cohort of students in the online program?

Literature Review

An extensive review of the literature illustrated various methodologies and lenses used to research student satisfaction with distance education. This researcher chose to examine the literature studying satisfaction based on the areas of communication, quality, and online delivery of courses as highlighted by the testing instrument used to collect data for this study. This instrument was first developed by Biner (1993) to measure student satisfaction in televised courses and later modified by Bolliger (2004) to specifically address satisfaction within online programs. Many studies have researched how these three factors, communication, quality, and online delivery of courses, affect student satisfaction with the online format. Consequently, a wide variety of contradicting and concurring findings have emerged from the collected data.

Communication

Communication in an online course consists of feedback between students and instructor or other program staff in regards to policies and procedures as well as grading. Accessibility and availability of instructors and program management are important concerns of online students (Reed, 2007; Wang & Lin, 2007). Research from Mupinga, Nora, and Yaw (2006) revealed four of the top five expectations students had prior to beginning online coursework related to issues of communication including feedback on student work, email and phone call responses, verifying receipt of student work, and basic communication with instructors. Communication in an online setting requires much effort from all parties involved. Questions and issues easily resolved in a face-to-face setting can escalate into larger miscommunications when online students do not take the time to post questions, read questions from classmates, or email instructors (Frey, Alman, Barron, & Steffens, 2004). Standardization of policies, procedures, and organization among online programs helps to facilitate communication and understanding for students, staff, and faculty (Frey et al., 2004). Research has also suggested that communication is integral for project-based learning activities in online programs and can affect grading outcomes for students (Pribesh, Dickinson, Bucher, 2006).

Findings in the literature concerning interaction among online course participants, including classmates, instructors, and other program staff are contradictory. Some research suggests interaction is a very important factor in course satisfaction (Bikowski, 2007; Bray, Aoki, & Dlugosh, 2008; Lim, Morris, & Yoon, 2006; Sher, 2009). In a longitudinal case study following pre-service teachers from their first class in a graduate education program to the end of their first year employed as teachers, participants perceived interactions with classmates as being among "the most important activities preparing them for knowing how to teach" (Schweizer, Hayslett, & Chaplock, 2008, p. 19). Interaction between the student and content has also been related to online satisfaction. Higher levels of satisfaction were found to be correlated to printing out materials from an online course (Lim, Morris, & Yoon, 2006). Other research indicates the opposite. Opportunity costs associated with the flexibility of the online format were found to outweigh the need for class interaction for some students (Braun, 2008; Lim, Kim, Chen, & Ryder, 2008). Moreover, Wyatt (2005) measured no significant difference between students' perceived levels of interaction in an online and traditional classroom.

Quality of Courses

According to the annual *National Online Learners Priorities Report* in 2007, the quality of online courses is an important area where many programs still need improvement (Noel-Levitz, Inc.). Perceptions of quality are influenced by a variety of factors including instructors and their individual teaching styles. Studies have shown that it is important for instructors to develop and adapt teaching styles to accommodate varying learners in an online setting just as they would in a traditional classroom (Hutchinson, 2007; Rovai, 2002). While studies have sought to find a precise learning style prevalent in students enrolled in online coursework (Hutchinson, 2007; Liu, Magjuka, & Lee, 2008), others have found a prevailing preference for independent learning as a unifying characteristic among many online students. Using the Myers-Briggs Cognitive Style Inventory to measure personalities, Mupinga, Nora, & Yaw (2006) found the majority of online students in their study of 131 undergraduates tested as introverts. According to researchers, this finding was "not surprising because

introverts need space and time alone, making the Web learning environment ideal" for this particular personality type (p.187). Bray, Aoki, & Dlugosh (2008) reinforced this finding with research indicating online students who had no preference for interaction had higher satisfaction levels than students who preferred interaction in the classroom.

Online Delivery of Courses

Student satisfaction with the online delivery of a course is also influenced by a variety of factors, some controlled by university programs and others by the individual student. The impact of course management systems chosen by online programs must be considered, in particular the methods and options offered by the course platform to facilitate the creation of a community among learners. More personal factors affecting student satisfaction include the students' personal technology proficiency in addition to the physical learning environment available to or developed by each student while they are engaged in online coursework.

Institutions use an array of different course management systems, including Blackboard and Moodle, for graduate online programs. While students, faculty, and staff may hold personal preference, studies have yet to reveal any significant differences among levels of student satisfaction associated with each type (Dahl, 2005; Frey et al., 2004). These course management software programs have many interactive communicative features that serve as connections for online participants to develop a class sense of community. Spirit, trust, common expectations for learning, and online interaction have been found to be critical in growing feelings of community with online courses (Rovai, 2002). In addition to these concepts, Bitkowski (2007) cited three main components to building a group identity in the online classroom: a) Individual factors like personality, interest, and computer proficiency; b) Sharing of course and personal information; and c) Support from faculty, classmates, and the technology itself. Throughout the literature, instructors have often used discussion boards to promote a sense of community within online classes (Frey et al., 2004; Gross, 2002). However, Stein (2004) advises that discussions work best when guided and summarized by the instructors.

Issues with technology are another factor of student satisfaction with the online delivery of courses that varies across the literature. Some students cite technology concerns as most critical in suggestions for program improvements (Bikowski, 2007; Bray, Aoki, & Dlugosh, 2008) while other studies have found that technology issues do not significantly affect student satisfaction in online formats. Research from Rodriguez, Ooms, & Montañez (2008) suggested that students with no prior online coursework were motivated to develop technology skills, but this factor did not influence their culminating course satisfaction. Further research also indicated no statistically significant relationship between Internet experience and student satisfaction (Sher, 2009). Conversely, Barakzai and Fraser (2005) measured computer expertise with a survey and reported that more tech-savvy students were more satisfied with their online program. In addition, Du (2004) measured a linear relationship between student levels of technology proficiency and perceived levels of satisfaction of their online courses: the higher their ability in using the technology, the greater the satisfaction reported by the students.

The literature review studied findings from various studies dealing with online student satisfaction. Researchers have discovered many factors influencing the satisfaction of online students in the areas of communication, quality of courses, and online delivery of courses. Communication, especially with instructors, is critical to student satisfaction in the online format. Student satisfaction with the quality of an online course can be affected by the instructor, class sense of community, and students' personal learning styles. Choices in course management systems and the personal learning environment of the student including technology proficiency have been found to not only affect student satisfaction, but also the student's ability to learn effectively. The literature review set a foundation for this study to achieve its main purpose: interpreting factors underlying student satisfaction in an effort to improve distance education.

Methodology

As distance education becomes more widespread, researching student satisfaction in online programs is critical in order to develop and inform best practices. The purpose of this research was to measure influencing factors on course satisfaction with two groups of students enrolled in the same online endorsement program for school librarians. Since data from an initial study will be compared with this study, the researcher replicated the research design and methodology of the first cohort study (Reed, 2007). Survey research was performed and data were investigated using an unpaired *t* test. The data gathered provide critical evaluative information regarding the perceived satisfaction levels of two similar populations of online students.

Respondents

The populations of students participating in both the first and second studies were similar in a number of ways. Both groups started with 20 full-time, licensed teachers from two diverse urban and rural regions of Virginia labeled as critical shortage

areas for school librarians. Both cohorts finished the program with 18 students, an attrition rate of 10%. Within these populations, 17 out of both groups of 18 students were female. Eleven and eight students from the first and second cohorts respectively resided in the targeted rural region, and seven and ten students respectively resided in the targeted urban region of the state. Chi-square Tests for Independence based on regional and gender differences indicated no statistically significant differences between the two groups of students. Also, both cohorts followed the same course schedule, workload, and residencies throughout the entire endorsement program. Tuition and fees as well as traveling stipends were supplied to both groups of students as part of grant funding from IMLS to begin the online program. The researcher recognizes a major challenge with comparing students between these two studies is that the two groups will naturally have different experiences and perceptions of this program based on their own personal expectations and circumstances as well as course discussions and interactions. Nonetheless, the above mentioned evidence supports the fact that these two groups are similar enough to compare survey data.

Testing Instrument

The survey instrument used to measure student satisfaction for both cohorts was first developed by Biner (1993) and then adapted by Bolliger (2004) to address the online format. The researcher for the first cohort of students slightly modified the instrument to specifically address this online program (Reed, 2007). The survey included 42 questions addressing the three factors of communication, quality of courses, and online delivery of courses. A final open-ended question asked the students for any other specific suggestions or comments they had regarding the program; however, due to space constraints, this information is not thoroughly examined in this paper. For the other 42 questions, respondents had a choice of five answers measured on a five point Likert Scale with "Strongly Agree" equaling five points; "Agree" equaling four points; "Do not know" equaling three points; "Disagree" equaling two points; and "Strongly Disagree" equaling one point. Students were sent this survey and a cover letter three weeks after they finished their online coursework. In the study of the first cohort, 16 of the total 18 students responded to the survey upon course completion in the spring of 2007, a response rate of 89 percent (Reed, 2007). This study focuses on the second cohort of students. Of the 18 total students in the second cohort, 15 surveys were returned at an 83 percent response rate.

After the surveys were returned, the data collected from the second cohort were analyzed based on measures of central tendency, including the mean and mode of each question on the five point Likert scale. Given that each survey question related to one of the three factor areas, the data were broken down into three groups and analyzed as part of determining the specific level of satisfaction within each of the three areas: communication, quality of courses, and online delivery of courses. After measuring and analyzing the data from the second cohort, an unpaired *t* test was used to provide comparison data between the two cohorts, measuring for statistically significant differences in each area. Although this was a step forward from the first study, replicate analysis measures were used to determine the overall student satisfaction with this online program in the first three years of its infancy based on the perceptions of its first two cohorts of students.

Findings

Student satisfaction with the online graduate program for licensed teachers to become school librarians was measured focusing on the factors of communication, quality, and online delivery of courses. The mean and mode of each question was calculated to determine the average level of student satisfaction for the differing questions. To this researcher, means higher than four indicated high levels of graduate student satisfaction. This figure was chosen because it represents a midpoint between the three highest satisfaction scores and this study was focused on the factors affecting students' positive levels of satisfaction in their online program. Since the raw data was not available from the study of the first cohort of students, the means of the second cohort were compared to the mean data recorded in the preliminary study with the first cohort (Reed, 2007) using an unpaired *t* test to measure statistically significant differences in satisfaction in the three areas. Carifio and Perla (2008) indicate this statistical procedure as an appropriate way to analyze such data.

Communication

Fourteen questions focused on the area of communication within the online program. The mean and mode for each question were calculated and compared to the mean and mode scores the first study measured using an unpaired *t* test. The only question found to hold a statistically significant difference was question three, dealing with timely feedback from instructors. The total mean for the fourteen communication survey questions was 4.28 with a mode of 4.00 for the second cohort and 4.04 with a mode of 4.00 for the first cohort. The grand total mean and mode for this area combining both cohorts' satisfaction levels were 4.24 and 4.00, respectively. Both cohorts measured similar satisfaction levels with communication in the online program, with the exception of the question regarding timely feedback of

assignments where the second cohort's satisfaction was significantly lower than the first.

