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Change: Case Study Findings of an Emergent Research Library**

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LIBRARIANS AND THE COMPLEXITY OF INDIVIDUAL AND ORGANIZATIONAL CHANGE: CASE STUDY FINDINGS OF AN EMERGENT RESEARCH LIBRARY

Donald L. Gilstrap

ABSTRACT

The purpose of this case study was to increase the knowledge base of how research librarians experience and cope with the turbulence of change within their library system. A library belonging to the Association of Research Libraries was selected for case study investigation. Seventeen librarians participated in on-site interviews, utilizing a protocol composed of a clustering technique and semi-structured interviewing. Instrumental case studies of each individual were then developed through a collective case method. The findings presented in this chapter include: the competing tensions between the physical and virtual environments, the speed of change, the search for professional meaning, and coping with the experiences of professional change. Analysis of the findings suggest: the emergence of a hypercritical state, the limiting nature of negative feedback, a complex systems framework for professional thinking, and coping in the hypercritical organization.

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INTRODUCTION

Now, think back to the first day on your current job. How did it change from your first job to your present job? How has your current job changed from day one to today? How has it changed from last week? Is the last statement tongue in cheek? Sarcastic? We don't think so. Our jobs are changing so rapidly it may seem as if we are, like Kirk and Scott, hurtling through space at warp speed and we sometimes think, as Scotty was always fond of saying, we 'canna take any more.' (Osif & Harwood, 1999, p. 224)

It is little secret that academic librarians have seen several major changes within their libraries over the past 20 years. These changes have been driven primarily by different external and internal shifts in access to information and expectations by academic and stakeholder communities. Librarians are faced with challenges to their traditional services with the rise in consumer use of virtual resources, the proliferation of search engines that link to gray literature, and new publishing and pricing models for academic research. Librarians are additionally confronted with decreased funding from federal and state agencies, leading to difficult decisions on which services, programs, and collections to maintain (De Rosa et al., 2005). Moreover, librarians now use technology to a high degree in the dissemination and diffusion of knowledge among scholarly publishers and users of university research. But the rapid technological integration of new tools for research while maintaining traditional print collections places demands on librarians for continual learning that sometimes appear both complementary and contradictory. Major differences in viewing these challenges over the past few years from previous decades, however, are the increasing speed and complexity that are now associated with changes in academic libraries. Librarians might describe their evolving professional life at present as an environment of turbulence: a paradox of "commotion, agitation, or disturbance" that concurrently "is of natural conditions" (Simpson & Weiner, 2001); one that breaks from the traditional history of equilibrium, control, and stability. These rapid and increasing changes have created environments of uncertainty for academic librarians and suggest shifts in professional and organizational thinking.

Changing Roles of Librarians

Roles of academic librarians now include more substantially the need for educating students, faculty, and themselves to keep up with the evolving aspects of research and information resources in a technological environment. The Internet has created increased student reliance on a tremendous amount of gray literature that professionals argue has led to a crisis of

quality information (Williams, 2001). At the same time students and sometimes even faculty, who are unfamiliar with the critical analysis methods for web-based resources often begin or perform research entirely with search engines such as Yahoo or Google (De Rosa et al., 2005). And the use of online search engines has led students to rate their self-efficacy of academic research at much higher levels than their actual ability to perform this research has shown (Dunn, 2002; Maughan, 2001). Many academic libraries now incorporate library instruction and information literacy programs that help students critically analyze and use different mediums of research information. In spite of these efforts, “librarians are put in the unfortunate position of telling people to eat their spinach, that fast food searching isn’t enough” (Wilson, 2004, p. 11).

Librarians are also dealing with the graying of the profession. Fewer students are matriculating from library science graduate programs in relation to population demands. Oftentimes, their absence in these programs reflects general student misperceptions of what the academic library world is like. Potential students sometimes view librarians through stereotypical frameworks of bibliophiles who are concerned with rules and order over access and management of information through the use of technology. This phenomenon has made recruitment efforts to fill positions that have come open due to retirements difficult (Fennewald & Stachacz, 2005; Unabashed librarian, 2003). Moreover, the increased need for academic librarians to have both broad and specific technology skill sets has led at least one library pundit, James Neal, to argue that “there will be fewer librarians working in academic libraries because of a significant increase in the number of technical staff” (Riggs, 1997, p. 6). In addition to the stress of this uncertain future, while librarians deal with many new changes in their environments, they are frequently working understaffed while trying to fill open positions or are dealing with setbacks from attrition or retrenchment (Rogers, 2004; White, 1985).

There has also been an exponential growth of scholarly information produced by the research community. Higher expectations for publication among university faculty combined with the power technology brings to conduct and present research contribute to this trend. Managing these growing collections and providing access to the overwhelming amount of new electronic resources that become available on a daily basis has become a daunting challenge for librarians, and traditional models of collection development are, therefore, beginning to crumble. Moreover, escalating subscription prices for scholarly publications, primarily in the hard sciences, have forced librarians to make tough decisions about the maintenance of

expensive print collections (Glogoff, 2001). Frequently, this is conflicted with the expectations of those faculty who tend to focus on the maintenance of traditional printed mediums while, at the same time, expect expanded access to electronic resources (Jankowska, 2004; Wisneski, 2005). Research librarians additionally struggle with their professional obligation to preserve the human record of scholarly research while trying to lead their libraries into a digital future. Consequently, these issues bring about a “disconnect between the library’s organizational self-understanding and the institution’s understanding about the library” (Stephens & Russell, 2004, p. 246).

Responding to Change

Librarians now deal with heightened emotional responses to shifts in the profession. However, some argue these professional shifts might be necessary for the survival of libraries (Glogoff, 2001; Weiner, 2003). Researchers in library science have noted that the changes that are coming in the future will be transformative professional and organizational changes that will challenge the core philosophies and structures of research libraries (Goble, 1997; Riggs, 1997, 1998, 2001; Weiner, 2003). In their view, librarians can no longer react to the changes that are taking place through incremental approaches. Much like the case with most technology-oriented organizations, “libraries that select comfortable, traditional, but increasingly marginal, roles risk becoming more marginalized and increasingly irrelevant to the central focus of information access and scholarly discourse” (Weiner, 2003, p. 70).

Some library organizational development theorists would go so far as to argue that this debate has ensued for much of the twentieth century. Ranganathan (1963) first proposed an organic view of libraries as living systems during the mid-century. He suggested that libraries function much like an ecosystem, responding to controlling and amplifying feedback. In the Association of Research Libraries (ARL), Webster (1973) developed a guide for library administrators that challenged traditional organizational ways of thinking. Relying on contemporary organizational development theorists such as Argyris (1971) and McGregor (1960), he suggested a transformative approach to organize libraries and management decision-making that called into question many of the common practices of the time. Yet, research libraries were slow to adopt these new systems-oriented concepts until the end of the twentieth century.

Technological advancements in libraries have equally increased the speed of change exponentially. Some research librarians have managed to face this

turbulent environment and lead their libraries into a brighter technological future. Historically, many librarians have been leaders on campuses in adopting and implementing new technologies, converting their card catalog systems to online catalogs during the 1980s. Academic librarians were also some of the first people on campuses to capitalize on web-based resources, transferring collections to electronic formats, implementing online databases, and moving technology centers to their own buildings. Evidence of these technological and organizational changes has led some researchers to argue that libraries are actually changing faster than their universities (Riggs, 1997). As Goble (1997) notes, “change is not new to librarians. What is different is that change is no longer intermittent. It is constant, and its pace is accelerating” (p. 151). However, the multitude of disparate changes and competing tensions librarians face is somewhat overwhelming (Osif & Harwood, 1999). Moreover, little is actually known about how librarians experience and cope with these changes.

These factors have led academic librarians to respond to this changing environment in different ways. Some librarians have been more reactive, focusing on traditional organizational structures and collection policies as an attempt to harness this changing environment in incremental steps (Stephens & Russell, 2004; Weiner, 2003). Librarians at other institutions have taken more progressive approaches in implementing radical changes in organizational structures, communication patterns, and methods of delivery for library services. These types of changes have often been identified through “fundamental paradigm shifts” that focus on the process of innovation which “has value in providing a means to an end beyond itself” (Weiner, 2003, p. 74). Some of these librarians have incorporated organizational structures that are more organic in nature and are able to adapt more easily to rapid decision-making (Giesecke, Michalak, & Franklin, 1997; Kascus, 2004; Phipps, 2004).

Statement of the Problem and Purpose of Study

Many academic librarians are, therefore, undergoing turbulent and transformative changes in their libraries. These changes are brought on largely by shifts in scholarly mediums of publication, dissemination, and access to information, but they are also influenced by changing educational practices, competing external resources, decreased funding, and conflicting expectations of information needs by students and faculty. As Stacey (2003) has argued, “human emotions ... are thus all social processes individually

experienced through variations” (p. 326). However, much of the research has focused on libraries as “things” while ignoring librarians as human beings.

At the same time, practices among many academic librarians continue not only to focus on but also to promote the organizational management concepts of Frederick Taylor (1911) (Stueart & Moran, 2002). As a result, these traditional management concepts of control, efficiency, and stability are not designed to encourage librarians to lead transformative changes, and they oftentimes limit the ability of librarians to expedite change at the rate needed for long-term, organizational survival (Goble, 1997; Kaarnst-Brown, Nicholson, von Dran, & Stanton, 2004; Phipps, 2004; Stephens & Russell, 2004). Consequently, there have been many emerging paradoxes in the research librarian community, similar to Morgan’s (1997) concept of competing tensions that lead to organizational environments of uncertainty and unpredictability.

According to Stephens and Russell (2004), librarians now require models that focus on adaptation to the environment while studying cases that manifest the connection between individual and organizational transitions. Although there is an increasing amount of new literature recommending a shift in organizational structures and leadership philosophy, research shows our knowledge is to be extremely limited with respect to the effects of these shifts librarians. It was the purpose of this research to increase the knowledge base of how research librarians experience and cope with the turbulence of change within their library. This research also examined the issues that surround the organizational structures and leadership of transformative change in a research library.

Research Questions

- What experiences do librarians associate with an environment of rapid change, uncertainty, and turbulence?
- What specific changes do they regard as having the most profound effects on their work lives?
- How do research librarians respond to their organizational structure?
- In what ways do librarians as individuals contribute to the leadership of the library?

The findings in this chapter *specifically* address the first two research questions, but it should be noted that a more comprehensive examination of all these issues is also available (Gilstrap, 2007b).

LITERATURE REVIEW

The literature review that accompanies this study contains a broad theoretical base, including complexity theory, organizational theory, leadership theory, library organizational development theory, and individual change theory. The intent of this researcher was to incorporate a wide range of theories that can help in understanding and interpreting the complex phenomena that emerge while studying a research library going through change. The evolution of these theoretical frameworks is included to develop the contextual and philosophical foundations for later data analysis and interpretation of findings. For the confines of this chapter, a general taxonomy is described, and further exploration of these theoretical frameworks and numerous studies that support these theories is encouraged.

Theories X, Y, and Z move from an authoritarian and confrontational relationship between worker and administrator toward a democracy-centered and inclusive framework of organizational dynamics (Argyris, 1957, 1960; McGregor, 1960; Ouchi, 1981). Normative and transactional theories rely on the identification of behavioral traits and the implementation or reciprocal relationships in the workplace (Avolio & Bass, 2002; Blake & Mouton, 1978, 1981, 1985; Blake, Mouton, & Williams, 1981; Burns, 1979, 2003). Situational leadership includes assessing worker willingness and readiness while subsequently adjusting leader responsiveness (Hersey & Blanchard, 1969/1993). Shared leadership focuses on the team environment, where individuals become accountable for the leadership and organizational development of the group through structures and processes (Carew, Parisi-Carew, & Blanchard, 1986; Yukl, 2002). Transformational leadership moves organizational development away from individual wants and needs, reflecting group purposes more developed than self-actualization (Avolio & Bass, 2002; Bass, 1998; Burns, 1979, 2003).

Systems theories of individual and organizational development and change are engineered from natural, ecological processes that reflect the relationships of humans within the larger environment of the organization (Ackoff, 1981, 1994; Argyris, 1990, 1992; Argyris & Schön, 1974, 1978; Ashby, 1956; Holloway, 2004; Lewin, 1951; Ranganathan, 1963; Schön, 1971, 1991; Senge, 1994, 2004; Stephens & Russell, 2004; von Bertalanffy, 1968/1973; Webster, 1973). Transitional and transformational theories of development highlight the psycho-social processes inherent among individuals within an organization going through significant change (Abraham & Gilgen, 1995; Bergson, 1911; Bridges, 2004, 2003; Buch, 1997; Burlingame, Fuhrman, & Barnum, 1995; Carver & Scheier, 1998; Dewey & Bentley, 1975; Goerner, 1995;

Mezirow, 1991). And complexity science theories extend the systems theoretical framework, identifying the concepts of emergence, interconnect- edness, turbulence, and self-organization in groups operating as dissipative, chaotic, or complex systems (Bak, 1996; Bateson, 1972; Gallagher & Appenzeller, 1999; Davis, 2005; Doll, 1993; Fleener, 2002; Gilstrap, 2007a; Lorenz, 1963; Mandelbrot, 1975; Morgan, 1997; Osberg & Biesta, 2007; Pascale, Millemann, & Gioja, 2000; Prigogine & Stengers, 1984; Stacey, 1992, 2003; Waldrop, 1992).

METHODOLOGY

An ARL institution library was identified for participation in this case study as exemplifying the transformative change process among research libraries. This library ranked near the ARL median and had participated in two organizational restructuring activities within the past 15 years. A preliminary survey dealing with professional changes was sent to all librarians, and approximately half of these librarians responded. As Denzin and Lincoln (1994) have consistently suggested in qualitative research, purposive sampling was conducted based on the responses to the preliminary survey. Seventeen librarians (Table 1) were chosen for on-site interviewing based on the richness of description of their responses, and on-site interviews consisted of an open-ended clustering technique where participants were asked to draw

Table 1. Demographic Information of Case Study Participants.