Quality of Courses

There were nine survey questions concerned with student satisfaction surrounding the quality of courses in the online graduate program. The researcher calculated the mean and mode for each question as it related to course quality and then compared both scores to the first cohort's scores using an unpaired *t* test. For this area, no questions were found to have statistically significant differences in satisfaction levels between the two cohorts. The total mean of the nine questions addressing the quality of courses was 3.84 with a mode of 4.00 for the second cohort and 4.08 with a mode of 4.00 for the first cohort. The grand total mean and mode for this area was 3.96 and 4.00, respectively. Both cohorts measured similar satisfaction in the quality of courses for this online program.

Online Delivery of Courses

The survey instrument included eighteen questions directed towards satisfaction in the online delivery of courses throughout the online graduate program. For this area, no questions were found to have statistically significant differences in satisfaction levels between the two cohorts. The total mean for all eighteen survey questions dealing with the online delivery of courses was 4.16 with a mode of 4.00 for the second cohort and 4.04 with a mode of 4.00 for the first cohort. The grand totals for both cohorts measured a mean of 4.10 and a mode of 4.00. As with the other two areas, both cohorts measured similar levels of satisfaction with the online delivery of courses in this program.

This study measured a total mean of 4.17 with a mode of 4.00 for all of the survey questions, one through forty-two, for the second cohort of students to graduate from the online program for school librarians. The study of the first cohort of students measured a total mean of 4.13 and a mode of 4.00 for survey questions one through forty-two. No statistically significant difference was measured between the satisfaction means or the modes of both cohorts. The combined mean totals of the two cohorts calculated together measure a mean score of 4.15 with a mode of 4.00 for total student satisfaction in the online program as reported by its first two graduating classes.

Discussion

Overall, both cohorts reported high levels of satisfaction in the three targeted research areas of communication, quality, and online delivery of courses. To this researcher, Likert survey responses and measures of central tendency of 4.00 and above indicated high levels of satisfaction with the addressed areas of the online program. As predicted, there was no significant difference in the overall satisfaction between the two cohorts. However, the third survey question dealing with timely feedback did measure a statistically significant difference and is discussed further in the following analysis sections.

Communication

Two questions in this area scored means under 4.00 on the survey of the second cohort. Question three, "Feedback and evaluation of papers, tests, and other assignments were given in a timely manner," scored a 3.93; however, only two of the fifteen students marked responses under 4.00 with ten and three students indicating 4.00 and 5.00, respectively. The two lower scores caused this low mean of 3.93. The first cohort indicated a much higher level of satisfaction for question three with a mean score of 4.76. This was the only survey question indicating a statistically significant difference in satisfaction between the two cohorts. This difference may be due to the only two instructor changes between both cohorts of students. These two instructors were specifically identified in the final open-ended question on the survey by a number of students. One student commented that feedback from these two instructors was "almost nonexistent" while another stated they "didn't seem to know much about their subjects."

The second question indicating lower levels of satisfaction for cohort two was question thirty-five, "There was more interaction between all involved parties in the online courses in this program." Involved parties in the online courses included instructors, program directors, and program and department staff. The total mean score was 3.80 with five students each scoring 5.00 and 4.00, two students scoring 3.00, a response of "Do Not Know," and three students scoring 2.00, a response of "Disagree." With one third of the students scoring under 4.00, agreeing with the statement in question thirty-five, data indicate that the almost completely online interaction of this program may not have been appropriate for these specific learners. Conversely, these students may benefit from more interaction when engaged in learning, as supported by some of the research studied in the literature review (Schweizer, Hayslett, & Chaplock, 2008).

These survey responses reinforce the importance of communication within an online learning setting as concluded by previous researchers (Frey et al., 2004; Mupinga, Nora, & Yaw, 2006; Reed, 2007; Wang & Lin, 2007). The findings from this study also indicate that clear and concise feedback on assignments is critical to student satisfaction in an online course. Furthermore, these results suggest that interaction is an important consideration of both in-

structors and students participating in online coursework.

Quality of Courses

Two questions in this area indicated a mean satisfaction level under 4.00 for the second cohort. Question thirty-nine, "I was satisfied with the workload required for this program," scored a mean of 2.82 for cohort two. Dissatisfaction with the workload was reinforced by open-ended survey responses indicating that the workload was "intense" and "overwhelming" to some students. This low level of satisfaction could be connected to a variety of factors. First, students enrolled in this program were all working teachers and not full time students. They may need to take one class per semester instead of two in order to give them more time to engage in their class work, professional, and personal lives. Also, these students may benefit from support in developing their time management skills so the workload is more manageable for them. Another suggestion from the open-ended responses was to overestimate work times for projects and "include samples" of projects within the syllabus.

The other question measuring low satisfaction for the second cohort was number 40, "I was satisfied with my final grades for classes in this program," which scored a mean of 3.87. The reasoning for question 39 dealing with course workload may also explain the low mean for question 40. The instructor change for two of the courses could be another influencing factor. While the project and course requirements remained the same for both of these courses, instructors naturally bring varying expectations and personal standards. Nonetheless, consistency is key within an online program employing an intense course timetable such as the one studied here. In addition, as indicated in previous research, instructors must be prepared to adapt teaching to their specific students' strengths and weaknesses as learners in the online environment just as they would in a traditional classroom setting (Hutchinson, 2007; Rovai, 2002). This could be an influencing factor on the students' perceptions of the quality of online courses.

Online Delivery of Courses

The second cohort of students revealed a mean score of less than 4.00 out of a possible 5.00 for three questions within this area. Question fifteen, "I was satisfied with the use of chat software," scored a 3.73 with three students marking a response of five, "Strongly Agree;" eight students responding with a score of four, "Agree;" one student marking a response of three, "Do Not Know;" and three students indicating a score of two, "Disagree." This mean may be reflective of the students' personal familiarity with chat software and various types of interactive technology used in the coursework. These findings reinforce some research of online formats studying how students' technology proficiency affects their course satisfaction (Barakzai & Fraser, 2005; Du, 2004). Survey question thirty-seven asked respondents to agree or disagree with the statement: "I was familiar with the technology tools used at the beginning of this program." A mean response of 4.00 was measured, indicating higher familiarity levels with technology than alluded by the chat software question. Proficiency with chat software for cohort two may be an exception to the other technology tools utilized in this program. These other tools mostly included basic software programs.

Question thirty-eight, "My environment in which I completed my work was free of distractions," was another low mean for cohort two at 3.80. This question concerns students' personal learning setting at school, home, or other locations. These graduate students were working educators with varying responsibilities so some of them may not have had access to a distraction-free environment to complete online coursework. In addition, some of these students resided in more rural areas of Virginia that may not offer reliable Internet access as other students living in urban areas. In the final open-ended survey question, one student suggested "requir(ing) high speed Internet access" for future students.

The final question, "Compared to classroom-based courses, I was more satisfied with the online program," scored the second lowest mean on the entire survey at a level of 3.35. This was also the only question with a tri-modal response of 2.00, 4.00, and 5.00. It is questionable from this data whether these students were prepared to engage in an almost entirely online program; responses on question thirty-five dealing with online communication and interaction indicated a similar conclusion. Based on the modal data from this question, it is clear that students within the second cohort had very diverse reactions to the online format compared to their perceptions of traditional classrooms. These findings are consistent with the first cohort of students who measured a 3.10 mean for this question. These results suggest an importance in thoroughly preparing and advising students mentally and physically for the rigors of a completely online program.

With only one question scoring statistical significance in the difference between the satisfaction levels of cohorts one and two, the similarities in satisfaction between both groups of students warrant consideration. As reported earlier, both populations of respondents were very similar demographically. Chi-Square analyses indicated no statistical significance between the two groups' gender and regional differences. Aside from two instructor changes mentioned earlier in the analysis, both cohorts completed dupli-

cate coursework and an identical program timetable. In addition, tuition and travel stipends were paid for both groups of students through IMLS grant funding. With so many similarities between the first and second cohorts of students, it is not surprising that only one question measured significant difference in the students' satisfaction. The similarities of their responses regarding satisfaction in the areas of communication, quality of courses, and online delivery of courses provide empirical evidence to inform best practices for online programs.

Next Steps

The next steps of this research seek to address a large gap in the research of online distance education: longitudinal studies of former online students currently in their professional careers. Only one such study was found during the literature review and this research only looked at online students' first year in the classroom as professional teachers (Schweizer, Hayslett, & Chaplock, 2008). The field would be better capable of preparing quality professionals via the online format if more was known about these students after they enter the work force. What are the areas they have been ill-equipped to address as employed professionals? What are their perceptions of gaps in the content and preparation of their respective online programs? Further research with this study's population will provide insight into these questions.

This study's methodology and procedures will be duplicated in the longitudinal study of the same students. An identical version of the survey will be sent to the first and second cohorts of the online program for school librarians. This survey will measure the students' perceptions of their satisfaction with the online coursework now two and three years out of the program. It will be interesting to see if time has changed their perceptions of the program. Since they were only a few weeks out of the program the first time they responded to the survey, they may have different perceptions of the workload and their perceived interactions with classmates and instructors. Being active in the workforce for two and three years now, they may have been able to fully utilize the skills and even projects they completed during their time as an online student. Conversely, they may be able to indicate areas the online program should address in order to better prepare future school librarians in Virginia. This insight will be invaluable to improving the online program at ODU, and also in helping to inform similar programs instructing professional educators online.

In addition to curricular and instructional improvements in the online program, the survey will ask students to describe their professional life since graduating from the program. After finishing their coursework, did they pursue employment in a school library? If not, why? If so, where? Did they remain in their specific regions, labeled by the VDoE as critical shortage areas for endorsed school librarians (2005; 2008a)? It will be interesting to see if these students have been able to fill these staffing shortages, truly addressing ODU's initial inspiration for developing the online program. It is the hope of this researcher that following these educators from their experiences as online learners to their current positions and professions will ultimately guide improvements in the ways and means future students should be educated online.

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Academic Faculty's Teaching Social Networks: What is the Extent of Library Faculty's Inclusion?

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Abstract

Collaboration between academic and library faculty is an important topic of discussion and research among academic librarians. Partnerships are vital for developing effective information literacy education. The research reported in this paper aims to develop an understanding of academic collaborators by analyzing academic faculty's teaching social network. Academic faculty teaching social networks have not been previously described through the lens of social network analysis. A teaching social network is comprised of people and their communication channels that affect academic faculty when they design and deliver their courses. Social network analysis was the methodology used to describe the teaching social networks. The preliminary results show academic faculty were more affected by the channels of communication in how they taught (pedagogy) than what they taught (course content). This study supplements the existing research on collaboration and information literacy. It provides both academic and library faculty with added insight into their relationships.

Introduction

For this study collaboration between academic and library faculty has been investigated by analyzing the teaching social networks of academic faculty at a community college. This investigation supplements the existing research on collaboration for higher education and provides both academic and library faculty with added insight into their relationships. Academic faculty teaching social networks have not been previously described through the lens of social network analysis. This paper thus explores the nature of a teaching social network and focuses on the roles of communication channels in academic faculty's teaching social networks.