Demographic	<i>n</i>
Female	8
Male	9
Mean age	51
Median age	56
Youngest participant age	36
Oldest participant age	63
Mean years of experience as an academic librarian	21
Number holding second subject masters or Ph.D. in addition to M.L.S.	10
Administrators or managers	7
Supervisors	5
Nonsupervisors	5
Number of branch librarians	3
Number in collections or technical areas	7
Number in public services areas	8

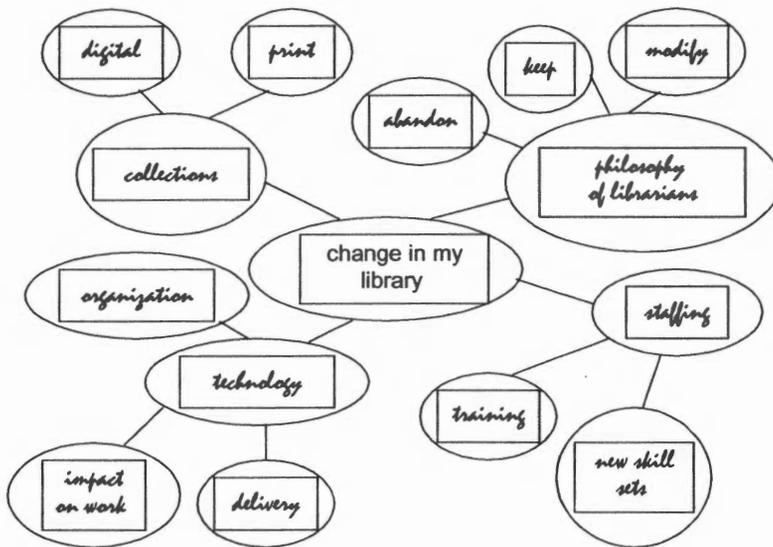


Fig. 1. Example of Clustering Technique Used during Interviews.

a concept map around the phrase, “change in my library” (Fig. 1). After the clustering portion of the interview was completed, semi-structured questions from the interview protocol were asked of each participant. Owing to institutional review board policies at both the participating institution and the institution of the researcher, anonymity of this research library and the librarians is further preserved through the use of pseudonyms. Case study instrumental and intrinsic data (Stake, 1995) were iteratively analyzed through a broad theoretical framework included in the literature, and four major themes that emerged through this analysis are reported in the following findings section.

RESEARCH FINDINGS

Introduction: Intrinsic Case Study Findings of the Organization

Six main themes emerged during intrinsic case study analysis of the East Coast University (ECU) Libraries as an organization from data collected from on-site instrumental case study interviews (Fig. 2). These themes spanned the breadth of experiences each librarian attributed to change, given his or her individual perspectives on the organization. The first two main research questions for this study are: (1) “What experiences do librarians associate with an environment of rapid change, uncertainty, and turbulence?” and (2) “What specific changes do librarians regard as having

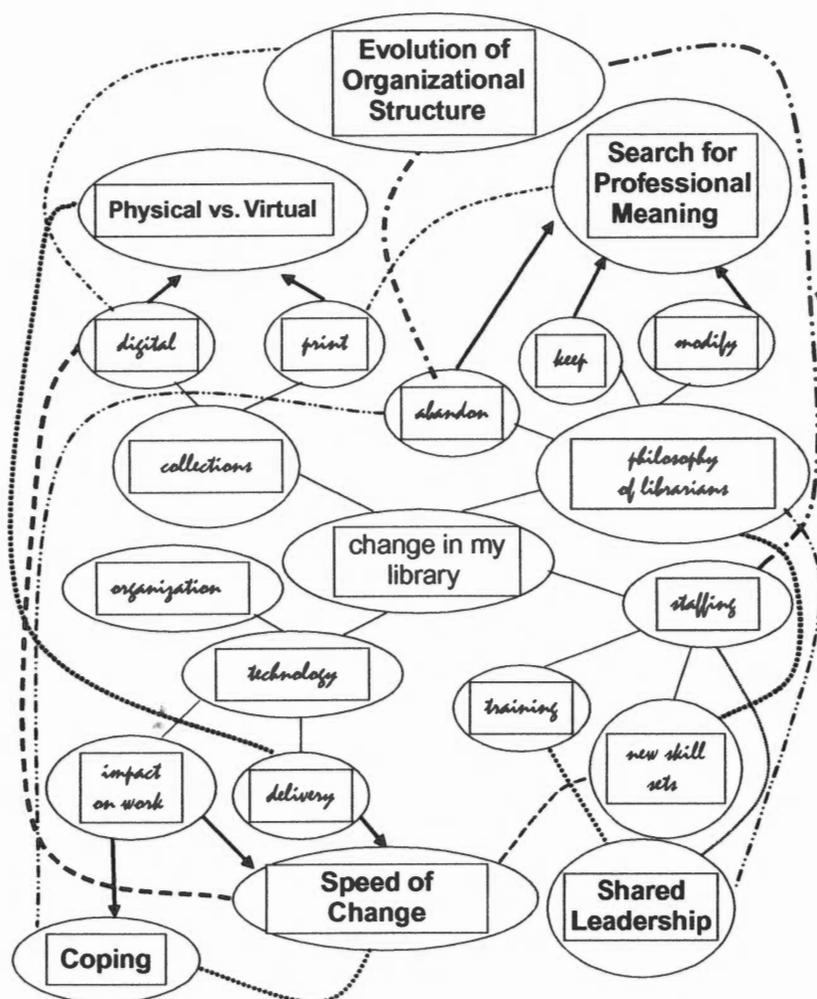


Fig. 2. Concept Map of Intrinsic Themes Emerging from Instrumental Case Clustering.

the most profound effects on their work life?" The four themes responding to the first two research questions on which this chapter is focused include: Competing tensions between the physical and the virtual environments, the speed of change, the search for professional meaning, and coping with the experiences of professional change.

Theme One: Competing Tensions between the Physical and Virtual Environments

Research librarians have begun the new century with many challenges facing the future directions of the profession. One of the most apparent issues for librarians, the users of library resources, and university administrators has

been a significant shift in focus from the print to the virtual library. In the past, research librarians defined themselves by print collections and boasted about the size of these physical collections. As more and more digital resources became available at the ECU Libraries, the maintenance of a print environment became an increasing challenge for the librarians. As a result, the ECU Libraries have significantly slowed collection development of print resources, moving toward a model of electronic-only where possible. Granted, this shift excludes the library's special collections, and, rather, integrates digital objects along side the preservation of rare items. But changes in the focus of overall collection development have led almost all librarians to respond with some emotion in favor of or against this trend. And the decrease in maintenance of print items challenges librarians to think in new ways about how to use the physical library building in the future.

Since the ECU Libraries have taken an active role in the shift from the physical to the virtual environment, this new focus has been a major catalyst for change within the organization. The library has decided to forego the purchase of a remote storage facility, since librarians at ECU have watched their peers at other institutions fill these storage units quickly while still running out of space. As a result, librarians at ECU have made a conscious decision to select electronic items over print and discard duplicate print copies. Library staff members have traditionally processed the print item, but work is now focused on providing access to electronic resources. The ECU Libraries outsource much of their processing of the remaining print items to receive "shelf-ready" materials from their book vendors. Though many academic libraries focus fully on cataloging data in the international standard MACHine Readable Cataloging (MARC) format, the ECU Libraries now have time to integrate an increasing amount of non-MARC metadata, using the extensible markup language (XML) and the Dublin Core standards. However, this shift in focus requires continual re-training to enrich data associated with the new digital resources.

Space issues have in recent years been of major concern in research libraries. In some ways, this trend could be viewed as a microcosm of the space issues faced by the university at large, as the number of students and faculty has increased on most comprehensive university campuses. At ECU, every campus in the state system has been asked to implement new programs, but, physically, where to place the students in these new programs has been perceived by some to have reached a critical level. So administrators identify the library at their campus as one solution to their space dilemmas. As an example, Paul, who manages a branch library, recognizes this growing tension between librarians and campus administrators and points out that,

“they walk around and ask, ‘isn’t it true people don’t use books anymore, and isn’t it true a whole lot of your space is taken up with book stacks?’ Well ... yeah [laughing].” At the same time, Paul presents a challenging argument to campus administrators that if they walk around several of the classrooms on campus, they will find many empty at any given hour and day of the week. For the same reasons that research libraries have to confront space issues through new services and technologies, this trend in libraries might signal a broader need to analyze the use of space, and subsequent scheduling, on university campuses in general.

The administration of current physical and virtual environments has also challenged librarians to differentiate between the library as place versus doing something in the building. If students primarily go to the library to get a cup of coffee and find a corner in which to study, then the purpose of the library as a physical space shifts dramatically. Moreover, if journal subscriptions and books move increasingly to electronic access, then storage of items in the physical building becomes somewhat obsolete with the exception of maintaining physical items to support statistical rankings. On this issue, Bill, who has administered work with both print and digital items processing, suggests that most physical items can be stored in off-site storage facilities while being shared by several research libraries in a consortium. But given that the shift to a virtual library is taking place at the ECU Libraries, he questions how the space that is left will be utilized most effectively.

This emphasis on digital over print resources has become a critical aspect of the ECU librarians’ vision of the future. The library previously had a consultant come in who asked how much of their collection budget was devoted to electronic-only purchases. After the library’s administration proudly remarked, 70 per cent, the consultant asked “why isn’t that one hundred percent?” This was a fairly reasonable question to ask of research libraries in the age of digital resources, but events like this reflect marker events in individual librarians’ professional lives. As an example, librarians had spent many years developing the print collections and watching them grow. James, a mid-career librarian who has worked with collection development and library instruction, indicates that ECU librarians were now given the difficult task to begin weeding out the collection at a much more dramatic pace than in the past:

It’s one of those traditional librarian roles that just never was much fun in the past. And now it’s definitely not something that anyone is excited about doing. But it’s just as critical as it has always been ... we have a real space crunch.

The reference unit in the ECU Libraries is another area that has been affected by the shift from print to electronic resources, impacting the psychological perceptions of librarians working in this unit. In the past years, the reference department proudly proclaimed how many thousands of volumes were in the reference collection, and these librarians had spent a considerable number of years building up that collection. Almost overnight the collection was cut in half in favor of online reference sources. Elizabeth, a young librarian new to her work in instructional services but with experience in other university academic units, argues that the decision to do this was critical for the survival of the ECU Libraries. However, some librarians at ECU now feel lost and are having a hard time transitioning away from the collection of physical items.

A parallel view of space issues also emerged during the discussion of the shift from the print to the virtual environment. Although freeing up space in the library by weeding out books has been successful at ECU, the demands for digital resources have placed a new set of requirements on the virtual spaces found on the library's networked servers. In effect, the space issue has not disappeared; rather it has shifted from the physical building to networked infrastructure. And this requires a new focus on how administrative decisions are made to support this digital environment. The new challenge has evolved toward trying to find enough server storage space and resources to house the digital items that have been created at the ECU Libraries. Robert, who works primarily with digital resources, notes for example that this will become an even more critical issue as the ECU Libraries expand access to information in online video and audio used for course reserves and special collections. Consequently, as the ECU librarians respond to physical space issues in the future, this demand for virtual space will continue to grow.

Theme Two: The Speed of Change

Many of the specific issues surrounding both changes at the individual level and how librarians cope with these transitions involve the speed of change itself. Though some librarians find the speed to be too fast, others find the speed slow and rigid. However, technology serves as a catalyst for the speed of the changing environment at the ECU Libraries in both proscribed and unintentional ways that lead to further complexity of the services and resources librarians provide to the university community. Limitations in the university structure, capital and human resources, and the external business

community also prohibit librarians from affecting change at a faster pace. And at the same time, the rapidity and constancy of the changing organizational environment increases levels of professional tension among the librarians.

Technology as a Catalyst for Change

Technology understandably contributes to many of the service shifts in academic librarianship today. As new library technologies emerge on a daily basis, librarians respond to the changing external environment to provide services and resources in a contemporary fashion. Equally, the integration of new technologies is applied to help transform the organizational structure of the ECU Libraries through continual adaptation to the changing student body. The librarians in this study indicate that technology has been a major impetus for change at the ECU Libraries, but they also note that it encompasses several different aspects of a changing profession. On the one hand, technology has been a very empowering tool for freeing up space in the library and making daily tasks more efficient. On the other, technology makes librarians somewhat nervous about the future, because it confronts the core values of librarianship. As an example, Elizabeth, who is new to the career of librarianship and who works in an educational role, shows how the use of electronic databases has entirely changed the way library instruction is taught at the ECU Libraries in the course of only a few years:

I find myself with instruction shifting the way I talk about things. From, 'you better know how to find it in print', to 'let's go looking for it in full text, but don't forget there might be print if you *have* to use it.' It's a totally different way of talking about things, of thinking about things.

These shifts in professional thinking as a result of technology cause librarians to speculate whether the changes at ECU are more successful because of technology or if sometimes technology drives the change.

Although technology has solved problems brought on by growing collections and services, it has brought, at the same time, new problems that are equally, if not more, complex in nature. Technology has greatly assisted the librarians at ECU to transition into the future, and most of the librarians self-identify their preference for the use of new technologies. However, all of these changes have required new equipment, new training, new network architectures, and an increasingly complex communication network with appropriate university officials: from carpenters to network technicians to legal counsel. And, because this network of both hardware and the people required to implement it is now so complicated, librarians have to

be very selective in what they choose to integrate. Furthering this argument, Laura, who supervises a unit that oversees technology used for public services, states that it becomes critical to plan for the obsolescence of old practices to integrate the new technologies. But, due to the limitations in librarians' abilities to predict far into the future, a significant challenge comes in knowing what to give up, when to do it, and how to plan for that abandonment.

Adding value to services that are provided primarily through the World Wide Web also becomes problematic. As librarians do not always know how to transfer skill sets in new, technologically oriented ways, grounding user expectations in the academic setting becomes increasingly difficult. As an example, Ted, who has worked in a branch library for many years, questions whether student use of certain technological products drives the changes taking place at the ECU Libraries. He states that he wonders whether RSS feeds and facebook.com pages in research libraries add any value to services. At the same time traditional collection development practices do not exist on the Web, and incorporating strategies that adapt to student and faculty use of technology becomes more critical in convincing the university community that librarians do something that adds value; or, as Ted comments, "that you're not an appendage of the Internet." Phillip, the library's director, extends this perspective by arguing that disseminating information in ways that are commonly used in society is crucial for the future of academic librarianship. If librarians do not embrace these changes, they will continue to lose ground at academic institutions, because library users will find ways to get the information they need if the library does not provide it in a contemporary fashion.

Technology can also be seen as a panacea for dealing with the inefficiencies of the print environment. With the rise in newer student expectations for a Web framework in which everything is in full text, some librarians believe that the library should abandon print collections wherever possible. Christina, for example, who is new to the profession and fully embraces technological change, states that she has become increasingly frustrated with any continued focus on collecting print resources. Although the ECU Libraries have been particularly active in this collection development strategy, she states that academic librarianship as a profession cannot break free from the frame of reference of the print environment:

[The ECU Libraries] are OK with not buying a print copy of a book if it's online. And if the online goes down for a couple of hours, nobody in this library is going to die ... I don't know how any librarian could *not* feel that way; this whole idea that you need to retain print.