Background / Literature Review

When academic faculty design and deliver their courses they are engaged in a teaching social network. A teaching social network, a new term created for this study, is comprised of people and their communication channels that affect academic faculty when they design and deliver their courses. Communication channels are formal (e.g., scholarly journals and professional development activities) and informal (e.g., personal communication) (Weedman, 1992). An example of a communication channel included in a teaching social network is involvement in team teaching. Through team teaching faculty members become a part of each other's teaching social network. They influence each other in the way they design and deliver the team taught course. Another example of a communication channel in an academic faculty's teaching social network is the process of collaboration when developing assignments with library faculty. The role for library faculty here is to explain search strategies, show how to locate, evaluate, and analyze information related for class assignments. A third example of a communication channel is attendance a professional workshop or reads a professional journal on pedagogy.

Collaboration

Educational theorists have promoted collaboration among faculty as a method to advance intellectual and practical student learning (Haycock, 2007; Lewis & Sincan, 2009). Collaboration through shared goals and objectives between faculty "improves teaching and strengthens academic programs" (Lindman & Tahamont, 2006). It is argued that when academic faculty members collaborate, students benefit from the collaboration by recognizing the connections across or within disciplines (Lewis & Sincan, 2009). Ideas transfer from one course to another as a result of the collaboration (Lewis & Sincan, 2009). Students are exposed to the unique perspectives and strengths of different participating faculty members (Lewis & Sincan, 2009). The experiences of collaboration help faculty to gain knowledge in each other's area of expertise and remove perceived barriers between departments (Lindman & Tahamont, 2006).

Information Literacy Education

Collaboration between academic faculty and library faculty is often conducted for information literacy education. Library faculty argue that collaboration between library and academic faculty is imperative in teaching the concepts of information literacy to students (England & Pasco, 2004). Information literacy education helps students grasp concepts and apply them in multiple disciplines (Barnard, Nash, & O'Brien, 2005). Library faculty believe building partnerships with academic faculty should be their key strategy for teaching information literacy concepts to students (Zhang, 2001).

Information literacy is usually described as the ability to locate, evaluate, and utilize information (ACRL Information Literacy Advisory Committee, September 29, 2006; American Library Association Presidential Committee on Information Literacy, 1989; Chartered Institute of Library and Information Professionals, 2003). Information literacy is commonly identified as an outcome of a community college education. The governing authorities for community colleges, also known as accreditation organizations, recognize information literacy as a student learning outcome and standard that must be met and stressed that collaboration between academic and library faculty is a strategy for meeting this standard (Saunders, 2008). Because of the widespread acceptance of information literacy as a part of higher education, a major theme in the library and education literature has been the need for academic and library faculty to work together (ACRL Information Literacy Advisory Committee, May 22, 2008; Andretta, Pope, & Walton, 2008; Bruce, 1997, 2004; England & Pasco, 2004; Gandhi, 2004; Li, 2007; Mackey & Jacobson, 2005; Sciammarella, 2009; Thompson, 2002; Wijayasundara, 2008; Winner, 1998). When academic and library faculty collaborate together library faculty become a part of academic faculty's teaching social network.

Teaching Social Network

Social networks are groups of people that have common interests, interact with each other, and exchange information between members (Zohar & Tenne-Gazit, 2008). Some examples of personal social networks are family, friends, graduate school, and work. Social networks significantly impact daily lives (Marshall & Foster, 2002; Ribeiro, Paúl, & Nogueira, 2007) and are dynamic throughout life. The social network that this study addresses is a *teaching social network*. A teaching social network is a term used to identify one of the personal social networks of academic faculty that affects the way they design and deliver their courses. This term has been created for this study and has not been identified in library or education literature.

As described earlier a teaching social network is comprised of people and their communication channels that affect academic faculty when they design and deliver their courses. The teaching social network connects people together through collaboration.

Significance of Research

The importance of collaboration between academic and library faculty has been illustrated in the library and education literature (ACRL Information Literacy Advisory Committee, May 22, 2008; England & Pasco, 2004; Winner, 1998; Zhang, 2001). However, academic faculty does not always accept library faculty as integral when developing course curriculum (Arp, Woodard, Lindstrom, & Shonrock, 2006; Winner, 1998). Library faculty are thought of as supportive but not an essential part of the learning process (Winner, 1998). In order to build more successful collaborations, it has been claimed that library faculty need to understand "academic faculty culture" and how to communicate more effectively with academic faculty (Rabinowitz, 2000).

There is a significant body of research dedicated to collaboration between academic and library faculty (Bowler & Street, 2008; Callison, Budny, & Thomes, 2005; Carter & Daugherty, 1998; Cochrane, 2006; Corrall, 2008; Donham & Green, 2004; Elrod & Somerville, 2007; Ferrer-Vinent & Carello, 2008; Matthew & Schroeder, 2006; Matthies, 2004; Prucha, Stout, & Jurkowitz, 2005; Thaxton, Faccioli, & Mosby, 2004; Thompson, 2002). However, the existing research does not investigate collaboration utilizing social network analysis from an academic faculty member's teaching social network perspective. Instead the library and education literature explored the influencers affecting academic faculty when they designed or delivered their courses (Auman & Lillie, 2008; Benton & Schillo, 2004; Briggs, 2007; Lindsay, Jeffrey, & Singh, 2009).

Research Problem and Research Questions

The overall research question of the study is: What is the nature of the teaching social networks of academic faculty? The sub-research questions that will be discussed in this paper are: What channels of communication affect academic faculty when they collaborate and design and deliver their courses? To what extent do the channels of communication affect academic faculty? In addressing the sub-research questions this paper will develop an understanding of collaboration from the perspective of academic faculty.

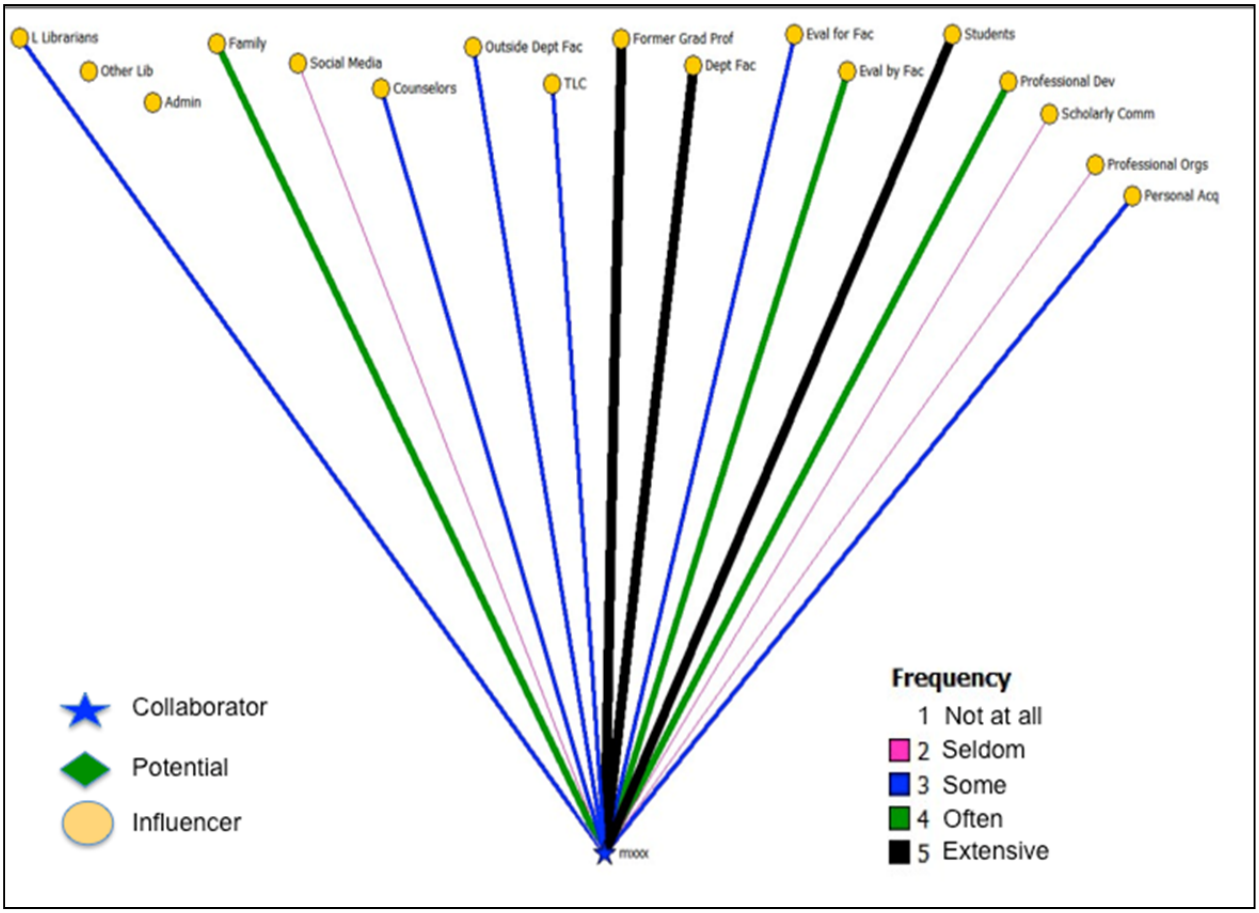

Figure 1 Legend of social network analysis graphs. This figure illustrates a teaching social network for one academic faulty member. The legend of the colors are used in figures 2, 3, 4, and 5 to show the results of the collaborators and potentials and the affect

Methodology

Social network analysis was the quantitative method chosen for this study to examine academic faculty's teaching social network. Social network analysis was appropriate as a methodology for this study because it identified the structure of a social network through sets of people or groups and their relationships that drew them together (Marin & Wellman, June 11, 2009; Tindall & Wellman, 2001; Wasserman & Faust, 1994). Social network analysis examined the relationships between social units like people or groups (Wasserman & Faust, 1994, p. 3). Social network analysis was also described as research into social relationships and the results that occur because of the existence of the relationships (Tindall & Wellman, 2001). A main priority of social network analysis was to develop an understanding of how social relationships support and impede individuals in their actions (Tindall & Wellman, 2001).

Software for social network analysis data

Software was used to analyze the collected social network data. The software used for this study was VisuaLyzer because of the ease of use in creating social network analysis diagrams. There was an additional analysis done of the Excel file, generated by the survey tool, which summed the results to determine the percentages of academic faculty selecting extensive, often, some, seldom, and not at all for the influencers.

Academic faculty selected the frequency of contact over the last three years (not at all, seldom, some, often, or extensive) for each channel of communication in the list. The channels of communication were included in the teaching social network when the participants chose seldom, some, often or extensive as the frequency. In other words if they chose not at all the influencers were not included in the teaching social network.

Data Collection

This section describes the overall process of gathering and analyzing the social network analysis data. A pre-pilot study and pilot study were completed last year to validate the feasibility of the study and the survey questions. After the pilot studies were completed revisions were incorporated into the main study data collection.