Katherine, a librarian new to the ECU Libraries who primarily works with technology, equally sympathizes with this shift in collection development. She comments that, “honestly, when I’m at the reference desk, I don’t want to send people to the paper stacks if I can possibly avoid it.”

Limitations in Affecting Change

One of the particularly frustrating issues that accompanies change at the ECU Libraries has to do with the actual purchase of new products or technology. A large amount of time may be spent on evaluating and making recommendations for new software that will help improve the ECU Libraries’ further transition into a digital environment. But once the selection has been made, librarians note that months can transpire in the university’s purchasing or legal units before the product is actually implemented. Whereas some might argue that the library is not changing fast enough, librarians argue just as often that the university’s bureaucracy cannot keep up with changes the ECU Libraries need to make. As a result, ECU librarians comment that they are given an unfair reputation of being resistant to change when in actuality the university structure prevents them from becoming more effective change agents.

Technology also becomes a system agent that adds further complexity when trying to move the library into the future. Again, many librarians note that they bear the brunt of criticisms by students and faculty about the library’s technology when it cannot compete with enterprise technologies like Yahoo or Google. As an example, James, who has contributed to the ECU Libraries’ migrations to two different integrated library management systems, states that online catalog systems supplied by corporate vendors continue to use technology that is “straight out of the 70s.” Librarians at ECU know the improvements that need to be made to this technology and, as beta partners, provide the knowledge and feedback to the vendors to make these changes on a weekly basis. Moreover, there is a tremendous investment made in these products, and, since the library has little ability within the overall structure of the university to pursue litigation, many librarians believe there is no way to confront the failure of these vendors.

There is a paradox that emerges in observing research libraries that try to compete with large corporations for similar product development. One of the most frustrating elements of being a research librarian is that much of the knowledge needed to create new products already exists among librarians. However, there is a lack of time and resources to implement these services. As an example, the librarians at ECU have many of the technological skills and the desire to be able to implement online audio and

video for course reserves, adding more value to services that would expand access to these resources for students and faculty regardless of time or geographic location. Equally, this model could effectively replace physical nonprint items that are currently held on reserve. Moreover, as information resources in research libraries evolve beyond traditional text-based items, the library's ability to support these new mediums of information will become critical. But the required equipment and product development are cost prohibitive for research libraries let alone smaller academic libraries.

Many ARL libraries become beta-sites for vendors to develop products as a way to address the lack of in-house resources. Some of these vendors give the ECU Libraries discounts in pricing in return for their agreeing to become a beta-site. But in reality, the ECU Libraries do significant product development of vendor software, including a large investment of human resources and intellectual capital from which the vendors benefit later on with other libraries. Christina, who brings experience from having worked in the corporate technology sector, laughs as she describes this model, arguing that any other company in the same situation would actually be *paid* to be a beta-site, rather than merely receiving discounts. Moreover, there oftentimes are no other vendors that provide better services, so being a beta-site is one of the only methods librarians believe they have to bring the vendors up to speed with the technology needs of twenty-first century research libraries. The frustrations that arise from this situation are highlighted by Elizabeth, who deeply questions the slowness of change when teaching library research, in her response to vendor limitations:

If change is so good and so essential, why isn't it just happening? Why aren't we in the twenty-second century with technology, and why aren't librarians inventing the technology? ... Change is certainly possible, but you can't just will it, however passionate you are about change.

Although the open source movement has received great attention recently in research libraries (Breeding, 2007a, 2007b; Pace, 2006), many ARL libraries do not have the capital to invest in equipment, people, and resources to create products that compete with vendors in the business community. Or, conversely, strategic priorities might move in this direction in the near future.

Another feature that emerged through the course of interviews concerned how quickly librarians are able to respond to change with the rise of so many communication technologies. Granted, email, wikis, listservs, and intranets have massively integrated and provided access to information in ways that enable librarians to absorb and share a great deal of knowledge in much faster ways. Several librarians comment that the real challenge comes

when the involvement of so many people actually slows down the process of implementing change, as Lisa, a library administrator in a public services area, recounts:

Sometimes change is very slow. You can't always have an impact, and it doesn't always go smoothly when you're working with a group of people. It also feels like the process can be slow, because you're consulting everyone.

At the broader professional level, research libraries have not been able to create and implement standards fast enough to keep up with technology due to the involvement of so many people in different online working groups. Robert, as an example, commented that he first chose to pursue an MLS because of the predicted mass digitization that was soon to take place. However, 10 years later, many of the metadata standards that apply to both the academic and private sectors are still in nascent stages, so many research libraries are left on their own to create or enhance locally the standards associated with metadata.

Limitations in decision-making are also connected to the basic limitations of the strategic planning process in the ECU Libraries, as well as in higher education in general. The ECU Libraries, like most research libraries, follow a yearly strategic planning process where library-wide goals and objectives are developed with input from all personnel in the library. However, technological developments in the ECU libraries now happen so quickly that by the time the library's goals and objectives have been finalized, emerging technologies have already shifted the focus of the librarians. Katherine describes her own frustrations with how this process slows down the ability of librarians to make periodic changes throughout the year:

Librarians aren't necessarily thinking in that cycle. They're thinking, we need to do this, and we need to do it now. They're not thinking in terms of 'well in two months I'll be able to propose goals and objectives for the next strategic planning cycle.'

And as universities continue to use these traditional strategic planning models, rapid changes in research libraries will be further limited by this annual cycle.

The Speed of Change is Rapid and Constant

Many librarians see continual change taking place at their libraries, ranging from the introduction of new technologies to the incorporation of new information sources. The literature in library science shows that many research libraries approach change as an incremental process. However, those librarians working at ECU frequently describe change as rapid and

constant, and they note that change no longer happens at a pace consistent with generations. Rather, technology in libraries has created an environment where something new comes out literally every day. And because of the rapid and turbulent speed of change, librarians at ECU are affected by this speed in their abilities to respond to change. Lisa, who works daily to help her colleagues move further toward a digital environment, highlights this feeling of being constantly pulled in different directions as a result of so much change:

This change is beyond a proliferation, it's an explosion. I can't finish doing one thing before I've got five more that need to be done yesterday. Looking at my calendar this week and last week, if I have two hours together without a meeting, somebody's waiting to fill that time ... It's like being on a treadmill.

The ECU Libraries are making significant progress in their transformation to an organization that relies predominantly on providing information and services in a virtual environment. However, several librarians comment that the speed of change happens so quickly that there seems to be little time to enjoy the successes that the ECU Libraries experience due to an immediate shift in focus toward the next project. As an example, Laura describes the turbulence of change in her own professional life:

Change is happening so fast, and flying at us at such a pace, that you constantly feel like you don't have time to get your foot down before you're moving on to the next thing ... And while we don't have the kind of financial support that the commercial sector would have, we still have to provide things in ways that are comfortable and convenient for the population in other areas of their lives.

Laura, who also suggested that librarians plan for the obsolescence of past practices, is an avid supporter of all the changes the ECU Libraries have made in the past few years. But she asks somewhat rhetorically if there is a way to control the speed of change that hits everyone's desk on a daily basis. Although she knows this probably cannot be accomplished, she recommends to the profession that, "there does have to be the voice that says, I embrace change, but there has got to be a way to do this that is not going to kill everybody."

Another phenomenon that emerged related to this theme pertains to the abandonment of old practices. The ability to increase the speed of change at the ECU Libraries is often slowed down, again, by trying to maintain both a physical and a virtual library. New digital resources and services compute to new work that has been added on top of the librarians' existing work, while new staff to handle these services are not added to the library. At the same time, however, Patricia, who administers a unit that processes many of

the print and digital resources of the ECU Libraries, notes that librarians are not willing to give up this work even if it is no longer needed. Consequently, this dilemma is exacerbated, since some librarians are very much in favor of continuing to add more and more digital resources while *maintaining* their work in the print environment. Several other librarians comment, however, this is just not an option for the ECU Libraries. So while librarians have been given permission to abandon their old work, passive aggressiveness toward change sometimes emerges regarding the protection of obsolete work. And, moreover, the necessity of this change becomes critical, because the library will not be viewed on campus as being an innovator or a partner in educational and research processes.

Theme Three: The Search for Professional Meaning

The search for professional meaning emerged as a philosophical undercurrent associated with change at the ECU Libraries. This theme ranged in diversity and depth of responses by librarians which showed that, although the ECU Libraries operate with a shared vision and team environment, the concept of change was not necessarily a conformist ideal accepted by all of the librarians. Rather, levels of its acceptance were connected to each person's individual experiences and desire to make sense of the phenomenon. This search for professional meaning leads librarians into a period of simultaneous uncertainty and discovery. Bridges (2004) describes this search as the "forest dweller" stage where an individual leaves the comfort of his or her previously stable settings and introspectively explores alternative perspectives of career meaning.

For some librarians at ECU, this journey does not include a change in professional philosophy. Rather, it implies the need for librarians to choose aspects of the philosophy that respond more readily to new environments while communicating their own professional relevance to the university community. For other librarians, this response to the external environment requires radical shifts in philosophical thinking to ensure the long-term survival of the profession. This search for professional meaning also brings the question of dehumanization in the profession to the surface, as some librarians fear that the implementation of new technologies without the presence of human interaction with students and faculty will create increased stress and uncertainty not only for librarians but for the academic community in general. Still other librarians suggest that the search for professional meaning includes active competition with the business community in future

product development. ECU librarians also suggest that internal professional crises precipitate the need to shift away from traditional librarian specializations altogether, requiring radical shifts in library science curriculum to provide the skill sets necessary to manage emerging virtual libraries. Moreover, the absence of these external opportunities for development requires research libraries in the future to promote professional transformation through the precipitation of organizational transformation.

Communicating Professional Relevance

In an online environment, the concept of communicating the relevance of the library becomes more and more difficult. Users access online resources to which the library subscribes, oftentimes without realizing the work that has gone on behind the scenes to provide a seamless gateway to these resources. As an example, Lisa, who previously questioned the continuation of outdated practices, notes the greater importance librarians attribute to the perception of the library by the academic institution. She describes this scenario as continually exacerbating the concept of communicating the library's importance:

You have to continue to prove your relevance, but you have to do it in ways you didn't do in the past. Volume counts aren't important anymore. When researchers get grants and rely on the electronic resources of the library, and they don't identify those resources with the library or the people that work there, how do you keep them aware of that?

Furthermore, the physical library used to be viewed as a central intellectual center on campus, but university administrators now see this central role disappearing due to the increasing demand for electronic information. And, while the library continues to pay for these digital subscriptions, researchers do not always identify the library with the information resources available to the university community.

Changes in the ECU Libraries might also be attributed to dysfunctional communication patterns among the librarians. Some librarians find themselves disconnected from the university community and from other academic librarians. As an example, Elizabeth, who previously questioned how slow change sometimes takes place, challenges librarians to communicate their relevance by tearing down both the physical and metaphorical walls that separate librarians from the university community. Moreover, this framework for understanding can help expose the dilemmas of libraries as similar symptoms of universities at large. Elizabeth argues that libraries epitomize the ivory towers on campus:

Libraries have always been a tower within a tower. And often literally, *literally*, a library is that building that looks like a tower in the middle of the campus.

In her view, the metaphorical significance of this image subsequently leads to a convent-like mentality among librarians. Because of their physical spaces, librarians allow themselves to be cloistered from the university community outside the walls of the library and from their own colleagues within the building.

The Question of Dehumanization in the Profession

Many of the problems the ECU Libraries face are equally representative of the same dilemmas encountered by other academic units on campus. As an example, many university employees take Information Technology (IT) departments for granted and do not realize the significant amount of work that goes into maintenance of the campus IT infrastructure. And this problem is exacerbated in IT units, since many of the people who work within them are never seen by the campus community. Elizabeth comments that librarians have in the same vein been unable to find ways to legitimize and advocate for themselves professionally. In her view, the human side of libraries continues to have importance even in a digital age:

You could erase the people, and we could hide ourselves underground, right? There would still have to be people hidden someplace like moles or gophers actually doing things to make that possible. We'll still be around. But it would be nice not to have to be buried in a hole. It would be nice to market ourselves.

The search for professional meaning in the age of commercial search engines becomes problematic when trying to project an image of human interaction into the future of librarianship. Some of the attributes of the profession happen philosophically behind the scenes but are not realized by many who use the ECU Libraries. As an example, Ann states that she feels the human focus of the profession has been taken for granted. Research librarians have a societal obligation to preserve history for the future while concurrently incorporating new technologies to make this happen. "It is sort of a dichotomy we've been faced with for 20 years or more at least, and it's not an easy one." However, Ann, like Elizabeth, fears that a research future that does not involve human interaction seems dark and desolate.

The Need to Respond to the External Environment

The search for professional meaning is a challenge that also shifts thinking in more rapid ways to respond to the real world experiences of library users. Librarians at ECU argue that librarians should learn to provide services and resources that are more in line with what people experience in their lives. Although Laura describes herself as an older, long-term career librarian,

many of the challenges in exposing the deeper issues of professional meaning are related to generational divides among older and younger librarians. The ECU Libraries are moving into the digital environment at a fast pace, but her experiences with librarians in other libraries have shown her that the profession is reaching a critical juncture. Laura, who has worked in different libraries for many years, argues that change in most libraries is happening at a slow rate that is unsustainable if librarians continue to force rigid structures of control and guardianship on the university community.⁴

Mostly in other libraries, the change doesn't come as fast as it does here, and it's not well received. There's a lot of older librarians in more hierarchical places who don't get it. They don't get it that, if they don't change, their whole institution may well disappear.

This argument does not imply that research libraries can do without older professionals. On the contrary, these librarians could lend a great deal of knowledge to the further development of the profession by beginning new individual searches for professional meaning. This dilemma becomes frustrating for many librarians when apathy toward a shift in professional thinking threatens job security. However, as Laura comments:

My sons, who are in their 20s and 30s, tell me, 'Mom, you have got to get a new profession. Libraries are going away. Nobody in their right mind goes to a library anymore.' That's an epidemic way of thinking in the population as a whole and not necessarily inappropriate I think ... It's a huge issue, and it really needs to be put out there especially for the benefit of the people who don't think their jobs are in danger or that libraries will go away.

Librarians at ECU also note that responding to the external environment must begin by reflecting on practice, and the practice of librarianship relies on understanding the educational and personal experiences of the library user. As Richard notes this includes recognizing what it is like to be a university student today and that many students are just as busy between work, school, and family lives as are librarians. What an incredible advantage it is for these students to be able to access the library's resources late at night after the family has gone to bed.

The divide between library user expectations and traditional frames of reference for the library profession can be particularly frustrating in an age of enterprise level search engines. Many of the students entering ECU now have lived through much of their educational careers with online search engines. As a result, they are accustomed to this type of searching and do not feel that library databases meet their expectations as far as user interfaces go. As one example, Christina notes that some of her colleagues take an adversarial position against the use of online search engines, and she states that any

librarian's quest for professional meaning should specifically address the failure of library resources to meet the Google expectation. Students now have choices and do not need to rely on librarians to find information. If librarians want to be able to compete with these types of search engines in the future, they must compete now, and that can only come with a new professional philosophy that tries to surpass the performance of Yahoo or Google. Students and faculty continue to view librarians as "kindly" and "intellectual," but these qualities will not suffice when librarians are no longer the people students and faculty turn to when they need information.

David, who has been a librarian for many years and administers technology in the ECU Libraries, argues that librarians have lost touch with the foundations of librarianship and need a recursive view of the founding philosophies:

It certainly doesn't have to do with books, and it has nothing to do with libraries – it has more to do with access to information. It's really what it was all about in the first place, but I think we've always gotten hung up by the book on the shelf itself.

This is the unfortunate circumstance within which librarians have placed themselves. Some would argue that librarians have focused on the book and have therefore shifted their thinking toward things rather than people. In effect, librarians have created for themselves the very crisis from which they are trying to escape. If librarians can begin marketing their own value, they have a chance to find a place for themselves in a future where physical items are less important and human beings are more valued in a profession that continues to compete with the private sector.

Identified Needs for Change in the Philosophy of Librarianship

Changes in professional and organizational structures are happening so fast that there have been significant shifts in how research libraries of the future are even discussed. Teresa notes, for example, that there has been a subtle conversation among ARL directors that in the future, there might only be a handful of research libraries, and the remaining libraries will end up merging in virtual environments with, or subsequently absorbing, other academic libraries. If the former occurs – all of the prestige that formally came with the title of being a research librarian will start to disappear – leaving many wondering what this future will hold. Research universities in general might subsequently follow this trend. As Teresa states, "I think the profession will probably continue to have an identity crisis [laughing]." Moreover, Teresa questions, like many of her colleagues, if there will even be research librarians as we know them now in the future. If there are, the stereotype of librarians

ECU Libraries faces. And these challenges often come in the form of a paradox between professional thinking about the printed and virtual environments. Research libraries have an obligation to preserve the past to make this information available for future examination. At the same time, research libraries are obligated to incorporate digital resources that streamline the research process for faculty and students. But regardless of the medium of exchange, the need for human experience and interaction will continue to be critical for the success of the research library in the future.

Theme Four: Coping with the Experiences of Professional Change

Significant turbulence in a person's life can greatly influence how she/he responds to change. And certainly there are significant changes taking place at many research libraries across the country. However, there is little in the literature that addresses how librarians cope with and experience change in academic libraries. During the course of interviews at the ECU Libraries, librarians described several different experiences and coping mechanisms they use when responding to change. The concept of increased stress and tension as a result of rapid change and increased workloads emerged frequently, and the phenomenon of stress as a shared experience also was identified by the librarians in this study. Subsequently, coping strategies were identified by the participants which included communicating change, learning new skills, and adapting workflows. Equally, the necessity of coping at the individual level and through dialogue with other individuals becomes important to establish what Schön (1991) would describe as new theories in use. It became clear during the course of these interviews that dealing with change focuses more on the individual's own experiences, and his or her coping mechanisms manifest themselves in ways relevant to these experiences.

Coping by Communicating Change

It has been suggested by several researchers in the social and behavioral sciences that leaders should communicate the issues that surround needed changes in organizations as a strategy that helps individuals deal with organizational shifts (Birnbaum, 2000; Burns, 2003; Shaw, 1999; Yukl, 2002). At the ECU libraries, several librarians extend this perspective of communicating changes at all levels as an effective coping strategy. By letting colleagues know that changes are coming before they happen gives the librarians an opportunity to confront and make sense out of those changes. As an example, Teresa, who has participated in both library organizational

restructuring activities, sees communication as the most important aspect of coping with change. Change for many people in her area is uncomfortable and frustrating since they require that outdated practices be phased out. The perception among staff can sometimes be that change is being pushed on them. But in her view, the ECU Libraries have been particularly successful at communicating changes throughout the organization and getting people involved in discussion. As a result, in addition to the library-wide opportunities for communicating change, in her own area Teresa tries to begin dialogue among colleagues as early as possible.

This process of allowing participants to verbalize their frustrations and share in this discomfort is a strategy for coping that helps employees move toward the change, similar to Bridges' (2003, 2004) description of the individual transition process. Occasionally, the changes are so dramatic that library personnel find themselves in a situation Mezirow (1991) would describe as a disorienting dilemma. For some, the change is insurmountable, and, in spite of opportunities to train for new skill sets, these employees see retirement as the only option for coping with change. Conversely, employees also go through a similar transformation of perspective that enables them to move into a more highly developed frame of reference for coping with change. Moreover, Teresa states that their involvement in communicating the change process is sometimes more important than the change itself, a phenomenon Ouchi (1981) has observed in corporate organizations.

Coping with change is also viewed from a different framework when discussing individuals outside of the ECU Libraries. Several librarians accept the changes that have taken place in at the ECU Libraries very positively. Adding further to this idea, James, who works in an educational capacity, states that communicating change is essential to help *faculty and students* cope with the shifts taking place at the ECU Libraries. Students, in particular, find it difficult to engage in instructional sessions on library research, because the amount of information is somewhat overwhelming for them and because their experiences are so different from those of students working 10 years ago. Consequently, it becomes more difficult to learn critical reflection skills in a dynamic rather than a static environment, as the traditional structures of research and learning are starting to disappear. Therefore, librarians constantly change lesson plans and supporting materials as a way to communicate shifts in higher education that subsequently help students and faculty cope with these changes.

Communicating change can also be used in subtle ways that help individuals accomplish their goals. Librarians who are relatively new to the ECU Libraries might use a naive approach to communicate change. As an

example, Robert, who has been at the ECU Libraries for a few years now, notes that much of the perception of the resistance or inability to cope with change at the ECU Libraries can be attributed to the idea that these conversations are “probably gossip enhanced to make the library more interesting.” Consequently, since it is more difficult for someone perceived as an outsider by long-time employees to be accepted and thereby affect change, newness and the naiveté that comes with it can break down these otherwise judgmental attitudes through the recognition that someone is new and does not know any better. This in turn allows librarians to be less reactive and reflect critically on the new ideas proposed by someone who has not been influenced by the traditions in the organization.

Coping with Change through Learning

Several ECU librarians identify the concept of learning as an integral strategy for coping with all of the changes taking place at their library. As an example, Lisa notes her own way of confronting change has incorporated new learning strategies to prepare for the future:

I have had to “come to Jesus” as it were. You know I have had to fight the same personal issues that a lot of people do. I just have to be prepared for change and that it’s a part of my life all the time. What we did well six months or a year ago may be different. So looking forward helps me not to get blind-sided.

Consequently, the brown bag lunches the ECU Libraries hold periodically have been a very effective method for her to incorporate continual learning into her coping strategies. These brown bag lunches usually cover a specific aspect of new technologies and give participants opportunities to discuss and understand the changes these technologies bring. Lisa also points out that no matter how much she might discuss the constancy of change at the ECU Libraries, “that doesn’t give anyone any comfort.” Rather the ability of individuals to experience and understand change through learning makes the change less uncomfortable, as well as provides new skills that will help during the change process.

Conversely, learning as a strategy to cope with change can also make increasing stress more problematic. Gaining new knowledge is integral to several of the ECU librarians’ evolving perspectives on the changing library profession. However, this quest for knowledge can be very time consuming, because the team environment contributes to a considerable number of meetings. Moreover, if training or learning activities are not geared toward immediate use, people will forget their new skill sets or will not be able to see the bigger picture of their application toward contributing to change.

Elizabeth, who works in an educational capacity with many web technologies, also expands on this idea, arguing that using learning to cope with change involves an incredible investment of time and a conscious decision to *choose* what to learn:

Someone could spend 40 hours a week going to informational meetings just trying to keep up with what's going on. I mean really, it's just so overwhelming. How do you balance learning new things with actually trying to get some work done [laughing]. It's difficult some times.

So, although learning can be an effective method for coping with change, it can also contribute to the increasing stress levels associated with change.

Coping by Adapting Workflows

Mechanisms for coping with stress can also be attributed to more direct methods in the workplace. For several librarians at ECU, adaptations in their professional lives include such concepts as organization, choice, and disengagement. For each librarian, adaptation in the workplace brings either positive or negative outcomes and sometimes a combination of the two. Many librarians note that they are better able to cope with change by drawing from one of the key philosophical components of librarianship: staying organized. The high volume of e-mails, meeting requests, and daily priorities are almost overwhelming for several of the librarians interviewed in this study. Recently, the ECU Libraries hosted a day of learning where time management and organizational skills were taught. As an example, Laura, who must use several different technologies in the area she supervises, found this very beneficial, as she now coordinates her e-mail with documents in her PC and Intranet folders to keep a connected map of her workflows. By taking this organizational approach, she believes she is able to replicate her thought processes about task development regardless of the medium of information or its location. Taking the extra time up front to enhance this information on project schedules turns out to be a long-term investment which prevents stressful cycles of trying to reach deadlines while trying to connect all of the data on individual computers.

Interruptions during the normal workday are also some of the more frustrating outcomes of continual change in libraries. Since many of the work responsibilities associated with professional librarianship are largely intellectual, there is an increased need for finding both the time and space for concentrated thinking about change. Organizational development theorists suggest one coping strategy that can be used is to review and answer e-mail only at a certain time of the day. However, e-mail traffic is

typically nonstop during most of the day at the ECU Libraries, and librarians note that waiting too long to respond leads to their being overwhelmed by the volume of e-mail. And interruptions to concentrated thought will become more and more significant as impairments for librarians to be able to adapt to change. As an example, Bill, who processes a great deal of communication in the area he oversees, finds himself closing the door to his office more frequently as a coping strategy. However, since the ECU librarians' work lives are so busy, people still constantly knock on his closed door to ask questions or report findings. Librarians, consequently, have growing levels of stress, since it becomes difficult to find time to think about complex decisions that need to be made quickly. Furthermore, in the case of Bill, he has shifted this time and space of concentrated thought to his home life, early in the morning or late in the evening, but he notices that having to do these cuts further into his personal life. Christina, who is involved with large team projects, also notes that she finds herself taking more and more work home, since she has little opportunity for concentrated effort during the work day. However, she feels that she is sometimes neglecting her family by working at home rather than spending time with them. In effect, both have carried over into their personal lives the cycle of stress from which they have difficulty escaping in their professional lives.

Overwhelming feelings of information overload can also contribute to the change of workflows at a philosophical level as a way to cope with change. As has been previously stated, several librarians describe the stress and tension that occur as a result of so much change at ECU. Realizing that he simply cannot keep up with everything, Richard, who works in a cross-functional manner with several different library units, now chooses to focus specifically on those changes that affect his area while ignoring some of the changes in tertiary areas. With the proliferation of information, it is virtually impossible for any single person to keep abreast of everything that is going on. Consequently, Richard has learned to filter information that does not pertain specifically to the tasks at hand:

The pace of innovation and change is everywhere, and you can't be part of it all. Or I can't be, because I just have too much to do ... I think there's a good deal of rhetorical cynicism about some of the changes, but I think it's a fairly easy cynicism. The gap between ideal and reality is all around us in our lives, and it's here in the library.

A strategy of disengagement extends the philosophical strategies used to cope with the stress of the changing library environment. As an example, Tony, who has participated in both library reorganizations, laughs when he

states the only way to cope realistically with these changes is through “therapy!” He notices his own coping strategy has been to disengage from commitments to the organization and to the profession, focusing primarily on the tasks that surround his local area. As another example, Ted, who has actively worked to help the ECU Libraries continually evolve, jests that, “there’s probably something that will cause change that I’m either blocking or ignoring!” However, both Tony and Ted try consciously to see the changes taking place at the ECU Libraries as positive which they feel helps them to cope.

Environmental settings are an equally effective method for coping with change. Issues such as access to external light and separation from others in office spaces can contribute to positive coping strategies. Librarians note that office spaces can be constructed in a way where there are constant interruptions which makes it very hard to stay focused. Philip, the library’s director, notes for example that his office is located at the end of a suite of offices. Because of the physical layout, no one comes to his office unless it is his or her destination. Equally, this office is surrounded by windows to the outside. As a result, Philip finds that this environment lends greatly to productivity on concentrated work where creativity is involved and, therefore, helps to decrease the stress and tension of everyday work life.

Coping as an Individual

Coping with change ultimately can be tied to the experiences of the individual. Librarians at ECU identify that coping most usually requires each person to respond in a manner most conducive to his or her own situation. Having worked in several research libraries, Ann says that, during her career, she was forced to go through a transformative experience when she was moved out of an administrative position. Much like Mezirow’s (1991) description of the “disorienting dilemma,” Ann went through several stages of reactions to this event and eventually realized that she was not coping productively with change when this event started to affect her personal life. When Ann sees this phenomenon taking place at the individual level at the ECU Libraries, she is able to draw from past experiences to encourage librarians to move toward positive reference points which will help them cope with change:

Despite 1000s of years of development, deep in our reptilian brains, we are still “fight or flight.” So much of what we do during that very first reaction to change is still based on that. And we can’t control that, but we can realize what it is.

As a result, helping colleagues develop frames of reference that relate to an individualized view of change subsequently enables people to build a broader perspective of others in the library going through similar transitions.

Another method used to cope with change is to project a positive image at the individual level. Some librarians at ECU note that this is sometimes difficult but believe this positive image helps others respond in ways that are beneficial to the group environment. As an example, Patricia sometimes finds it frustrating to deal with the people that she supervises when “they complain just to complain.” This is one of the most difficult aspects of her job because of her deep affection for her colleagues. By focusing less on failures and more on success, librarians see the positive effects of her individual attempts. In turn, Patricia feels personal gratification which enables her to continue to adapt to the changes in her own work.