Social Network Analysis

Surveys were used to gather teaching social network relationship data. The surveys contained a list of potential channels of communication that may

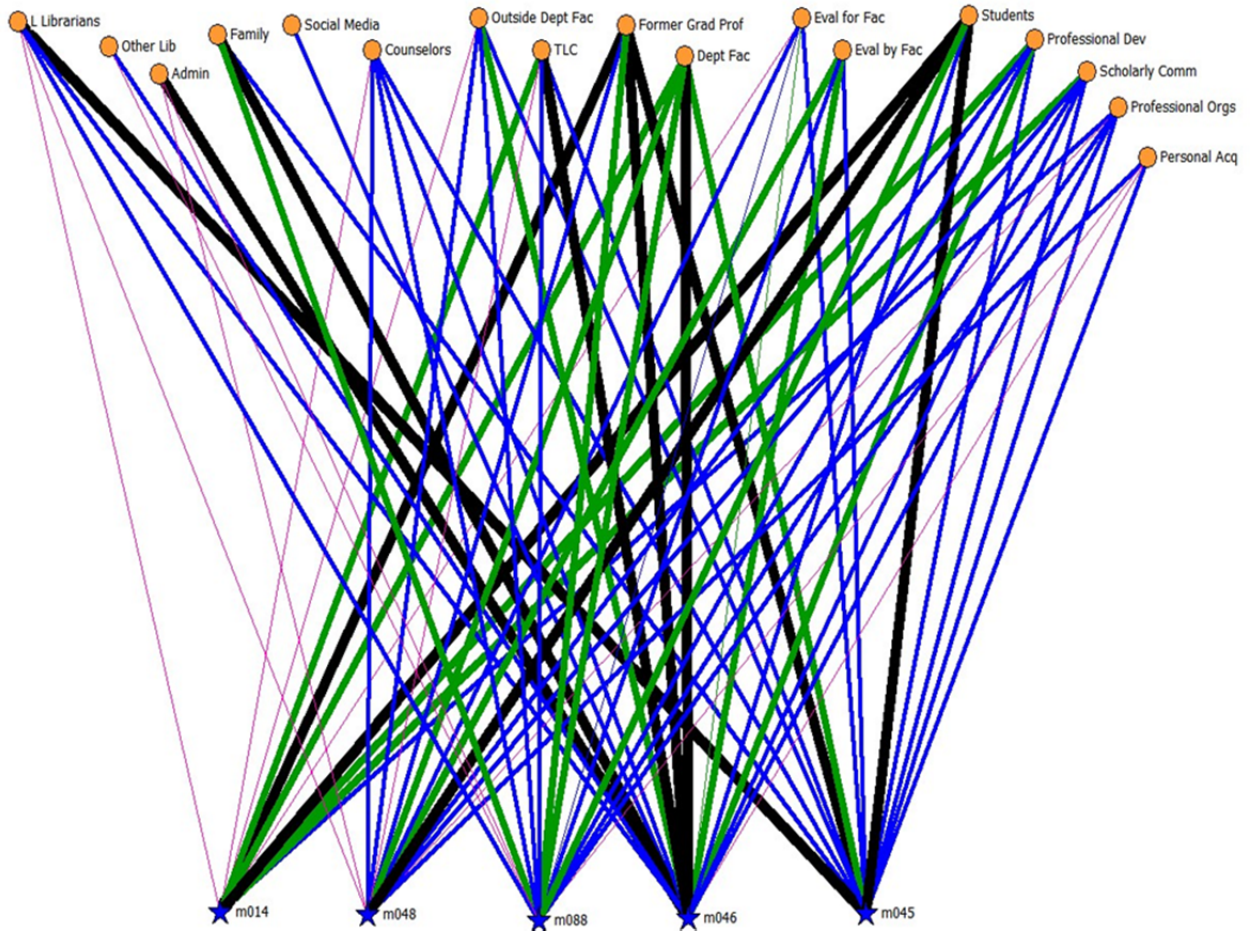

Figure 2 Influencers that affected how (pedagogy) collaborators taught. The thicker lines in the graph display a greater impact by the influencers on academic faculty.

affect academic faculty when they design and deliver their courses. There was also a free-form question at the end of the survey where academic faculty could list any missing channels of communication. The survey was a short questionnaire that was emailed to the participants. See Appendix A for the complete survey.

The survey question was: "Please indicate to what extent in the last three years each of the listed people/information affected how you teach and what you teach. How you teach refers to: pedagogy/methodology, types of assignments, classroom strategies, or classroom activities. What you teach refers to: content, subject matter, or topics. In the table/matrix below, click on the arrow and select not at all, seldom, some, often, or extensive. Your answers in both columns may differ." The first column was the list of channels of communication that may have affected academic faculty when they designed and delivered their courses. Academic faculty were asked to indicate the frequency of contact with the channel of communication in how they taught (pedagogy) and what they taught (course content). The list of channels of communication included in the survey were: administration, family member(s), formal evaluations **by** other faculty members, formal evaluations **for** other faculty members, former graduate professors and coursework, Las Positas College (LPC) counselors (i.e. DSPS students), LPC department faculty, LPC faculty outside of department, LPC librarians, LPC Teaching and Learning Center [instructional technology group], other librarians (public or academic), personal acquaintances, professional development (on campus workshops; state, regional or nation conferences; or webinars), professional/industrial organizations, scholarly and professional communications (books, journal articles, wikis, blogs), social media (email groups, LISTSERVs, Facebook, Myspace, LinkedIn, Chat), and students. This list was brainstormed with the authors, the prepilot study, the pilot study participants and confirmed through the literature review. The survey was designed to elicit responses from the participants to describe their teaching social networks.

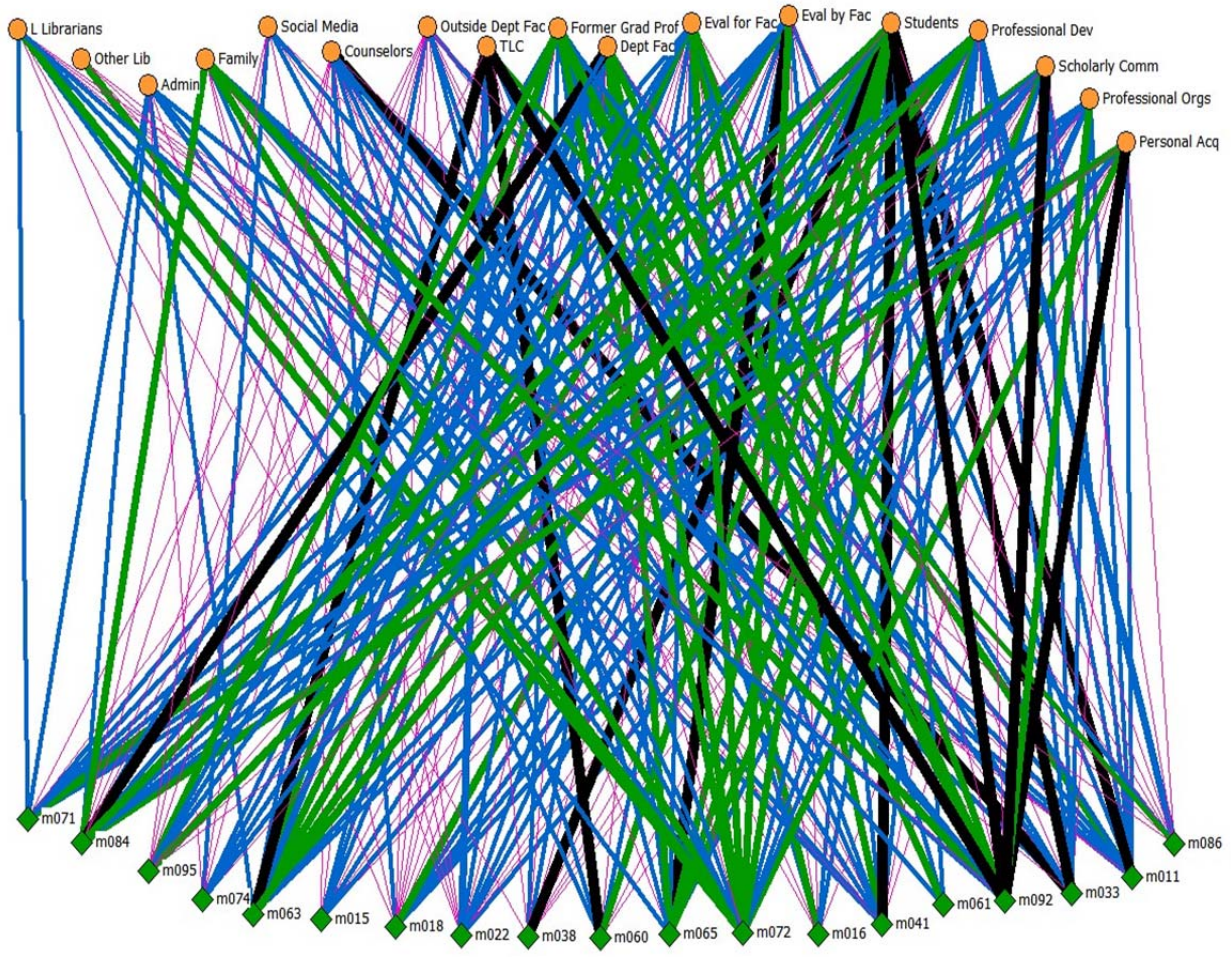

Figure 3 Influencers that affected how (pedagogy) *potentials* taught. The thicker lines in the graph display a greater impact by the influencers on academic faculty.

Participants

Las Positas College (LPC), a community college in Livermore, California was selected to participate in the main study. The surveys were sent to all full-time faculty members. Ninety-seven full-time faculty were emailed the survey, 78 percent of the faculty responded to the survey.

Categories for the type of respondent were established to determine if academic faculty have similar teaching social networks across the groups. Each academic faculty member was associated with a category. Criteria were established for categorizing academic faculty members into four groups: 1) *collaborator*, 2) *cooperator*, 3) *potential* and 4) *non-potential*.

1) *Collaborators* were those individuals who work in conjunction with library faculty when they create assignments, assess students, and devise teaching strategies.

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2) *Cooperators* were those who divide tasks between themselves and library faculty keeping a clear division of responsibilities (Montiel-Overall, 2008). The *cooperators* typically delegate the information literacy component to library faculty by providing an assignment that requires students to locate, evaluate, and utilize information. The library faculty does not have any input into the creation of the assignment.
3) *Potentials* were those who did not work with library faculty when developing their curriculum but taught courses with potential for collaboration. The *potentials*' courses were determined by reviewing the library and education literature.
4) *Non-potentials* were those who do not work with library faculty and teach skills-based courses (e.g. graphics design).

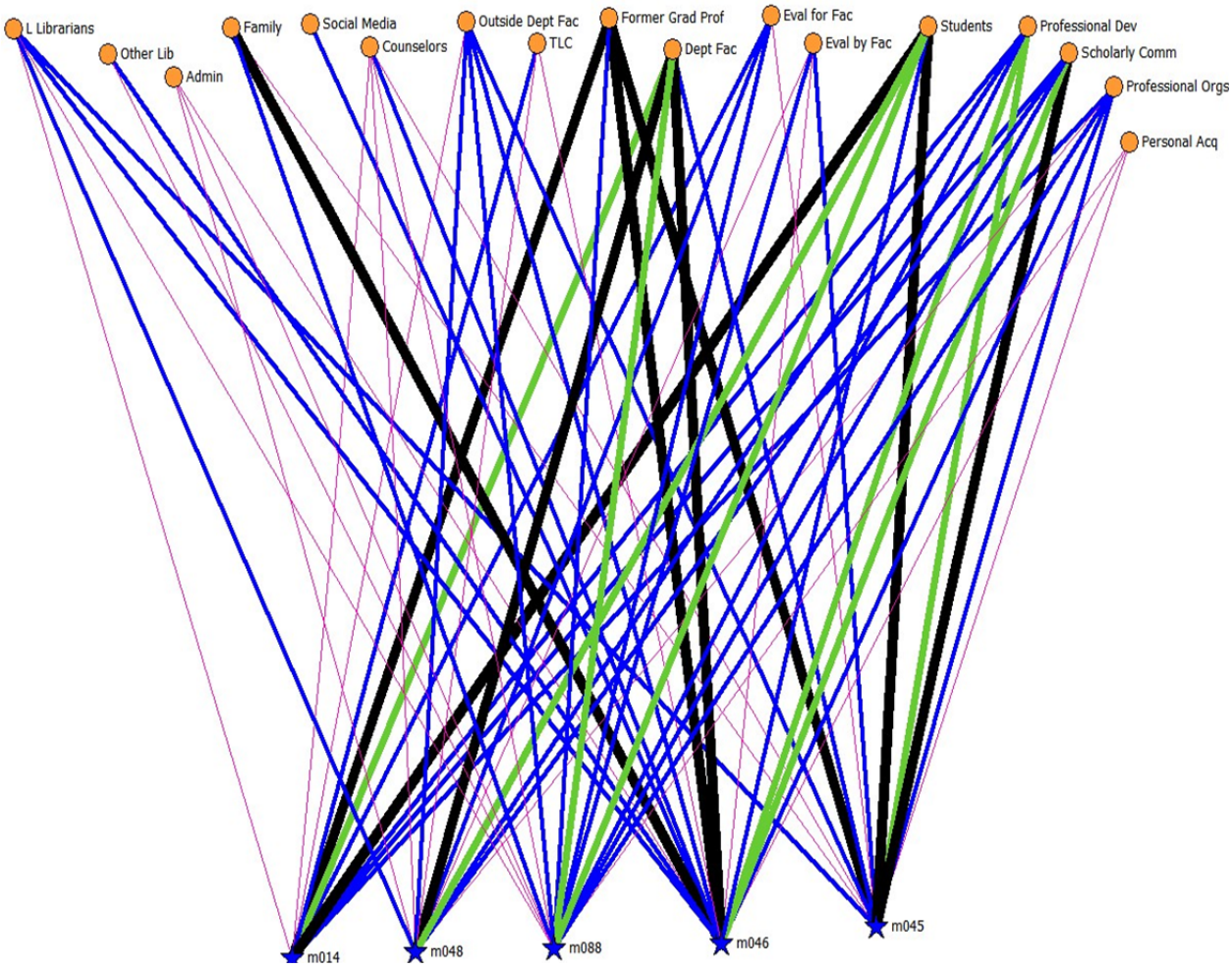


Figure 4 Influencers that affected what (course content) *collaborators* taught. The thicker lines in the graph display a greater impact by the influencers on academic faculty.

After initial review of the data the most distinct differences in the data existed between the *collaborators* and *potentials* therefore the *cooperators* and *non-potentials* will not be discussed in this paper.

Preliminary Results of Social Network Analysis Survey for *Collaborators* and *Potentials*

This section will discuss the preliminary findings about academic faculty identified as *collaborators* and *potentials* that completed the survey. There will be a discussion of academic faculty responses in relation to how the channels of communication affected how they taught (pedagogy). Afterwards there will be a discussion of academic faculty responses in relation to what they taught (course content). The channels of communication will also be referred to as influencers in this section.

Analysis of how influencers affect academic faculty in how they taught (pedagogy)

Collaborators and *potentials'* teaching social networks were compared in "how" they taught (pedagogy). After initial review of the data the most distinct differences in the data existed between the *collaborators* and *potentials* therefore the *cooperators* and *non-potentials* will not be discussed in this paper. *Collaborators* were affected more than *potentials* by their identified influencers. When asked to what extent in the last three years each of the listed people/information affected how they taught, 30.6 percent of *collaborators* selected extensive or often. Only 15.2 percent of the *potentials* made the same selection. In contrast, 84.8 percent of the *potentials* selected some, seldom, or not at all while 69.4 percent of the *collaborators* made the same selection. Even though the percentage of academic faculty that extensively used their influencers was low, these

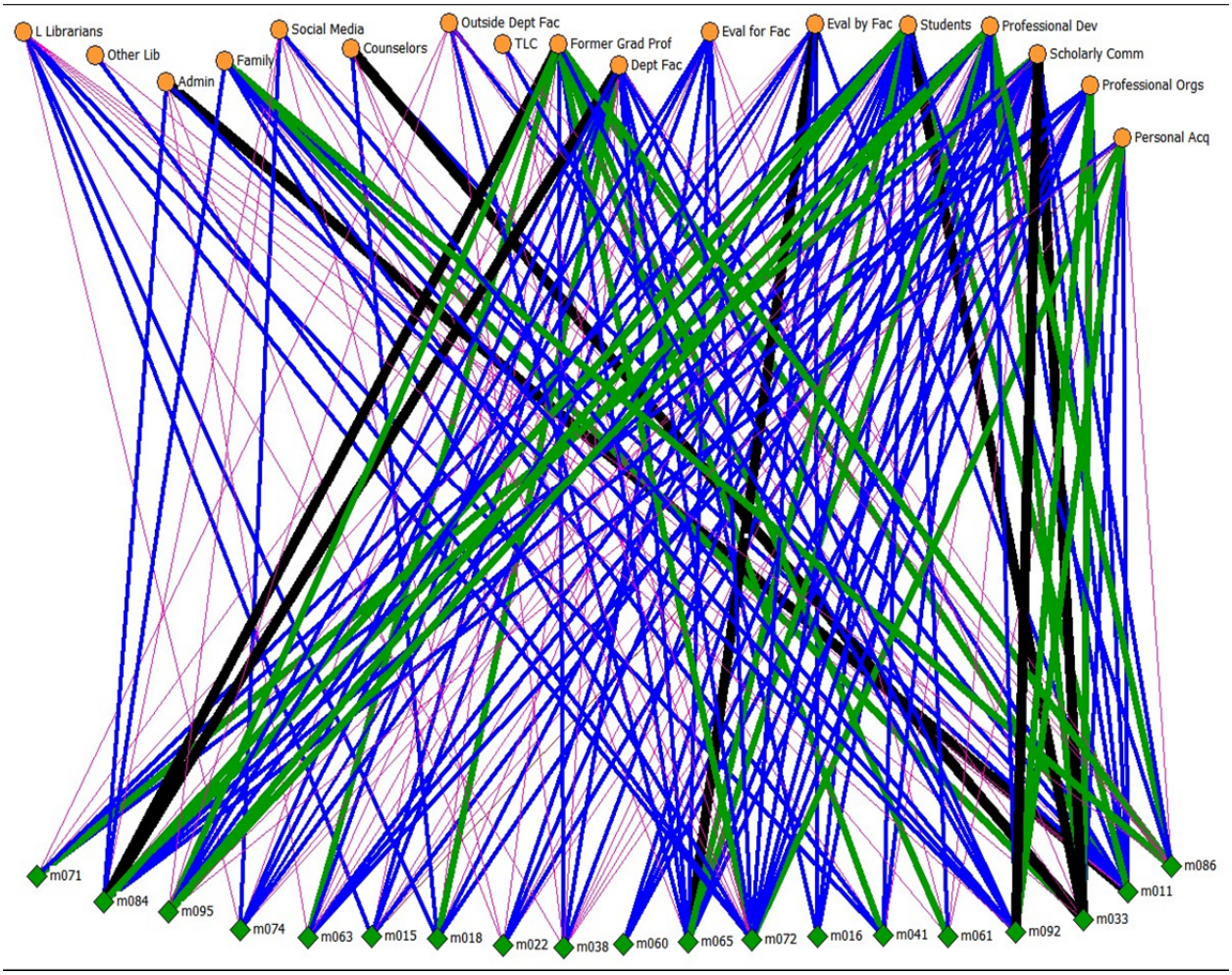


Figure 5 Influencers that affected what (course content) *potentials* taught. The thicker lines in the graph display a greater impact by the influencers on academic faculty.

results show the *collaborators* were more affected by their influencers than the *potentials* in how they taught.

The social network analysis graphs were created with VisuaLyzer using the data retrieved from the survey for *collaborators* and *potentials*. Figure 1 shows the teaching social network for an academic faculty member and is the legend for the colors. The influencers were displayed across the top of the graphs and the survey participants were displayed across the bottom of the graphs. The influencers were classified with a circle shape and yellow color, the *collaborators* were represented with a star shape and blue color, and the *potentials* were classified with a diamond shape and green color. The frequency (or relationship/link) colors refer to how often in the last three years the *collaborators*/*potentials* were affected 2=seldom, 3=some, 4=often, and 5=extensive. The thicker lines reveal a stronger affect by the influencer on the respondent. Extensive (black) lines have the thickest lines, often (green) and some (blue) have progressively thinner lines, and seldom (pink) has the thinnest line. "Not at all" was not depicted by a color because the influencer was not a part of the teaching social network. Figure 2 shows the results for the people and information (influencers) that affected how *collaborators* taught their courses. Figure 3 shows the results for the people and information (influencers) that affected how *potentials* taught their courses.

The graphs show similarities and differences between *collaborators* and *potentials* in how academic faculty members taught. Both *collaborators* and *potentials* were the most influenced by: students and former graduate professors and coursework. A difference that

emerged suggests that *collaborators* were most influenced by department faculty and *potentials* were most influenced by professional development. The least influential to both *collaborators* and *potentials* were: social media, other librarians (public or academic), and administration. In addition, *collaborators* were least influenced by personal acquaintances and *potentials* were least influenced by LPC library faculty.

Analysis of how influencers affect academic faculty in what they taught (content)

Collaborators and *potentials'* teaching social networks were compared in "what" they taught (course content). *Collaborators* were affected more than *potentials* by their identified influencers. When asked to what extent in the last three years each of the listed people/information affected what they taught, 18.2 percent of the *collaborators* selected extensive or often. Only 9.9 percent of the *potentials* made the same selection. In contrast, 90.1 percent of the *potentials* selected some, seldom, or not at all while 81.8 percent of the *collaborators* made the same selection. Even though the percentage of academic faculty that extensively used their influencers was low, these results show the *collaborators* were more affected by their influencers than the *potentials* in what they taught.

The social network analysis graphs were created with VisuaLyzer using the data retrieved from the pilot study survey for *collaborators* and *potentials*. Refer to Figure 1 for the legends of the colors. The influencers were displayed across the top of the graphs and the survey participants were displayed across the bottom of the graphs. The influencers were classified with a circle shape and yellow color, *collaborators* were represented with a star shape and blue color, and the *potentials* were classified with a diamond shape and green color. The frequency (or relationship/link) colors refer to how often in the last three years the *collaborators*/*potentials* were affected 2=seldom, 3=some, 4=often, and 5=extensive. The thicker lines reveal a stronger affect by the influencer on the respondent. Extensive (black) lines have the thickest lines, often (green) and some (blue) have progressively thinner lines, and seldom (pink) has the thinnest line. Figure 4 shows the people and information (influencers) that affected what (course content) for *collaborators*. Figure 5 shows the people and information (influencers) that affected what (course content) for *potentials*.