Exercise is another strategy that can be used to cope positively with change. Interestingly, the concept of exercise as a coping mechanism was not identified by a majority of the librarians interviewed at ECU, although it is stressed by many in the social and behavioral sciences (Austin, Shah, & Muncer, 2005; Morse & Walker, 1994; Puetz, O’Connor, & Dishman, 2006; Taylor-Piliae, Haskell, Waters, & Froelicher, 2006). This researcher found that those librarians who identified exercise as one technique they used for coping tended to have positive attitudes about change while dealing with stress in constructive ways. As an example, Bill states that he originally began exercising everyday for health reasons, but now that he has done it for so long, he recognizes that it has become an aspect of how he copes with change, noting, “I do feel better, I feel more energetic.” As another example, Patricia comments that, in addition to contributing to her general well-being and positive attitude, she notices that exercise gives her an opportunity to clear her head from competing ideas, enabling her to focus more deeply on the critical issues that need immediate attention. Equally, Philip argues that he has to exercise everyday to deal with the stress of his job and that his exercise regimen allows him to think more positively about his work. Additionally, he recommends to all librarians that, when tension is starting to build up during the day, they should get up and walk around the library to cope with stress in the workplace.

Coping through Dialogue with Other Individuals

Although communicating change is one method used to cope with stress in the workplace, dialogue with others suggests a broader focus on giving

meaning to organizational change. As many organizational theorists have argued, communicating with others on the crises or dilemmas affecting an individual in his or her professional life provides the group with a context to generate deeper meaning about their own on circumstances (Abraham & Gilgen, 1995; Bridges, 2004; Mezirow, 1991; Stacey, 2003). Librarians at ECU also concur that conversations with others about the stress of their work life has been an effective personal strategy to cope with all of the changes taking place at their library. As an example, Tony, who is hearing retirement, notes that being able to share the same frustrations with his colleagues enables him to decrease his own angst about professional changes. Equally, Lisa, who is somewhat new to the ECU Libraries, shares this belief, stating that "being honest about the fear of change when that is what is happening enables everyone to learn ways to deal with it better." And Patricia, who has worked at the ECU Libraries for several years, comments that personal stories can be used to help others both learn and teach from the experiences of others, helping everyone to reflect further on their own individual coping strategies.

The open meetings at the ECU Libraries also help to encourage group communication that contributes to coping with change at the individual level. Since not all of the ECU librarians deal with change in the same way, the open forums for discussion have been very effective for helping other librarians see the different perspectives of their colleagues. Ted suggests, for example, that all research libraries should integrate this style of communication:

Go ahead and talk about it. If you don't like it, bring it up. For someone upon whom change is being imposed, talk about it. If it's negative, if it's positive, at least it's expressed.

Therefore, reflections become less focused on the change itself than on the need for the voices of individuals to be heard, reflecting Ouchi's (1981) work on *Theory Z*. As another example, Laura argues that territorial boundaries tend to lead to negative misperceptions about "what the other guy does." Now her entire department meets informally with other ECU librarians outside of her area which has allowed all librarians involved to develop "broad spectrum" coping strategies across individuals working in various areas within the ECU Libraries.

The ECU Libraries' administration has moved toward being as transparent as possible when addressing upcoming changes at the library. This helps staff tremendously, as they like to know what is going to happen, when it will take place, and how changes will affect their own work. Equally, the ECU

Libraries have implemented a program that helps train staff for new responsibilities, and this has been viewed positively by library staff. In this program, staff are presented with scenarios for the future, and work that will be de-emphasized is discussed, as well as why the work will be phased out. Philip, as an example, has found this program to be valuable, as many staff want to be successful in their new work, and the more time they are given to explore options and talk about them, the better they are able to succeed.

The comfort that comes from communicating the stress associated with the workplace can also be found in relationships with spouses and partners. A few of the librarians identified this as the most effective way for them to cope with change. As an example, Lisa comments that she speaks with her husband every night about problems, frustrations, or achievements made by and within the ECU Libraries. She also notes that she has the added benefit of having a partner working in higher education, enabling her to have an actual dialogue with someone outside her own work environment. As another example, David, who has been married for many years, believes it is essential for this researcher to understand that he feels he is really only able to cope with the stress caused by working in the library by expressing his concerns and joys with his wife:

I have somebody that I can talk about changes in the library with, and decompress them, and put them into some kind of real situation. That's on a very personal note, but I think it's important. I don't know how I could do it without her. It would be so relentless: I wouldn't be able to step away from it.

As a result, both Lisa and David find that having a trusted confidant outside the library serves as a successful way to cope with the increasing stress and turbulence that comes from working in an organization undergoing transformative change.

INTERPRETATION OF FINDINGS

Introduction

Academic librarians are faced with dramatic changes in their libraries. The turbulence and rapidity of these changes are manifested in the study of the ECU Libraries. Librarians at ECU's main and branch libraries have experienced many significant changes, ranging from the shift from the physical to the virtual library to organizational restructuring activities that focus on continual change in the thinking and practices of the participants.

This study reveals significant findings pertaining to the experiences of these librarians, and each participant provides an individual interpretation of organizational phenomena that are integrated into a systemic picture of the ECU Libraries.

An interpretive framework of complex systems was used as the main method for analysis of the phenomena that emerged through case study research. This researcher also included a broad literature base on change theory, organizational theory, leadership theory, and library organizational development theory in the analysis of findings. Complexity theory “emphasizes a nonlinear, even emergent approach to dealing with organizational challenge” and “provides an integration point for many disciplines,” sometimes even those that seem to be at odds with each other (Bütz, 1997, pp. 184, 223–224). Using this wide range of theories, therefore, enabled the researcher to analyze and interpret recursively the findings of this study through the lens of complexity theory while grounding the study in the main theoretical literature pertaining to individual and organizational change. This chapter, therefore, presents the experiences of the ECU librarians under study by generating interpretive results that include: the emergence of a hypercritical state; the limiting nature of negative feedback mechanisms in relation to change; a complex systems framework for professional thinking; and coping in a hypercritical organization.

The Emergence of a Hypercritical State

The concept of paradox in group dynamics has been presented by several different researchers during the twentieth and twenty-first centuries (Abraham & Gilgen, 1995; Mitleton-Kelly, 2003; Morgan, 1997; Stacey, 2003). Morgan (1997) has described the paradoxes in organizational life through various ideas, ranging from power and influence to adoption and resistance. In organizations, paradox often is manifested through competing tensions between organizational cultures, norms, and experiences. It is in this discovery of paradox that one is able to see an organizational place that might exist “between the status quo and alternative future states” (p. 271). At the same time, the results of these changes contribute to further complexity in the organizational lives of the individual participants in this study, increasing the competing tensions surrounding organizational paradox. Consequently, a hypercritical state has become evident at the ECU Libraries, contributing to the transformative changes in both individual and organizational dynamics.

For many ECU librarians, their experiences with change, uncertainty, and turbulence contribute to competing tension between the emergences of their future state while trying to maintain the traditional roles of research librarianship. The shift from the print to the digital research library has not taken place as quickly as many librarians had previously expected at the ECU Libraries. Equally, many external constituents – from faculty and students to university administrators and alumni – have identified the shift to the virtual library at ECU as a panacea for decreasing the costs of running libraries in the future. Although this is possible, it is not the planned outcome, and ECU librarians have continuously encountered this misinterpretation, not as a result of resistance to change, but rather as the slow progress made so far that is a consequence of the growing complexity with which librarians now deal when financing and providing digital services and resources.

It is apparent that the shift away from print resources allows the ECU librarians to focus less on the expenses and resources associated with maintaining print collections. Human involvement with printed materials is greatly reduced if there is not as much need to have library personnel process, check-out, and re-shelve physical items. Equally, fewer facilities expenses arise if there is less physical square footage that must be maintained. Conversely, in a digital environment, many of the costs and resources associated with the maintenance of print collections shift to the maintenance of items in digital form. Research information and the technology needed to provide it still cost money in a virtual environment. Moreover, humans are still needed to help faculty and students address and match their research needs with the electronic resources that are purchased by the university or are otherwise available. However, the library as a physical place and the physical items within it change in importance on campus which bring emotional and psychological challenges to the librarians at ECU. This shift from the physical to the digital library at the ECU Libraries might provide a glimpse of the future that can be extended to other libraries. For several librarians at ECU, particularly those who have been in the profession for many years, the shift from print to digital environments manifests individual changes that are accompanied by discomfort, heightened emotional responses, and feelings of confusion about the future. Moreover, these changes represent a time of closure in the provision of print-based services that librarians had embraced throughout their careers.

There is, as in the earlier section, unique similarity to Bridges' (2003, 2004) stages of transition in that several librarians are now confronted with a professional "ending" to a large aspect of their careers. During the

previous reorganization at the ECU Libraries, the maintenance of both the print and virtual environments allowed librarians to avoid confronting this stage. But in very recent years, the impetus to move away from print altogether has thrust several librarians into the "neutral zone," a period described by Bridges (2003) as one filled with confusion and doubt. At the same time, a significant finding in this study suggests that the heightened levels of stress associated with the rapid and turbulent environment of change are related to the current reality that the ECU librarians still maintain both print and virtual environments. The next stage in this transition process is the time for "new beginnings" that one could speculate might possibly represent the evolution of philosophical and professional thinking among librarians.

When interpreting these phenomena through the lens of complexity theory, it can be noted that Prigogine and Stengers (1984) have identified this period as one existing between a chaotic state and a bifurcation point. Accordingly, when agents operating as a system move through a chaotic state, there is a period right before bifurcation when chaotic activity appears to dissipate in a period doubling cycle where the internal resonance or balance of agents within the system seem to be at their most harmonic state (Ravindra & Mallik, 1994). Metaphorically speaking, one can find similarities to the absence of turbulence found in the eye of a hurricane. In a dissipative structure, the outcome of this bifurcation has the potential to be either negative or positive, and the system will evolve with higher development and structure, bringing the system back toward an equilibrium state.

There are similarities between the observations that take place in physical and life systems and the observations of change within the ECU Libraries. Individuals in this study have moved into a level of professional turbulence and uncertainty that creates a chaotic organizational state. Bak (1996) has described this hypercritical state in physical systems through the concept of self-organized criticality, and this state has also been shown to emerge among individuals in group and organizational settings (Breu & Benwell, 1999; Gilstrap, 2008; Lichtenstein, 2000; Smith & Comer, 1994). Some researchers in the social and behavioral sciences have argued that it is necessary for individuals to remain in this state without moving toward a bifurcation point (Carver & Scheier, 1998; Pascale et al., 2000). Other researchers have argued that it is critical for people to move beyond this phase for organizational transformation to take place (MacIntosh & MacLean, 1999, 2001). In the case of the ECU Libraries, both situations seem to have occurred. During the library's first reorganization, transformative structural change led the librarians through individual and organizational bifurcation points where the organizational operations,

culture, and thinking have been transformed at a level with which Osberg and Biesta (2007) have described as *strong emergence*. During the library's second reorganization, structures were put into place that both influence and limit librarians' abilities to operate in far-from-equilibrium conditions while simultaneously preventing movement into periods of unbounded chaotic activity.

The speed of change was a major contributor to the feelings of uncertainty and turbulence among the study's participants. Several librarians identified technology as a critical component that greatly affects this speed and, subsequently, is associated with heightened emotional responses among the participants. Continual learning and the implementation of expanding forms of communication with the ECU Libraries' constituents also contributed to the speed of change through more rapid rates of information processing at the individual level. Consequently, the information taken in by librarians is then used to generate rapid and consistent change at the organizational level, reflected in the statement of one librarian that, "change happens faster here than at other libraries."

In the case of ECU, these librarians deal with increasing amounts of information on which they must make decisions. These rapid and fluid information flows lead each librarian to process and reprocess information in interconnected ways that are shared among the members of the group. Likewise, a qualitative characteristic of a dissipative system is its ability to take in and exchange information at faster and more comprehensive rates than systems moving toward equilibrium states. Ashby (1956) first described this phenomenon through requisite variety in cybernetics, where a system's ability to reflect internal variety at levels comparative to the external environment becomes critical for its survival. Stacey (1992, 2003) has also argued that a dissipative system's absorption of increasing amounts of information leads to further diversity among individual system agents.

The Limiting Nature of Negative Feedback Mechanisms

In contrast to the stress associated with the rapidity and turbulence of change, certain limitations identified by the ECU librarians act to inhibit their abilities to affect change at a faster pace. These limitations include slowness in university purchasing and strategic planning, vendor production failures, and the lack of capital, physical, and human resources to develop library technology within the ECU Libraries. As several researchers in the social and behavioral sciences have observed, such limitations can be viewed

as negative feedback mechanisms (Checkland, 1999; Flood, 1999; Stacey, 1992; von Bertalanffy, 1973). It was assumed by this researcher that during the course of this study much of the negative feedback would result internally, either at the individual level through resistance to change or at the administrative level. However, as detailed in the following section, librarians identified negative feedback controls primarily as originating outside of the library system. In complex systems, these negative control mechanisms move individuals toward equilibrium and stability (Stacey, 1992, 2003). More importantly, over time, the damaging effects of negative control mechanisms can move systems toward obsolescence (Pascale et al., 2000). It must be noted that the university structure at ECU supports creativity and growth in intellectual thought and educational change which is evidenced in its support of the ECU Libraries' organizational restructuring activities. However, it is equally important to note that, while this support exists, institutional limitations to the ECU Libraries' continual evolution still occur within the framework of negative feedback in organizational systems.

One of the strongest negative feedback mechanisms identified by the ECU librarians pertains to the strategic planning process. Strategic planning in most institutions of higher education is typically performed on an annual, two-, or five-year cycle that is repeated after goals and objectives have been achieved. On the one hand, this mechanism prevents academic departments and units from shifting goals and objectives too quickly, preventing an environment of unbounded chaos (Morgan, 1997; Stacey, 1992). On the other hand, when changes do need to be made at a faster rate that responds to the external environment, longer cycles limit an organization's ability to respond and adapt to the changing environment (Cutright, 2001; Weick, 1985). Strategic planning largely evolved from the Management By Objectives (MBO) movement of the 1950s and 1960s and was fully integrated into the academy by the 1980s. It has since been criticized as an ineffective and unproven strategy by major management theorists in both the higher education and business communities (Birnbaum, 2000; Mintzberg, 1994). However, this periodic cycle of strategic planning continues to be used to a high degree by institutions of higher education for, as some might argue, lack of a better model.

The strategic planning process at the ECU Libraries is problematic to the complex systems framework. The annual cycle is linear in nature, with the creation of goals and objectives taking place at the beginning of the cycle followed by a report on goal and objective progress or completion at the end of the cycle. Little room is given for deviation from this linear process when new or changed goals arise as a result of the changing environment. Equally,

similar to the single-order learning organization (Argyris, 1992; Argyris & Schön, 1978; Schön, 1991), reflection on practice during a strategic planning cycle while in process often involves the same information or practices that originally created system errors. Although this model can still be viewed as an open system in complex adaptive systems due to the absorption of external influences on a periodic cycle of planning and replanning, the limiting aspects of strategic planning can prevent an organization from reaching its full potential. Some researchers even suggest that traditional forms of strategic planning in higher education should be abandoned and replaced by newer models that continually adapt to the changing environment (Cutright, 2001). This phenomenon challenges all academic librarians to reflect more critically on how timely and effectively the strategic planning process contributes to the organization's adaptation to the environment, whereas considering or proposing alternative forms of planning, such as scenario probability development, that reflect the nonlinear dynamics inherent in the library as a system.

The university purchasing process also contributes negative feedback from the environment external of the ECU Libraries. Technology evolves at an exponential rate, however, a typical purchase for any high dollar item involves a lengthy process including: bid, response review, contract negotiation, legal review, and implementation, which takes about six months before the technology is in full production. Equally, if the product is needed at the time but deviates from the strategic planning process, the purchase must be delayed until it can be added into the next cycle.

Failures of library technology vendors have also contributed to the limiting aspects of the ECU Libraries' organizational development. As ECU librarians pointed out, technology used in most integrated library management systems is outdated and does not compete with enterprise technologies in the private sector. This trend of poor performance by library technology vendors has also been documented in the library science literature most recently (Antelman, Lynema, & Pace, 2006; Breeding, 2007a, 2007b; Pace, 2006). Although the open source software movement has gained attention, it has not fully been embraced by information technology units in higher education. This reluctance can be explained in complexity theory through Arthur's (1994) concept of increasing returns: adoption of software models becomes difficult with which to compete the longer products have been on the market and have been mainstreamed by individuals; even when better and less expensive software exists. Consequently, the librarians at ECU are left with few options to provide technology that competes with the private sector without further investment in human and capital resources for

product development. And, since many comprehensive universities have in the past few years faced significant funding restraints at the federal and state levels, this issue must be discussed at a broader level in the research library community. If librarians at individual institutions are unable to fund product development, it might be beneficial for research libraries to expand on their consortial partnerships to promote collaborative technology product development that can be shared at the regional or national levels.

The limiting nature of both university purchasing cycles and technological development points to the recreation of Prigogine's (1967, 1980) concept of dissipative structures. In these cases, the organization is limited in the amount of resources it is able to take in from the external environment and subsequently dissipate entropy, or rather random and unused energy, as a way to adapt to the environment. Equally, if the dynamics taking place among the ECU librarians exhibit the characteristics of dissipative structures, then the external negative controls could be said to operate as the boundary parameters that prevent the organization of the library from moving toward bifurcation points. However, as a result of the negative feedback mechanisms' at the macrolevels that have a tendency to move systems toward equilibrium conditions, stress and turbulence at the microlevel of the individual librarian is heightened to a state where potential bifurcations emerge from within the organization.

This observation of dissipative structures activity among the ECU librarians leads to Prigogine's (1980) theory of order through fluctuations. Observations of this activity in physical systems show the spontaneous generation of self-organization among individual agents within a system. Bak (1996) furthers this idea through the study of self-organized criticality. When negative feedback mechanisms prevent a system at the macrolevel from interacting with its external environment, internal perturbations at the microlevel can contribute to self-organization among individual agents within the system where critical system states emerge (Gilstrap, 2008). In organizations, Stacey (2003) has also observed this type of dissipative structures activity in similar terms through the amplification of system diversity. This appears to be a major finding of this study, because the librarians at ECU have been able to institute transformative changes in spite of these external limitations, showing that the phenomenon of self-organization, and subsequent self-organized criticality, might be taking place and contributing to the change process.

Trends in scholarly publishing also contribute to negative feedback mechanisms for librarians at ECU. The control mechanisms of publishing models emerged frequently during participant interviews. However, scholarly

publishing inflation has been copiously cited in the library science literature. On the surface, this issue does not present new knowledge for the findings of this study. But as one librarian commented, “change is sneaky ... you must peel back the layers to understand.” Therefore, a major finding for this study suggests, in general, that librarians, faculty, and administrators inadvertently contribute positive feedback to this trend of scholarly publishing inflation, particularly in regard to academic journals in print and electronic format. As has been stated previously, scholarly publishing inflation rates – particularly in science, medicine, and technology – far outpace the Consumer Price Index (Bureau of Labor Statistics, 2007; EBSCO Information Services, 2007; Van Orsdel & Born, 2007). Although librarians and university administrators have been active in addressing this for many years now (Crow, 2002; Edwards & Shulenberger, 2003), the trend continues to take place as an aspect of this positive feedback.

At the microlevel, faculty members at comprehensive institutions in many disciplines are required to research and publish in the highest tiered and subsequently most expensive journals for consideration for promotion and tenure. Resources for faculty to conduct this research and writing are primarily provided through tuition and fees, state tax revenues, and tax sponsored federal grants and programs. After faculty publish the results of their findings in journals produced by for profit publishing companies, the information is then sold back to university libraries at an extremely high cost. In effect, the revenues universities receive from the public subsidize many highly successful sectors of the scholarly publishing industry in the form of new knowledge provided by faculty. And universities again subsidize the publishing industry when purchasing the information written by university faculty to be held in the form of journals in institutional libraries (Edwards & Shulenberger, 2003).

Librarians and administrators have been advocates for bringing attention to this paradox between academic expectations for faculty and increasing inflation rates in scholarly publishing. Albeit, this has been conducted somewhat idiosyncratically among teaching faculty, institutions have participated in economies of scale consortium arrangements for many years now to try to drive down inflation rates on scholarly journals. And some suggest that attempts to maintain both print and electronic formats of journals have contributed to this problem from both the public and private sectors (Johnson & Luther, 2007). At the national level, most recently, the U.S. Congress initiated legislation to promote open access to government-funded research which primarily appears in science, medical, and technology journals (National Institutes of Health, 2005, 2008). In the case of several

academic libraries, librarians have instituted negative feedback mechanisms in the form of canceling subscriptions where possible; yet many of these publications can be considered essential to the academic programs of the university.

From a complex systems framework, this phenomenon represents a constant flux of negative and positive feedbacks between the higher education community and the private publishing sector. Converse to what would seem to be the natural order of market-driven economies, university libraries generate positive feedback to the external publishing community by paying high inflation rates for information that has been produced by faculty and is integral to university teaching and research. The publishing community, understandably, faces rising production costs and subsequently increases subscription prices each year, which, in turn, serves as an external negative feedback mechanism imposed at the institutional level, creating continued financial dilemmas.

A Complex Systems Framework for Professional Thinking

The call for a philosophical evolution of academic librarianship serves as another challenge for participants at the individual level. Some librarians are able to transfer the philosophy of librarianship to the newly emerging research library. They argue that the philosophy has not changed; rather, many librarians have lost touch with their professional philosophy by focusing entirely on the physical item. Other librarians see a need for a critical shift in thinking about how research libraries operate in the future, including a shift toward services and technologies that reflect contemporary society.

These observations by the librarians at ECU reflect the work of Argyris (1990, 1992), Argyris and Schön (1974, 1978), Schön (1971, 1991), and Senge, (1994, 2004) on organizational learning. In single-order learning environments, librarians would correct errors within the environment by applying rules that already exist within the organization. In the long run, this type of learning environment becomes problematic, because the same system structures that contributed to the errors are integrated into problem-solving situations. In second-order learning environments, librarians identify the key philosophical issues that contribute to the causes of error by critically reflecting on existing theories in use and by subsequently developing new theories in use that respond to changes in the environment. The ECU librarians' recognition that the need for change in professional philosophy,

or a recursive reflection on the original philosophy, highlights their incorporation of a second-order learning organization. Although single-order learning still exists in the organization, it reflects the paradox that emerges in the move away from constrained, linear learning toward an environment of self-organizing learning described by Aram and Noble (1999). Equally, the observation that second-order learning is often taking place among librarians is significant, because it signals that the ECU Libraries are in a continually recursive process of movement toward the organizational learning and complex systems learning environments described by Senge (1994), Doll (1993), and Fleener (2002). This learning environment at ECU reflects the openness of librarians to external influences that continually challenge librarians to think in a complex systems framework. This observation is also significant, because it challenges the academic library community to identify whether single-order learning is a dominant learning function of several contemporary research libraries. If that is the case, it implies that some libraries have moved increasingly toward a closed system framework which could be contributing to the professional perception that academic librarianship might be coming to an end.

Several tacit outcomes of the changing environment at the ECU Libraries have also had profound effects on librarians' professional thinking. Communicating the relevance of the library becomes more difficult when resources are provided in digital formats and are not necessarily branded in ways that associate the library with the resources. The ECU Libraries' recruitment of recent graduates of library science programs who not only possess the technological skill sets to operate in a digital environment but who also understand the complexities these technologies bring when providing virtual services continues to be difficult. Along these same lines, from interviews with the ECU librarians, it can be inferred that recruitment by library science programs which continue to admit students who are "bookish" might prove problematic for the profession. This is particularly challenging when research libraries are reaching a time when many librarians from the baby boomer generation will be retiring. As a result, librarians at ECU identified that the profession will need to become more flexible, more adaptable, promote strategies of continual change, and reflect more critically on the future rather than the past. This finding is important, because the ECU librarians have suggested that faculty and students *will* find other places from which to receive their information. And this is particularly the case if librarians miss opportunities to transfer important aspects of professional thinking toward the digital environment by focusing their energies on the physical items in their library.

Finding analogy with the work of Lewin (1951) in field theory, it can be said that the ECU librarians paint the picture of research librarianship as a current state of being “frozen.” Extending this perspective to complexity theory, the maintenance of the status quo reflects professional thinking that is designed to promote stability and equilibrium in academic libraries. Although stability might be a desired aspect of individuals operating within organizations, the unfortunate long-term consequence of this approach in organizations is that equilibrium jeopardizes the survival of the system (Pascale et al., 2000; MacIntosh & MacLean, 1999, 2001). If this is the case for research libraries, the future of these organizations might appear much bleaker to those both outside and inside these institutions.

Coping in the Hypercritical Organization

The movement toward far-from-equilibrium conditions also brings increased levels of individual as well as group stress, and the experiences of the ECU librarians equally reflect this phenomenon. On the surface, observations of heightened individual stress suggest a negative analysis. But even though stress levels are high among the ECU librarians, the activities associated with this stress actually reflect a healthy organization that responds to its environment. As Stacey (1992, 2003) has found, individuals interacting with high levels of energy lead to the amplification of system feedback. The reverberations of this feedback throughout the organization contribute to the creation of a critical state where organizational learning continues to fold in on itself, presenting the possibility for transformative development to take place with each iteration. Brey and Benwell (1999) have observed this same phenomenon in organizational studies, where individuals actually reach states of “hyperactivity” that challenge each person to seek out learning opportunities to help understand the experiences of stress associated with change. It is at this stage that hyperactivity appears sometimes to be without formal structures or outcomes. If individuals enter this state and seek out opportunities for new learning, however, the organization has the ability for “strong emergence” (Osberg & Biesta, 2007) to take place where radically novel shifts in professional thinking can lead to further organizational transformation.

To reiterate previous discussion, Bak (1996) describes this phenomenon in the natural world as self-organized criticality. Supercritical interaction among individual agents leads to a system’s ability to create emergent internal structures. When individual agents within a system reach this state,

there is a point where the system can fluctuate between predictable outcomes and chaotic activity. In Bak's (1996) view, this observation highlights the characteristics of a complex system. It can be said that the individual stress associated with rapid change at the ECU Libraries reflects this hypercritical state where the emergence of more highly developed professional thinking is taking place. However, the potential for unbounded chaos implies that this emergence could take either positive or negative forms. Although recognizing that this phenomenon is a natural occurrence within complex systems (Prigogine, 2000; Prigogine & Stengers, 1984), it is at the juncture between this stress and organizational turbulence that it becomes critical for librarians to learn coping mechanisms that limit the ability of unbounded chaos to take hold within the system as a response to negative individual psycho-social bifurcations.

Coping mechanisms for dealing with change are varied at the ECU Libraries. One observation that took place during the course of this study is that those librarians who identified more developed methods for coping with change exhibited lower levels of stress even when significant change was taking place in their areas. As Wheatley (1994) has noted in organizational dynamics, we often confuse "control with order" (p. 22). Consequently, lower levels of stress came from those librarians who released the psychological desire to control situations that bring turbulence and uncertainty. Additionally, the concept of communicating change at the organizational level was viewed by a majority of librarians who *receive* this information as an effective method of coping, but it was not reflected in general as contributing to lower levels of stress when viewed in the context of the wide range of responses by each librarian at the individual level. Of interest, however, were those librarians who commented that communicating change was an effective method they used to help *others* – both internal and external to the organization – cope with the stress of the changing library environment, similar to Karpiak's (2000) finding of a "call to community" in mid-career professionals. Moreover, these librarians tended to project a level of stress that was well managed in spite of the turbulence surrounding them. Additionally, these librarians did not identify themselves as "change agents" but were instrumental in helping their colleagues who did project high levels of stress cope with change. This was observed in both their own and their colleagues' responses. Returning to the theory of dissipative structures, complex systems dissipate increasing levels of entropy, or unused random energy, as the system moves away from equilibrium and toward a chaotic state (Prigogine, 1980, 1964). Taking this observation further, it can be said that these librarians dissipated the stress

associated with change by helping colleagues and external constituents cope with their own individual responses.

Conversely, dialogue on individual frustrations associated with change was also identified as an effective coping mechanism. Librarians in this group tended equally to exhibit lower levels of stress in their descriptions of the ECU Libraries. Although other factors might be involved in the phenomenon such as disengagement that emerged for this group, in individual transition theory (Bridges, 2004), perspective transformation theory (Mezirow, 1991), and complexity theory (Stacey, 2003), humans enter a state of confusion where discussion of a cathartic event helps that person to cope with and deal with the changes taking place in his or her life. Extending this approach to group therapy in psychology, Burlingame et al. (1995) expand on the reciprocal process of dialogue among individuals within organizations:

It is readily apparent that the psychotherapeutic process is not only characterized but influenced by multiple levels. These levels exist within the intrapersonal sphere, the interpersonal sphere, and the global sphere. Although no one level may be individually preeminent, each could potentially be connected to or influence another, thus contributing to process change and evolution. (Burlingame et al., 1995, p. 90)

The appearance of this phenomenon at the ECU Libraries, therefore, suggests that, at the microlevel, individuals can cycle through periods of stress and stability whereas, at the macrolevel, the library as a system can be exhibiting concurrent or conflicting periods of stress and stability. Equally, extending these same types of dialogue that take place between two or three people to larger groups provides a generative framework to further the process of individual and organizational change while contributing to positive coping methods in academic libraries.