The graphs show similarities and differences between *collaborators* and *potentials* in what academic faculty members taught. Both *collaborators* and *potentials* were the most influenced by: students, professional development, and former graduate professors and coursework. *Potentials* were also heavily influenced by scholarly communications. The least influential to both *collaborators* and *potentials* were administration and other librarians. A difference that emerged suggests that *collaborators* were least influenced by social media and personal acquaintances and *potentials* were least influenced by the Teaching and Learning Center (instructional technology group).

Discussion and Implications

The findings from the survey describing academic faculty's teaching social network illustrated the majority of academic faculty were not highly influenced in designing and delivering their courses. Both *collaborators* and *potentials* were affected more often in how they taught (pedagogy) than what they taught (course content). The Las Positas College library faculty affected the *collaborators* more than the *potentials* in both how and what they taught. The preliminary findings suggest that the academic faculty that collaborated with library faculty were more likely to be influenced when they were designing and delivering their courses than the *potentials*. The channels of communication derived from the literature review (Auman & Lillie, 2008; Benton & Schillo, 2004; Briggs, 2007; Lindsay, et al., 2009) and the pilot study confirmed there was an influence on academic faculty. The strengths of utilizing social network analysis are that a description of academic faculty's teaching social network is provided and the frequency academic faculty were influenced by the channels of communication is revealed in the analysis. The major weakness of social network analysis was that the question of how the influencers affected academic faculty in their teaching social network was not revealed.

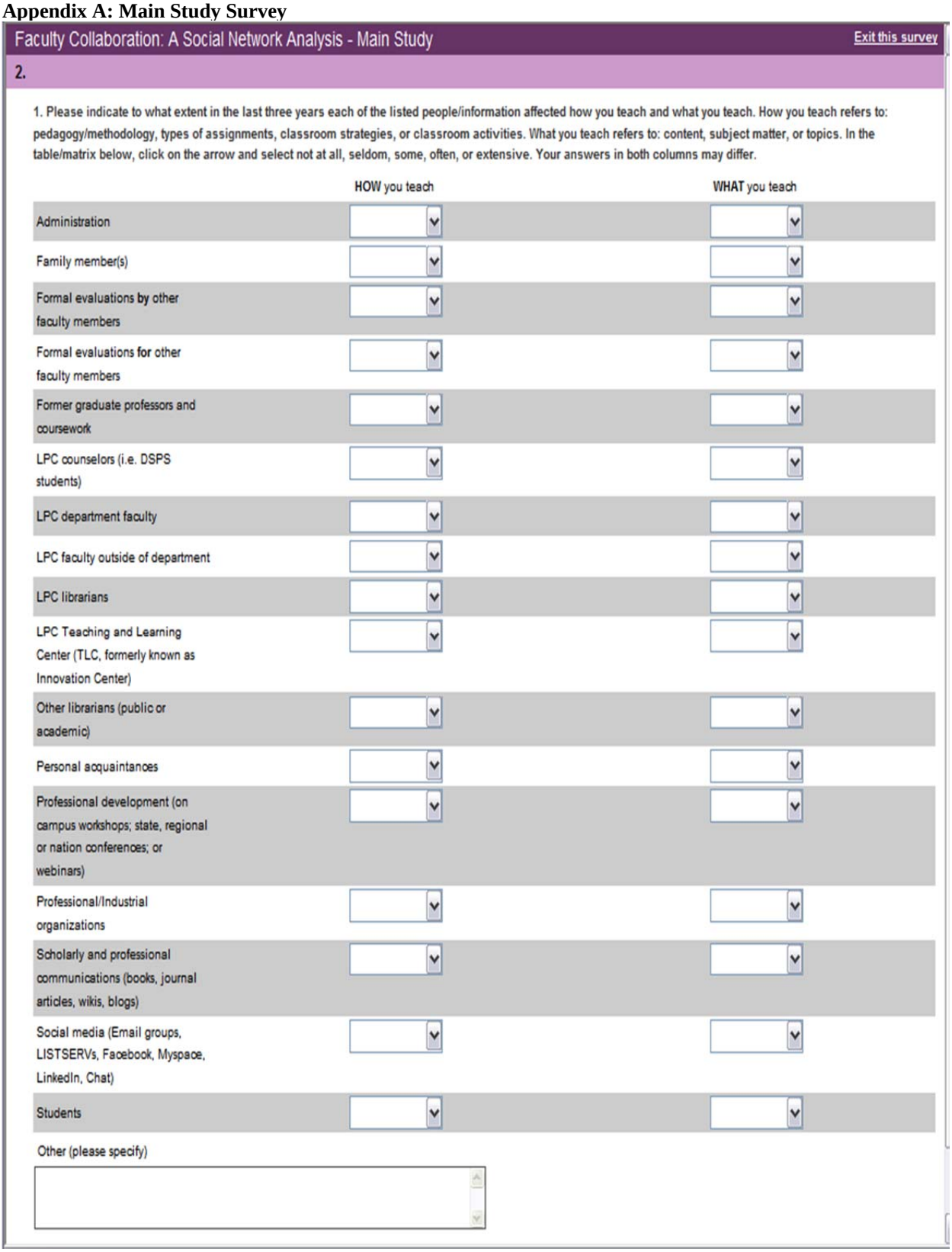
The interviews have provided more clarification of how the channels of communication influenced academic faculty. The preliminary discoveries uncovered by the interviews revealed when library faculty were included in academic faculty's teaching social network the library faculty provided the information literacy education components of the courses. Additionally the interview data revealed that some of the academic faculty categorized as *cooperators* (delegating the information literacy components) analyzed how the library faculty taught their portion of the course and incorporated changes from the library faculty into the assignments. When channels of communication were included in teaching social networks new ideas and new ways of presenting material to the students were the primary outcomes of the influence of academic faculty. This data needs further analysis in a future paper.

Conclusion

There is a lot known about collaboration between library and academic faculty from the library faculty perspective, but there is little known about academic faculty members' teaching social networks. Understanding academic faculty's teaching social network is important because the academic faculty perspective of collaboration has not been explored extensively in the literature. The preliminary results of my survey describe the teaching social network of academic faculty identified as *collaborators* and *potentials*. The preliminary results have shown that the *collaborators* were more affected by their channels of communications than the *potentials*. Both *collaborators* and *potentials* were more affected in how they taught (pedagogy) than what they taught (course content). This may suggest library faculty should be more focused on collaborating in the pedagogical process. The effect of LPC librarians on academic faculty showed a stronger influence on *collaborators* than *potentials*.

The strengths of utilizing social network analysis have been shown to be a) that a description of academic faculty's teaching social network is provided and b) that the level of frequency academic faculty were influenced by the channels of communication is revealed in the analysis. The major weakness of social network analysis was that the findings were unable to reveal insights into the question of how the influencers affected academic faculty in their teaching social network. In order to address this weakness of social network analysis, 26 interviews of academic faculty were completed to gain a better understanding of how the influencers affected academic faculty. Ways for library faculty to become a more integral part of academic faculty's teaching social network will be explored for my final dissertation.

Appendix A: Main Study Survey



Faculty Collaboration: A Social Network Analysis - Main Study

Exit this survey

2.

1. Please indicate to what extent in the last three years each of the listed people/information affected how you teach and what you teach. How you teach refers to: pedagogy/methodology, types of assignments, classroom strategies, or classroom activities. What you teach refers to: content, subject matter, or topics. In the table/matrix below, click on the arrow and select not at all, seldom, some, often, or extensive. Your answers in both columns may differ.

	HOW you teach	**WHAT** you teach
Administration		
Family member(s)		
Formal evaluations by other faculty members		
Formal evaluations for other faculty members		
Former graduate professors and coursework		
LPC counselors (i.e. DSPS students)		
LPC department faculty		
LPC faculty outside of department		
LPC librarians		
LPC Teaching and Learning Center (TLC, formerly known as Innovation Center)		
Other librarians (public or academic)		
Personal acquaintances		
Professional development (on campus workshops; state, regional or nation conferences; or webinars)		
Professional/Industrial organizations		
Scholarly and professional communications (books, journal articles, wikis, blogs)		
Social media (Email groups, LISTSERVs, Facebook, Myspace, LinkedIn, Chat)		
Students		

Other (please specify)

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Manuscripts of Technology and Industry: The "Golden Era" of Collecting at Smithsonian, 1954-1970

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Introduction/Methodology

In 1978, just two years after the United States' bicentennial celebrations, the Smithsonian Institution published a small volume entitled *Guide to Manuscript Collections in the National Museum of History and Technology*. Known subsequently as "the green guide" due to the color of its soft-cover binding, the 143-page publication included a foreword by National Museum of History and Technology museum director Brooke Hindle describing the museum's growing archival holdings:

> Some relate directly to and describe the artifact collections while others, in some measure, substitute for them. Even with the most selective discrimination, it has been impossible to collect the largest objects or to provide satisfactory representation of real objects in many of our divisions. Increasingly it will become necessary to rely more heavily upon documentary collecting to preserve here the elements of historical and technological evolution (National Museum of History and Technology, 1978).

With this publication, the Smithsonian provided the first comprehensive listing of the archival collections held by its flagship historical museum. It also revealed that the national museum was part of a very small group of manuscript repositories with a special focus on industrial and technological history. At the time, however, the museum employed no archivists and had no dedicated archival storage facility.

An examination of archival collecting practice at the Smithsonian Institution's National Museum of History and Technology reveals that a "golden era" of manuscript collecting occurred 1956-1970. For this paper, ethnographic methods, including interviews with surviving participants, augment historical research into institutional records of curators, administrators, and museum committees. This research indicates that archival collecting was led by curators with little formal curatorial or archival training. Material was gathered in a haphazard fashion with little deliberate collection development planning – occasionally to inform museum exhibits, but more often in support of the general research mission of the institution.

Manuscript collecting at the National Museum of History and Technology responded to curators‟ research interest and exhibit needs, rather than the tenants to collect, organize, describe, and provide access of more traditional library and archival programs. A better understanding of decision-making practice in case studies such as this will inform archivists in their future development of selection and appraisal practice, as well as historians, industrial archaeologists, and others whose research agendas include the history of American business and industry.

Technological History and Manuscript Collections at The Smithsonian Institution

The Smithsonian Institution's National Museum of American History holds one of the nation's most varied and significant collections of manuscript material in the history of industry and technology. This historical museum program developed as an independent entity in 1954 with Congressional authorization for a Museum of History and Technology. Previous research has reviewed aspects of the Smithsonian's interest in industry and technology (Cohen 1983; Henson 1999; Molella 1991; Post 2001), but none has provided any detailed description of the museum's archival holdings. Yet it was the unusual nature of the museum's exhibit and research program which provided the impetus for much of its archival collecting practice.

Science and technology has had a central place in the evolution of a national history museum in the United States. As early as the 1830s, members of the National Institute for the Promotion of Science displayed American innovation through exhibits and displays, some of them in space secured in the U.S. Patent Office (Henson, 1999). Similar organizations, such as Philadelphia's Franklin Institute, founded in 1824 as an industrial mechanics institute, coordinated international exhibitions of invention and technology and served as a testing and quasi-regulatory professional body (McMahon, 1977; Morris, 1987; Sinclair, 1974). The spirit of these early ventures was incorporated into Congressional discussion about how best to use the bequest of James Smithson "to found in Washington, an establishment, under the name of the Smithsonian Institution, for the increase and diffusion of knowledge." The 1846 act creating the Smithsonian called for a collection of "all objects of art and foreign and curious research and all objects of natural history" (Henson, 1999). The Smithsonian's first Secretary, Joseph Henry, debated the best ways to fulfill both Smithson's bequest and the Congressional mandate, initially steering the institution away from

collecting and hoping to direct activity more toward international exchanges of scientific information, particularly in the natural sciences.