In a similar vein, coping with change through the projection of a positive attitude was another strategy identified to help others deal with the stress of a turbulent environment. In complexity theory, this might be interpreted as a positive feedback mechanism which is integral to self-organizing, open systems. As Bütz (1997) has found “positive emotional communication ... appears similar to positive feedback loops” (p. 157). Amplifications of the positive aspects of the transitions through which the ECU Libraries are moving are integrated back into the organization by the librarians who, in turn, amplify the system’s positive feedback. Using the metaphor of the strange attractor in chaotic systems (Fig. 3) increased levels of positive feedback cause individuals within the ECU Libraries system to move toward

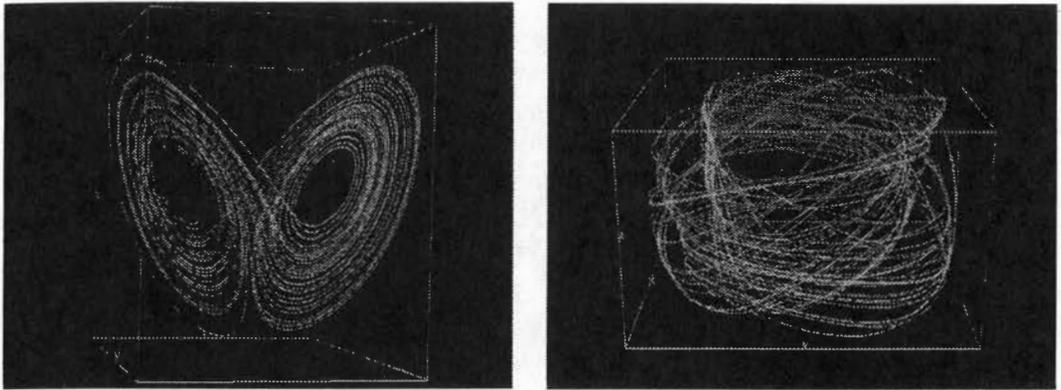


Fig. 3. Lorenz and Duffing Chaotic Attractors. Source: Fair use of the *Chaos Hypertextbook* is encouraged. <http://hypertextbook.com/contact.shtml>

basins of attraction that stimulate growth (Gilstrap, 2005). As these cycles loop into themselves, the energy created by the positive feedback causes subtle transitional states to grow stronger with each iteration, leading to high levels of energy production and entropy dissipation.

Several other coping strategies for dealing with the turbulence of change in the organizational environment were proposed by the study's participants, including exercise, disengagement, and isolation. Although not identified by a majority of librarians in this study, exercise was perceived as critical to a few individuals at ECU. Much literature exists on the positive benefits of exercise in relation to work attitude and performance (Austin et al., 2005; Puetz et al., 2006; Taylor-Piliae et al., 2006). More research would be needed to investigate this concept further, but these findings suggest that academic libraries consider encouraging employee wellness programs as an additional strategy for coping with change. A strategy of disengagement was also identified by a few of the ECU librarians as successful, since they were receiving so much information and had more new work responsibilities to accomplish. This is an understandable reaction to change at the ECU Libraries, and Carver and Scheier (1998), in their research on the self-regulation of behavior, suggest that disengagement is sometimes a necessary process to help individuals struggle through self-verification; or, rather, "confirming their view of themselves" (p. 211). Conversely, they note that it can contribute to self-destructive patterns of behavior. In the case of research librarians, disengagement as a coping method can lead to possible anomie among colleagues and implies that this strategy for coping might follow the same phases at research libraries that incorporate either traditional hierarchies or flattened organizational

structures. At the same time, other ECU librarians identified that they had less and less time in the workplace for uninterrupted, concentrated thought. These librarians also noted that they had begun seeking out opportunities for this type of isolated thinking in their home lives, adding further stress to both their professional and personal lives. This paradox between practiced disengagement and needed isolation will most likely continue, and the phenomenon taking place at the ECU Libraries might signal an emerging challenge for librarians at research libraries in general.

Opportunities for learning were also identified by many librarians as effective methods for coping with change, but, at the same time, this learning created more stress among participants. Activities ranged from self-directed learning and brown bag lunches to formal workshops on new technological and workflow skill sets. Intrinsically, these learning opportunities are important for most librarians to keep up with the changes happening at the ECU Libraries. However, learning was not observed to decrease levels of stress among the ECU librarians in general terms; rather, learning opportunities appeared to increase stress levels among many librarians. In the study of nonlinearity in psychology, proportionality in relationships between psychosocial responses are not always congruent (Goerner, 1995). As is the case for learning opportunities among the ECU librarians, this suggests that it is not necessarily a correlative relationship where increases in produced knowledge lead to linear decreases in stress levels. Conversely, the environment of learning contributed to further amplification of chaotic periods among study participants by their hypercritical consumption of information. As Prigogine (2000) has argued, in a networked society, "the imperatives of the connected collective overwhelm the individual's ability to make choices" (p. 36). Primarily, there were so many different learning opportunities in which individuals could or felt they needed to engage at the ECU Libraries that increasing amounts of knowledge began to contribute to these individual librarians' confusion over selecting which learning was most relevant to their work. Furthermore, the abilities of these librarians to retain new knowledge became problematic if the new skill sets were not immediately applicable, increasing the amount of individual stress as a result of investing in learning that did not contribute to the tasks at hand. These findings suggest that, although boundary conditions can exist to keep an organization from moving toward unbounded chaos, at the individual level these boundaries appear to be less defined. Consequently, although coping with change is necessary at the individual level, systemic mentoring opportunities to learn how to cope with change might be idiosyncratic in many academic libraries.

IMPLICATIONS AND CONCLUSION

The findings of this research present significant new knowledge concerning the librarians and the organization that make up the ECU Libraries. Responding to the two research questions in this chapter, these librarians are making significant shifts from a print to a digital environment, but a paradox emerges that challenges traditional ways of thinking about libraries. Possible implications for academic librarians therefore include: the challenge of emerging resources needs, associating digital resources and services with the library, a radical shift in professional thinking, and learning how to cope with change at the organizational level.

The implications for a shift from the physical library as place to a virtual environment that integrates many new mediums of information to support research, teaching, and learning suggest the emergence of a more complex set of resource challenges. Librarians must be able to provide the hardware, network infrastructure, and human knowledge to make future transformations successful. Current librarians need continual learning of new and relevant skill sets, and hiring librarians with the high-level skill sets needed for even entry level positions will be difficult. Equally, the implications of shifting to a digital environment might create further issues of professional relevance for academic librarians. Associating resources and services in a digital environment – particularly those that are highly expensive – with the work of librarians is problematic when library users find it much more difficult to distinguish between the free and subscription-only aspects of the World Wide Web. Moreover, librarians will be challenged to market the resources and services they provide to the academic community in nontraditional ways that focus much more on becoming part of the external environment, using methods that may have yet to be explored.

The incorporation of new technologies and the organizational changes taking place at the ECU Libraries cause heightened emotional responses and apparent increases in stress levels that may not exist in other academic and administrative units in the university system. Most importantly, the findings of this study suggest that much of the individual stress at the ECU Libraries is not due to resistance to change but, rather, can be associated with attempts to maintain concurrently a print *and* a digital library. This dual environment creates additional work and added stress for librarians who already deal with an exponential amount of growth in scholarly research and services.

A significant implication for this study, therefore, suggests that a radical shift in professional thinking might be required for academic librarians. For this study's participants, this change represents what Bridges (2004)

describes as an “ending” in the history of the ECU Libraries. Choosing which aspects of our professional stance can be transferred to a digital environment – while recognizing that certain aspects of the philosophy should be modified or abandoned altogether – can contribute to library organizational development that focuses on continual change and adaptation to the external environment. However, promoting the relevance of librarians in the academic community will continue to be problematic if campus constituents do not congruently reflect on practice in ways that question whether similar professional shifts in thinking are needed in other units of higher education.

The efforts on the part of the ECU librarians to cope with the turbulence and rapid change in their library environment are another significant finding of this study. Stress levels among librarians varied, but, in general, a heightened intensity of stress was observed through this research. Inference can be made that the transformative changes that take place at the ECU Libraries contribute heavily to this stress. Subsequent coping mechanisms were intended to help librarians respond to the experiences attributed to change in active and positive ways. These coping strategies utilized among the ECU librarians ranged from adapting workflows and dialogue with others to learning new skill sets and the projection of positive feedback into the organizational environment.

The implications for the study’s participants suggest that coping mechanisms are still somewhat misunderstood among academic librarians. Continued high levels of stress at the individual level can have negative effects on organizations over the long term, and ways to deal with this stress at the individual level can contribute to resources and energy being devoted to nonessential functions in the library. In particular, coping strategies might be promoted in idiosyncratic ways or are primarily driven at the individual level. Although this is both expected and necessary, academic librarians will continue to be challenged to find methods that promote coping with change in positive, mentoring, and supporting ways at the macro-organizational level.

In summary, interpreting the experiences of individuals interacting and responding to change within the ECU Libraries highlights the complex systems nature of the organization. The 17 librarians who participated in the main part of this research study bring experiences that might be shared by academic librarians in general and that are also unique to their own individual environmental responses to the ECU Libraries over the past few years. The findings of this study suggest that librarians at ECU have critically reflected upon the experiences of turbulent change and have developed new perceptions of research libraries and professional librarianship in the future.

It should be reinforced that this journey has not been easy for even the most willing of participants in the change process. Conversely, the changes that have occurred in this library have empowered librarians and provided opportunities for them to facilitate professional shifts that they note otherwise would have been very difficult for them to accomplish. Moreover, the deep reflection on errors or misperceptions on previous theories in use has moved the ECU librarians' thinking away from *being* in a library that focuses on the eminency of the physical object. Librarians are now⁸ in the process of *becoming* professionally, as they learn to accept or embrace the necessity of responding and adapting to the external environment through a continual and natural flux of order and disorder.

REFERENCES

- Abraham, F. D., & Gilgen, A. R. (Eds). (1995). *Chaos theory in psychology*. Westport, CT: Greenwood Press.
- Ackoff, R. L. (1981). *Creating the corporate future: Plan or be planned for*. New York: Wiley.
- Ackoff, R. L. (1994). *The democratic corporation: A radical prescription for recreating corporate America and rediscovering success*. New York: Oxford University Press.
- Antelman, K., Lynema, E., & Pace, A. (2006). Toward a twenty-first century library catalog. *Information Technology and Libraries*, 25(3), 128–139.
- Aram, E., & Noble, D. (1999). Educating prospective managers in the complexity of organisational life: Teaching and learning from a complexity perspective. *Management Learning*, 30(3), 321–342.
- Argyris, C. (1957). *Personality and organization: The conflict between system and the individual*. New York: Harper & Row.
- Argyris, C. (1960). *Understanding organizational behavior*. Homewood, IL: Dorsey Press.
- Argyris, C. (1971). *Management and organizational development*. New York: McGraw-Hill.
- Argyris, C. (1990). *Overcoming organizational defenses: Facilitating organizational learning*. Englewood Cliffs, NJ: Prentice Hall.
- Argyris, C. (1992). *On organizational learning*. Cambridge, MA: Blackwell Publishers.
- Argyris, C., & Schön, D. A. (1974). *Theory in practice: Increasing professional effectiveness*. San Francisco: Jossey-Bass.
- Argyris, C., & Schön, D. A. (1978). *Organizational learning: A theory of action perspective*. Reading, MA: Addison-Wesley.
- Arthur, B. (1994). *Increasing returns and path-dependence in the economy*. An Arbor, MI: University of Michigan Press.
- Ashby, R. W. (1956). *An introduction to cybernetics*. New York: Wiley.
- Austin, V., Shah, S., & Muncer, S. (2005). Teacher stress and coping strategies used to reduce stress. *Occupational Therapy International*, 12(2), 63–80.
- Avolio, B. J., & Bass, B. M. (Eds). (2002). *Developing potential across a full range of leadership: Cases on transactional and transformational leadership*. Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.
- Bak, P. (1996). *How nature works: The science of self-organized criticality*. New York: Copernicus.

- Bass, B. M. (1998). *Transformational leadership: Industrial, military, and educational impact*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Bateson, G. (1972). *Steps to an ecology of mind*. New York: Ballantine Books.
- Bergson, H. L. (1911/1975). *Creative evolution*. Westport, CT: Greenwood Press.
- Birnbaum, R. (2000). *Management fads in higher education: Where they come from, what they do, why they fail*. San Francisco: Jossey-Bass.
- Blake, R. R., & Mouton, J. S. (1978). *The new managerial grid* (2nd ed). Houston, TX: Gulf Publishing Company.
- Blake, R. R., & Mouton, J. S. (1981). *Productivity, the human side: A social dynamics approach*. New York: AMACOM.
- Blake, R. R., & Mouton, J. S. (1985). *The managerial grid III*. Houston, TX: Gulf Publishing Company.
- Blake, R. R., Mouton, J. S., & Williams, M. S. (1981). *The academic administrator grid: A guide to developing effective management teams*. San Francisco, CA: Jossey-Bass.
- Breeding, M. (2007a). An update on open source ILS. *Computers in Libraries*, 27(3), 27–29.
- Breeding, M. (2007b). An industry redefined: Private equity moves into the ILS, and open source emerges. *Library Journal*, 132(6). Available at <http://libraryjournal.com/article/CA6429251.html>. Retrieved on 1 October.
- Breu, K., & Benwell, M. (1999). Modelling individual transition in the context of organisational transformation. *Journal of Management Development*, 18(6), 496–520.
- Bridges, W. (2003). *Managing transitions: Making the most of change* (2nd ed). Cambridge, MA: Perseus Books.
- Bridges, W. (1980/2004). *Transitions: Making sense of life's changes* (2nd ed). Cambridge, MA: Perseus Books.
- Buch, K. (1997). Managing the human side of change. *Library Administration & Management*, 11(3), 147–151.
- Bureau of Labor Statistics. (2007). Consumer price index history table. Table Containing History of CPI-U U. S. All Items Indexes and Annual Percentage Changes from 1913 to Present. Available at <http://www.bls.gov/cpi/>. Retrieved on 24 September.
- Burlingame, G. M., Fuhrman, A., & Barnum, K. R. (1995). Group therapy as a nonlinear dynamical system: Analysis of therapeutic communication for chaotic patterns. In: F. D. Abraham & A. R. Gilgen (Eds), *Chaos theory in psychology*. Westport, CT: Greenwood Press.
- Burns, J. M. (1979). *Leadership* (1st ed). New York: Harper & Row.
- Burns, J. M. (2003). *Transforming leadership: The new pursuit of happiness*. New York: Atlantic Monthly Press.
- Bütz, M. R. (1997). *Chaos and complexity: Implications for theory and practice*. Washington, DC: Taylor & Francis.
- Carew, D. K., Parisi-Carew, E., & Blanchard, K. H. (1986). Group development and situational leadership: A model for managing groups. *Training and Development Journal*, 40(6), 46–50.
- Carver, C. S., & Scheier, M. F. (1998). *On the self-regulation of behavior*. Cambridge, UK: Cambridge University Press.
- Checkland, P. (1999). *Soft systems methodology: A 30-year retrospective*. New York: Wiley.
- Crow, R. (2002). The case for institutional repositories: A SPARC position paper. The Scholarly Publishing & Academic Resources Coalition. Available at http://www.arl.org/sparc/bm~doc/ir_final_release_102.pdf. Retrieved on October 10, 2007.

- Cutright, M. (2001). *Chaos theory & higher education: Leadership, planning, & policy*. New York: Peter Lang.
- Davis, B. (2005). Interrupting frameworks: Interpreting geometries of epistemology and curriculum. In: W. E. Doll, J. M. Fleener, D. Trueit & J. St. Julien (Eds), *Chaos, complexity, curriculum, and culture: A conversation*. New York: Peter Lang.
- Denzin, N. K., & Lincoln, Y. S. (1994). *Handbook of qualitative research*. Thousand Oaks, CA: Sage Publications.
- De Rosa, C., Cantrell, J., Cellentani, D., Hawk, J., Jenkins, L., & Wilson, A. (Eds). (2005). *Perceptions of libraries and information resources: A report to the OCLC membership*. Dublin, OH: OCLC Online Computer Library Center, Inc.
- Dewey, J., & Bentley, A. F. (1949/1975). *Knowing and the known*. Westport, CT: Greenwood Press.
- Doll, W. E., Jr. (1993). *A post-modern perspective on curriculum*. New York: Teachers College, Columbia University.
- Dunn, K. (2002). Assessing information literacy skills in the California State University: A progress report. *Journal of Academic Librarianship*, 28(1), 26–35.
- EBSCO Information Services. (2007). Five year journal price increase history (2003–2007). Available at <http://www2.ebsco.com/en-us/InfoProfs/serialspriceproj/Pages/index.aspx>. Retrieved on 24 September.
- Edwards, R., & Shulenberger, D. (2003). The high cost of scholarly journals (and what to do about it). *Change*, 35(6), 10–19.
- Fennewald, J., & Stachacz, J. (2005). Recruiting students to careers in academic libraries. *College & Research Libraries News*, 66(2), 120–122.
- Fleener, M. J. (2002). Curriculum dynamics: Recreating heart. In: J. L. Kincheloe & S. R. Steinberg (Eds), *Counterpoints: Studies in the postmodern theory of education* (Vol. 200). New York: Peter Lang Publishing.
- Flood, R. L. (1999). *Rethinking the fifth discipline: Learning within the unknowable*. London: Routledge.
- Gallagher, R., & Appenzeller, T. (1999). Complex systems. *Science*, 284(5411), 79–109.
- Giesecke, J., Michalak, S., & Franklin, B. (1997). Changing management roles for associate directors in libraries. *Library Administration & Management*, 11(3), 172–179.
- Gilstrap, D. L. (2005). Strange attractors and human interaction: Leading complex organizations through the use of metaphors. *Complicity: An International Journal of Complexity and Education*, 2(1), 55–69.
- Gilstrap, D. L. (2007a). Dissipative structures in educational change: Prigogine and the academy. *International Journal of Leadership in Education*, 10(1), 49–69.
- Gilstrap, D. L. (2007b). *Librarians and the emerging research library: A case study of complex individual and organizational development*. Doctoral dissertation, University of Oklahoma, Norman, OK. Dissertation Abstracts International (Publication no. ATT 3284303).
- Gilstrap, D. L. (2008). Dialogic and the emergence of criticality in complex group processes. *Journal of the Canadian Association of Curriculum Studies*, 6(1), 91–112.
- Glogoff, S. (2001). Information technology in the virtual library: Leadership in times of change. *Journal of Library Administration*, 32(3/4), 61–84.
- Goble, D. S. (1997). Managing in a change environment. *Library Administration & Management*, 11(3), p. 152.
- Goerner, S. J. (1995). Chaos and deep ecology. In: F. D. Abraham & A. R. Gilgen (Eds), *Chaos theory in psychology*. Westport, CT: Greenwood Press.

- Hersey, P., & Blanchard, K. H. (1969/1993). *Management of organizational behavior: Utilizing human resources* (6th ed). Englewood Cliffs, NJ: Simon & Schuster.
- Holloway, K. (2004). The significance of organizational development in academic research libraries. *Library Trends*, 53(1), 5–16.
- Jankowska, M. A. (2004). Identifying university professors' information needs in the challenging environment of information and communication technologies. *Journal of Academic Librarianship*, 30(1), 51–66.
- Johnson, R. K., & Luther, J. (2007). *The e-only tipping point for journals: What's ahead in the print-to-electronic transition zone*. Washington, DC: Association of Research Libraries.
- Kaarnst-Brown, M. L., Nicholson, S., von Dran, G. M., & Stanton, J. M. (2004). Organizational cultures of libraries as a strategic resource. *Library Trends*, 53(1), 33–53.
- Karpiak, I. E. (2000). The 'second call': Faculty renewal and recommitment at midlife. *Quality in Higher Education*, 6(2), 125–134.
- Kascus, M. A. (2004). *Effect of the introduction of team management on the leadership role and skills needed to lead teams: A case study*. Doctoral dissertation, Simmons College, December. Dissertation Abstracts International (Publication no. ATT 3159376).
- Lewin, K. (1951). *Field theory in social science*. New York: Harper & Row.
- Lichtenstein, B. B. (2000). Self-organized transitions: A pattern amid the chaos of transformative change. *Academy of Management Executive*, 14(4), 128–131.
- Lorenz, E. (1963). Deterministic non-periodic flow. *Journal of Atmospheric Science*, 20, 130–141.
- MacIntosh, R., & MacLean, D. (1999). Conditioned emergence: A dissipative structures approach to transformation. *Strategic Management Journal*, 20(4), 297–316.
- MacIntosh, R., & MacLean, D. (2001). Conditioned emergence: Researching change and changing research. *International Journal of Operations and Production Management*, 21(10), 1343–1357.
- Mandelbrot, B. B. (1975). *Les object fractals: Forme, hasard, et dimension*. Paris: Flammarion.
- Maughan, P. D. (2001). Assessing information literacy among undergraduates: A discussion of the literature and the University of California-Berkeley assessment experience. *College & Research Libraries*, 26(1), 71–85.
- McGregor, D. (1960). *The human side of enterprise*. New York: McGraw-Hill.
- Mezirow, J. (1991). *Transformative dimensions of adult learning*. San Francisco: Jossey-Bass.
- Mintzberg, H. (1994). *The rise and fall of strategic planning*. New York: Free Press.
- Mitleton-Kelly, E. (Ed.) (2003). *Complex systems and evolutionary perspectives on organisations: The application of complexity theory to organizations*. Kidlington, Oxford: Elsevier Science.
- Morgan, G. (1997). *Images of organization* (2nd ed). Thousand Oaks, CA: Sage Publications.
- Morse, A., & Walker, R. (1994). The effects of exercise on psychological measure of the stress response. *Wellness Perspectives*, 11(1), 39–46.
- National Institutes of Health. (2005). Policy on enhancing public access to archived publications resulting from NIH-funded research. Available at <http://grants.nih.gov/grants/guide/notice-files/NOT-OD-05-022.html>. Retrieved on October 1, 2007.
- National Institutes of Health. (2008). NIH public access policy. Available at <http://publicaccess.nih.gov/>. Retrieved on 11 August.
- Osberg, D., & Biesta, G. J. J. (2007). Beyond presence: Epistemological and pedagogical implications of 'strong' emergence. *Interchange*, 38(1), 31–35.
- Osif, B. A., & Harwood, R. L. (1999). Change challenges and coping. *Library Administration & Management*, 13(4), 224–228.

- Ouchi, W. (1981). *Theory Z: How American business can meet the Japanese challenge*. Reading, MA: Addison-Wesley Publishing Company, Inc.
- Pace, A. (2006). Technically speaking: Giving homegrown software its due. *American Libraries*, 37(10), 50–51.
- Pascale, R. T., Millemann, M., & Gioja, L. (2000). *Surfing the edge of chaos: The laws of nature and the new laws of business*. New York: Crown Business.
- Phipps, S. E. (2004). The system design approach to organizational development: The University of Arizona model. *Library Trends*, 53(1), 68–111.
- Prigogine, I. (1967). *Thermodynamics of irreversible processes*. New York: Wiley.
- Prigogine, I. (1980). *From being to becoming: Time and complexity in the physical sciences*. San Francisco: W. H. Freeman and Company.
- Prigogine, I. (2000). The future is not given, in society or nature. *NPQ: New Perspectives Quarterly*, 17(2), 35–37.
- Prigogine, I., & Stengers, I. (1984). *Order out of chaos: Man's new dialogue with nature*. New York: Bantam Books, Incorporated.
- Puetz, T. W., O'Connor, P., & Dishman, R. K. (2006). Effects of chronic exercise on feelings of energy and fatigue: A quantitative synthesis. *Psychological Bulletin*, 132(6), 866–876.
- Ranganathan, S. R. (1963). *The five laws of library science*. Bombay: Asia Publishing House.
- Ravindra, B., & Mallik, A. K. (1994). Role of nonlinear dissipation in soft Duffing oscillators. *Physical Review E*, 49(6), 4950–4954.
- Riggs, D. E. (1997). What's in store for academic libraries? Leadership and management issues. *Journal of Academic Librarianship*, 23, 3–8.
- Riggs, D. E. (1998). Visionary leadership. In: T. F. Mech & G. B. McCabe (Eds.), *Leadership and academic libraries*. The Greenwood Library Management Collection. Westport, CT: Greenwood Press.
- Riggs, D. E. (2001). The crisis and opportunities in library leadership. *Journal of Library Administration*, 32(3/4), 5–17.
- Rogers, M. (2004). Where are all the library jobs? *Library Journal*, 129(15), 14–15.
- Schön, D. A. (1971). *Beyond the stable state*. New York: Random House, Inc.
- Schön, D. A. (1991). *The reflective practitioner: How professionals think in action*. Averbury, UK: Ashgate Publishing Limited.
- Senge, P. (1994). *The fifth discipline: The art and practice of the learning organization*. New York: Doubleday.
- Senge, P. (2004). *Presence: human purpose and the field of the future*. Cambridge, MA: Society for Organizational Learning (SoL).
- Shaw, K. A. (1999). *The successful president: "Buzzwords" on leadership*. Phoenix, AZ: Oryx Press.
- Simpson, J. A., & Weiner, E. S. C. (Eds.). (2001). *Oxford English dictionary*. Oxford, UK: Clarendon Press. OED online Oxford University Press. Available at <http://dictionary.oed.com>. Retrieved on 1 November.
- Smith, C., & Comer, D. (1994). Self-organization in small groups: A study of group effectiveness within non-equilibrium conditions. *Human Relations*, 47(5), 553–581.
- Stacey, R. (1992). *Managing the unknowable: Strategic boundaries between order and chaos in organizations*. San Francisco: Jossey-Bass.
- Stacey, R. (2003). *Complexity and group processes: A radical social understanding of individuals*. New York: Brunner-Routledge.
- Stake, R. E. (1995). *The art of case study research*. Thousand Oaks, CA: Sage Publications.

- Stephens, D., & Russell, K. (2004). Organizational development, leadership, change, and the future of libraries. *Library Trends*, 53(1), 238–257.
- Stueart, R., & Moran, B. B. (2002). *Library and information center management* (6th ed). Greenwood Village, CO: Libraries Unlimited.
- Taylor, F. W. (1911). *The principles of scientific management*. New York: W. W. Norton.
- Taylor-Piliae, R. E., Haskell, W. L., Waters, C. M., & Froelicher, E. S. (2006). Change in perceived psychosocial status following a 12-week Tai Chi exercise programme. *Journal of Advanced Nursing*, 54(3), 313–329.
- Unabashed librarian. (2003). *Library Journal*, 128(5), p. 48.
- Van Orsdel, L. C., & Born, K. (2007). Serial wars: As open access gains ground, STM publishers change tactics, and librarians ask hard questions. *Library Journal*, 132(7). Available at <http://www.libraryjournal.com/article/CA6431958.html>. Retrieved on 1 October.
- von Bertalanffy, L. (1973/1968). *General system theory: Foundations, development, applications* (Revised edition). New York: George Braziller, Inc.
- Waldrop, M. M. (1992). *Complexity: The emerging science at the edge of order and chaos*. New York: Simon & Schuster.
- Webster, D. E. (1973). *Library management review and analysis program: A handbook for guiding change and improvement in research library management* (Vol. 2). Washington, DC: Office of University Library Management Studies. Association of Research Libraries.
- Weick, K. E. (1985). Sources of order in unorganized systems: Themes in recent organizational theory. In: Y. S. Lincoln (Ed.), *Organizational theory and inquiry: The paradigm revolution*. Beverley Hills, CA: Sage Publications.
- Weiner, S. G. (2003). Resistance to change in libraries: Application of communication theories. *Portal: Libraries and the Academy*, 3(1), 69–78.
- Wheatley, M. J. (1994). *Leadership and the new science: Learning about organization from an orderly universe*. San Francisco: Berrett-Koehler Publishers, Inc.
- White, H. (1985). Library turf. *Library Journal*, 110(7), 54–55.
- Williams, J. F. I. (2001). Leadership evaluation and assessment. *Journal of Library Administration*, 32(3/4), 145–167.
- Wilson, A. (Ed.) (2004). *The 2003 OCLC environmental scan: Pattern recognition. A report to the OCLC membership*. Dublin, OH: OCLC Online Computer Library Center.
- Wisneski, R. (2005). Investigating the research practices and library needs of contingent, tenure-track, and tenured English faculty. *Journal of Academic Librarianship*, 31(2), 119–133.
- Yukl, G. A. (2002). *Leadership in organizations* (5th ed). Upper Saddle River, NJ: Prentice-Hall.