The 1876 Centennial Exposition in Philadelphia provided a turning point in the Smithsonian's growing collections, particularly those in science and technology (Molella, 1991). As part of Congressional support of the international gathering, the museum's staff gathered objects and produced a series of "government exhibits" for the exposition. At the conclusion of the event, Smithsonian staff convinced many of the exhibitors to donate their exhibits to the museum. Materials from 34 countries, filling dozens of boxcars, were delivered from Philadelphia to Washington, DC (Henson 1999; Post, 2001; Multhauf, 1965). The excitement of the nation's showing at the exhibition also encouraged Congressional funding for an additional building; the new National Museum of the Smithsonian Institution (later known as the Arts and Industries building) opened in 1881, filled with many new exhibits drawn from the exposition donations (Molella, 1991; Post, 2001).

Smithsonian curator George Brown Goode (1851-1896) extended the chronological limits of the anthropology collections to include the modern age and, as a result, the new building afforded space for exhibit of materials relating to contemporary technology and industry (Molella, 1991). Curators for these areas were often drawn from related fields of industry. This included John Elfreth Watkins (1852-1903), who was appointed as curator of transportation in 1885, the first curator in any discipline related to technology or industry (Vogel, 1965). Entering the museum via a successful railroad career, Watkins helped to secure and preserve artifacts such as the early steam locomotives *John Bull* and *Stourbridge Lion* (Taylor, 1946). George C. Maynard (1839-1919) had managed the District of Columbia telephone system and joined the museum as curator of the "section of electricity" in 1898. His association with Alexander Graham Bell and Gardner Greene Hubbard encouraged some of the earliest acquisitions in the fields of telegraphy, telephony, and aviation (Loomis, 2000; Taylor, 1946). The museum's object collection grew dramatically during this period, including large transfers of original patent models in 1908 (Multhauf, 1965). The few published notes about collecting during this period include reference to some archival material, including single blueprints and small sets of engineering drawings of early steam engines (Taylor & United States National Museum, 1939).

An initiative to develop a separate museum specifically for engineering and industrial history began under the leadership of Carl W. Mitman (1890-1958). Mitman became chief curator in 1918 and promoted the need for a strong national industrial museum similar to Germany's Deutsches Museum, Britain's South Kensington Museum, and the Conservatoire des Arts et Métiers in France (Molella, 1991; Taylor, 1946). Although Mitman failed in his initial efforts during the 1920s, his protégé and successor Frank Taylor (1903-2007), took up the gauntlet for a museum of engineering and industry within the Smithsonian system (Frank Taylor: Founding Director, 2007; Frank Taylor: Influential Public Servant, 2007). By the 1950s, the two succeeded in attracting Congressional support for what would become the Museum of History and Technology. During this time – largely through the work of Mitman and Taylor – holdings of Smithsonian had become "in effect, the national museum of engineering and industry in the United States" and compared favorably with the national museums of science and industry abroad (Taylor 1939).

Although the museum hadn't amassed a significant amount of manuscript material prior to 1955, there are indications of some specific acquisitions. An early catalog of the mechanical collections of the museum's division of engineering includes references to sketches of a 1776 Watt pumping engine, drawings of Robert Fulton's early steamboats *Clermont* and *Chancellor Livingston*, and a series of blueprints of George Corliss steam engines and his 1876 Centennial engine which powered portions of the Philadelphia exhibition (Taylor, 1939). Watkins also acquired manuscript items during his tenure as curator. Popular for his acquisition of the locomotive *John Bull*, he spoke widely to professional groups and conventions seeking historical materials and impressing his former engineering colleagues about "the importance of preserving the artifacts of railway's youth" (Vogel, 1965). One of Watkins" finest acquisitions were records of the Baltimore and Ohio Railroad which included drawings and lithographs, as well as 1,500 photographs documenting bridge construction, stations, and roadbeds (John White, personal communication, April 5, 2010). Acquisitions in the field of rail history were the exceptions rather than the rule, however, and other disciplines were poorly represented by either object or archival material in the museum's collections into the middle of the twentieth century (Vogel, 1965; Robert Vogel, personal communication, May 30, 2009).

A "Golden Era" of Archival Collecting

Congressional authorization for the Museum of History and Technology in 1954 completed decades of work by dozens of curators, administrators, and supporters. Yet, there was little time for celebration – the new museum building required planning, new exhibits, and new collections. Taylor was given the responsibility for planning the new museum and

was formally appointed director in 1958. His reorganization of the museum resulted in a set of four divisions, with a supporting department/section structure. More significant than the thematic reorganization, however, was the hiring of curatorial staff in the new organization chart (Multhauf, 1965). From the standpoint of the museum's collection of manuscript archival material, several key figures began their employment with Smithsonian during this era.

Robert P. Multhauf (1919-2004) became a significant driving force behind the new museum project. He joined the Smithsonian staff as associate curator of engineering in 1954, coincident to Frank Taylor's final legislative push for the stand-alone Museum of History and Technology. Multhauf would ascend to oversee the division of science and technology and its numerous subunits, a venture which would be the primary focus of his work for more than 30 years (Finn, 2005).

Multhauf's most important decisions for the museum's program may have been hiring selections made for his new curatorial staff in the 1950s. Some of these individuals came from academia, while others came from engineering or industrial work:

> When I came in, there were people like me who had a science or technical background and went back and took history courses ... [we may have been] internalists but nevertheless we were doing stuff related to the technology. [I]ncreasingly now you get people who are getting Ph.D.'s in the history of technology and science and never had a course in the technology. They're treating it as a social discipline. (Bernard Finn, personal communication, March 1, 2010)

Historian Pamela Henson claims that the change to "university-trained historians of science" occurred in the 1950s, but Robert Post disagrees, saying that "less than 20 percent" of the curators at the end of Multhauf's era were academically trained historians of science and that "many of the most productive had never been to graduate school" (Henson, 1999; Post, 2001). Regardless of educational background, few were hired from other museum organizations, and it is not clear if any arrived with training in curatorial work. Both Multhauf and Frank Taylor were convinced of the need for the museum to function more like a university, with exhibits based on serious scholarship (and an awareness of changes in historical interpretation), exhibit design handled by a separate exhibits staff, and an expectation that curators would publish their research in scholarly journals.

Three of Multhauf's hires would play pivotal roles in the development of manuscript holdings in the museum: Robert M. Vogel (1930-), John "Jack" White (1933-), and Bernard S. "Barney" Finn (1932 -). Vogel was the first to arrive, joining the Smithsonian staff in 1957. A collector with a budding interest in history throughout his childhood in Philadelphia and Baltimore, Vogel made regular visits to museums including the Smithsonian. He completed a bachelor's degree in architecture at the University of Michigan in 1954, but spent much of his college years distracted with trips to the Henry Ford Museum, studying the history of steam engines as prime movers, and taking summer jobs at places like an isolated lumber camp in Idaho ("whole place run by steam; main saw driven by a large, elderly Corliss engine…Heavenly place; time warp") (The Life and Times of Robert Vogel, 1988). Following graduation, he worked as an architect for a large East Coast contractor, but his thoughts turned more and more to museum work. The timing of his blind application letter to the Smithsonian "offering one with a solid appreciation of the technological past" could not have been better; Multhauf was looking for someone to help refurbish galleries for mechanical and civil engineering:

> The only reason that they hired me, I'm quite certain, was that I had done as a term paper in my last year at the University of Michigan, a term paper titled "Factory Prime Movers of the Nineteenth Century." It was … heavily illustrated with Nineteenth Century woodcuts and engravings of steam engines, water turbines, motors and that sort of thing. And I brought that with me, and I had it bound, which is something fairly unusual for a term paper and I laid that on Multhauf's desk and he took that and I think he kept it for a while, passed it around in the administration of the museum, and that I'm absolutely convinced is the only reason they hired me. Had it not been for that term paper, I would not have been hired, I'm quite certain of that. (Robert Vogel, personal communication, May 30, 2009)

Vogel was hired as a curator of heavy machinery and civil engineering in 1957 and remained in this general area of the museum until his retirement in 1988 (The Life and Times of Robert Vogel, 1988).

White, who arrived at Smithsonian initially as a summer intern in 1958, had spent his youth riding streetcars, hanging around machine shops and engine rooms in Cincinnati, and building working models of various machines (Post, 1990). His study for a bachelor's degree in history from Miami University in Ohio introduced him to some of the early literature on the history of transportation and technology. White also worked on an assembly line at a small manufacturing plant and held summer jobs creating scale drawings in a drafting room, instilling

a hands-on appreciation of technology. Responding to an interviewer in 1990, White indicated that balance between practical knowledge and college training was important:

> Certainly, an engineering background is going to impart insight that a straight historian probably won't have, but the crucial hands-on aspect may still be lacking. And engineers who haven't studied history are notoriously terrible historians. My argument is that practical experience and formal training are both essential to the making of a good technical historian (Post, 1990).

White interned under curator Howard Chapelle in the design of three new galleries for the fledgling Museum of History and Technology. Chapelle took responsibility for marine transportation, while White was tasked with producing exhibits on automotive and locomotive history. White ascended to Chappelle's position as curator of transportation in 1967 and transitioned to the title of senior historian in 1986 before his full retirement from the Smithsonian in 1990.

Barney Finn was hired by Multhauf as a curator of the museum's electrical collections in August 1962. He completed a bachelor's degree in engineering physics from Cornell University in 1955 and worked as an experimental physicist in the nuclear power field. Pursuing an interest in the history of science, Finn returned to graduate school and worked under Irwin Hebert at the University of Wisconsin to complete a Ph.D. in history of science. At the Museum of History and Technology, Finn remained responsible for electrical collections throughout his career and also served several periods as chair of multi-unit administrative departments within the institution. He retired in 2005 and transitioned to the position of curator emeritus (Bernard Finn, personal communication, March 1, 2010; Powering a Generation: Finn Biography, Undated).

Archival Collections: What to Collect and How to Collect It

As these curators arrived at the institution, they faced some very immediate concerns. Some initial exhibit concepts were tried in temporary installations in the Arts and Industries building in the late 1950s, but most efforts were focused on the new purpose-built facility to be opened in 1964. Developing exhibits for the new building, included a push to locate and acquire new objects and support material and the Smithsonian became a formidable collector. In addition to historical artifacts, Multhauf, Vogel, Finn, and White gathered large amounts of archival material. The late 1950s were the ideal moment for an emerging museum of industry and technology, a period Vogel referred to as a time "of ferment, funding, new concepts, hope – a golden era" (The Life and Times of Robert M. Vogel, 1988).

Curators struggled with how best to represent technical themes, how to interpret the operation and impact of machines and engines, and how to educate the museum's visitors about innovations over time. Some topical areas were more difficult than others and the representation of large objects from civil and mechanical engineering became a particular challenge. Vogel addressed the problem in a 1965 article:

> Despite its importance in man's adaptation to his surroundings, the field of civil engineering has, until the recent past, received hardly more than token treatment in technical museums anywhere. This deficiency is plainly a result of the size of the objects created by civil engineering. A bridge or dam does not respond to the format of a conventional museum exhibit with the same facility as a collection of rare coins, or an early surveying instrument, or even, for that matter, a locomotive (Vogel, 1965).

Historically, the museum made use of models for interpretation of large objects; Frank Taylor's 1939 catalog of objects in the museum's mechanical collections is largely a listing of models – some original patent models constructed and submitted by companies in support of patent applications, other models donated by companies directly to the museum, and still others "made in museum" for use in earlier interpretive exhibits (Taylor, 1939).

Multhauf's attempts at gathering systematic collections of automobiles, planes, steam locomotives, and streetcars in the 1950s encountered obvious storage problems. "The preservation of an adequate record of the history of a device as crucial to American history as the steam locomotive is a problem worthy of attention. It is analogous, however, to the problem of the sailing ship, whose preservation was never undertaken on a systematic basis" (Multhauf, 1965). As a result, "about the only point that was absolutely clear from the outset of planning" for the new museum "was that models would form the very foundation of the exhibits" (Vogel, 1965). In turn, the construction of accurate models was dependent upon reliable source material. "There was an enormous variation in the amount of data which could be located on the subject structures," noted Vogel in connection to the museum's exhibit on bridge design, "ranging from the thinnest sort of fourth-hand account of a bridge's appearance, to full sets of original drawings" (Vogel, 1965).

In cases where a model was either bulky or insufficiently detailed, curators turned to illustrations

as a substitute, some from manuscript engineering drawings and others from earlier published accounts (Vogel, 1965). Multhauf understood the importance of this background material to the success of a research-based museum institution:

> The objective of our collection is the most accurate and complete record possible of the mechanical as well as the cultural history of transportation, which requires a degree of care in restoration and model construction not always apparent to the casual visitor. It requires as well a documentary collection of drawings, trade literature, and component parts, much of which remains largely in "reference collections," available to the public but used primarily in the production of exhibits rather than in the exhibits themselves (Multhauf, 1965).

Although some of the manuscript items entering the museum were employed to illustrate exhibits or to inform the creation of models, most of them were not formally accessioned to the museum's holdings, and archival material was rarely included as part of an exhibit. The vast majority of manuscript material was gathered for the sake of recording and documenting a given industry. "It was obvious that steam engines were becoming an obsolete form of machinery," recalled Vogel, "so when I went to Erie or to Milwaukee … I was gathering stuff that I knew was going to record an eventually obsolete form of technology, the stationary steam engine" (Robert Vogel, personal communication, May 30, 2009). Similarly, Multhauf did not feel the museum's new hall of electricity represented the "totality of our concern with electricity," referring readers to the museum's reference collections "where the bulk of the collections in telegraphy, telephony, and radio are maintained" (Multhauf, 1965).

Generous funding for exhibits for the new 1964 museum building increased the curators' research, artifact purchase, and archival collecting. Curators used a variety of techniques to locate and solicit manuscript collections, "The Smithsonian had a lot of prestige," recalled White. "Most people had at least heard of it [and most] people had a pretty good opinion of it. So that did open a number of doors" (John White, personal communication, April 5, 2010). Firms had produced heavy machinery and engines were approached about historical records, as were municipal agencies that purchased and maintained engines for water and sewer systems. Some were told the "museum's archival function is a major aspect of our activities, assuring the collections under our care of proper indexing, preservation treatment, and permanent preservation in fire-proof, air conditioned surroundings" (Vogel, 1965, November 19). Curators also distributed special printed solicitations to members of the American Society of Civil Engineers (ASCE) and the Institute of Electrical and Electronics Engineers (IEEE) "as a means of extracting material of historical value" from their membership (Vogel, 1965, August 4). The brochures were illustrated with manuscript items from the museum's growing archival holdings, including Thomas Edison's early 1883 sketches of light bulbs, photographs of early Niagara power lines, reproductions of illustrations from trade literature and manufacturers' catalogs, and a set of 1873 drawings for an early pumping station on the Chesapeake and Ohio Canal. Excerpts from these brochures indicate the directness of their call for donations:

> Raw material for the history of electrical science and technology is to be found scattered throughout notebooks, photographs, catalogs, patent records, motion picture films, audio tapes, and artifacts. But unless these resources are identified and gathered together in appropriate centralized locations they are virtually useless to historians, and the danger of their being destroyed is greatly increased… If you know of appropriate manuscripts, notebooks, catalogs, photographs, artifacts, please write to the Division of Electricity, National Museum of History and Technology (An Archive for the History of Electrical Science and Technology, Undated).

> The U.S. National Museum invites submissions of records, plans, photographs, trade catalogs, journals and diaries, correspondence and personal papers as well as artifacts that are either relevant to the history of civil engineering or that are contemporary to earlier periods of history and relate to some phase of civil engineering (Archival Collections in the History of Civil Engineering, Undated).

More than 50,000 copies of the ASCE brochure were circulated with a reasonable good return on the cost of the mailing. "A lot of stuff came in" according to Vogel. "There was a little concern, I think, on the part of our museum's administration that we would be flooded with this stuff; we were not. It came in reasonable quantities and we were selective." (Robert Vogel, personal communication, March 5, 2010)

The museum also purchased collections from private collectors and at public auctions. Of these, the Warshaw Collection of Business Americana was certainly the most significant. Comprising more than 1,000 cubic feet, the collection was amassed by Isadore Warshaw, a New York amateur

historian and scrap paper dealer, and included business ephemera such as advertising cards, posters, trade catalogs, and handbills (Warshaw Collection of Business Americana, 2010). The material was brought to Jack White's attention in the early 1960s:

> I was just overwhelmed by the material. [A] lot of it was early Nineteenth Century or middle Nineteenth Century…he was a scrap paper dealer, that's how he started collecting. And he thought some of this material was so marvelous that it shouldn't be turned into paper pulp, it should be preserved … I think it's magnificent. I mean, its ephemera. There's not George Washington's letters or notebooks or that, but it was everyday life represented in just any category you can think of. (John White, personal communication, April 5, 2010)

White convinced Vogel to make a follow-up visit and he was equally impressed with the collection, particularly the 35,000 trade catalogs. "The great bulk of the catalogs were prior to 1875 with a large body of them in the period 1850-1865," Vogel reported to Multhauf. "It is important to realize the uniqueness of this collection," he continued, "There is, quite simply, nothing like it, anywhere, and can never really be again" (Vogel, 1966, May 2). With his curators‟ assurance that this was a one-of-of a kind opportunity, Multhauf convinced Smithsonian Secretary S. Dillon Ripley to allow an unprecedented $100,000 purchase of the collection in August 1967 (Warshaw Collection of Business Americana, 2010).

Yet curators were not always successful with their attempts at new acquisitions. Many companies weren't yet willing to give up their collections. Vogel distributed printed cards to be inserted into selected files: "This collection has historical value; if it is of no longer of use to this firm, would you kindly notify the Smithsonian Institution" (Robert Vogel, personal communication, March 5, 2010). It was often a disheartening journey. Many firms that had once built engines and heavy equipment had destroyed their drawing files decades earlier as the repair parts business dwindled and space was needed for other purposes (Vogel, 1967). In some cases, it was literally only a matter of weeks:

> One that comes immediately to mind was the collection of glass negatives from the Pelton Water Turbine Company in San Francisco…I was in this guy's office and I said I believe you have a large collection of photographs and glass negatives of your various water turbines. And he said „Oh dear, you should have been here two weeks ago." You know, the old story that the curator hates to hear: „If you'd only been here last week when we sent … something like three dump-trucks full of glass negatives to the dump." (Robert Vogel, personal communication, May 30, 2009)

Yet many of the direct solicitations proved successful, like a collection of 500 drawings of Corliss engines acquired from the Sun Shipbuilding and Dry Dock Company of Chester, Pennsylvania. Representing much of the firm's work from 1872 to 1900, Vogel remarked that "collections of mechanical drawings from such an early period have rarely survived in so complete a form" (Vogel, 1967).

Curatorial staff also scoured older laboratories at universities and colleges for artifacts and documents. "You'd find the janitor or the head of the physics department or whoever might be around and you say „have you got any old stuff, "" recalled Barney Finn (Bernard Finn, personal communication, March 1, 2010). Many institutions with heat engine laboratories in mechanical engineering and structural laboratories in civil engineering were changing emphasis in the 1950s and 1960s and discarding obsolete machinery, Vogel recalled:

> It was just sheer dumb luck that at that time this transition was occurring at institutions of higher learning. I can't think of the number of universities and colleges that I myself visited. Yale, Harvard, MIT, Lehigh, every major college and university, mostly in the eastern U.S., that had a heat engine lab, and we got engines and records ... Faculty in these areas were delighted to see these curators coming on to their campuses … They hated the thought of disposing of this stuff. (Robert Vogel, personal communication, May 30, 2009)

Curators refer to this era as the "golden era," when funding for the new museum included significant amounts of money for "travel, money for collecting, and money for almost everything" (Robert Vogel, personal communication, May 30, 2009).

That said, most of the curators agreed that there was very little coordination or deliberation in this work. "I think it's fair to say that our archival collecting efforts before 1980 were conducted largely without plan or with any good notion of what we were going to do with the material once we got it," reported Barney Finn. "Our experience with objects led us to believe a) that we had a well-founded sense of what was important, b) that if we didn't take it when we found it there might not be a second chance, and c) that space would be created in response to the collecting effort" (Bernard Finn, personal communication, February 15, 2010).

Conclusions

Following the completion of exhibits for the new building in 1965, curators found themselves responsible for large amounts of archival material. Lacking any deliberate or comprehensive archival policy, significant collecting continued through the 1970s. Some basic procedures developed in response to limits of storage space, demands for intellectual control over collections, and from increasing pressure by external researchers for information about and access to manuscript material. Yet, it wasn't until 1979 that curators and museum administrators finally established a formal manuscript collection policy and set aside space for an archival facility within the museum. The new facility, to be called the "Archives Center of the National Museum of American History," began operation in 1982 and the museum hired its first professionally-trained archivist the following year.

It is clear that the Smithsonian Institution did not enter into manuscript collecting deliberately. The museum's growing interest in manuscript material during the "golden era" often related to exhibit research and publication and archival material became a necessity in understanding and documenting large objects and structures. This was particularly true in topical areas such as transportation, mechanical engineering, and civil engineering; other disciplines within the museum collected very few manuscript items. Collecting activity was not specifically directed toward exhibit installations, nor were archival items regularly utilized as material culture objects in displays. Manuscript collections supported general research needs and many acquisitions were made with an awareness of the importance of preserving items which might otherwise be destroyed. Most professionals associated with acquiring archival material in the Museum of History and Technology were historian-curators. Although some had advanced degrees, others were drawn from relevant fields of professional practice. Few had any formal curatorial training and there is little indication of any awareness of developing professional archival practice.

Regardless of the nontraditional development of this manuscripts program, significant industrial collections were acquired by the Smithsonian during the "golden era" of collecting and curators felt a genuine commitment to preserving unique and important archival materials that nobody else wanted. Through the continued preservation and provision of access to these rich collections the Smithsonian Institution will endure as one of the leading manuscript repositories documenting American business and industrial history.

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