Information Practices of Disaster Preparedness Professionals in Multidisciplinary Groups

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ABSTRACT

OBJECTIVE: This article summarizes the results of a descriptive qualitative study addressing the question, what are the information practices of the various professionals involved in disaster preparedness? We present key results, but focus on issues of choice and adaptation of models and theories for the study. METHODS: Primary and secondary literature on theory and models of information behavior were consulted. Taylor's Information Use Environments (IUE) model, Institutional Theory, and Dervin's Sense-Making metatheory were used in the design of an open-ended interview schedule. Twelve individual face-to-face interviews were conducted with disaster professionals drawn from the Pennsylvania Preparedness Leadership Institute (PPLI) scholars. Taylor's Information Use Environments (IUE) model served as a preliminary coding framework for the transcribed interviews. RESULTS: Disaster professionals varied in their use of libraries, peer-reviewed literature, and information management techniques, but many practices were similar across professions, including heavy Internet and email use, satisficing, and preference for sources that are socially and physically accessible. CONCLUSIONS: The IUE model provided an excellent foundation for the coding scheme, but required modification to place the workplace in the larger social context of the current information society. It is not possible to confidently attribute all work-related information practices to professional culture. Differences in information practice observed may arise from professional training and organizational environment, while many similarities observed seem to arise from everyday information practices common to non-work settings.

Keywords

Disaster preparedness, Information practice, Information behavior, information science theory, Library science research.

INTRODUCTION

This article summarizes the results of a descriptive qualitative study of the information practices of disaster response professionals participating in the Pennsylvania Preparedness Leadership Institute (PPLI). The immediate goal of the study is to identify commonalities in information practices across disaster preparedness professions. Longer range, these commonalities can be leveraged by librarians to create information resources and services for disaster preparedness professionals that fit into their existing information practices and provide them with needed information. The history, content, and initial impact of PPLI have been described elsewhere. (Potter, Burns, Barron, Grofebert, & Bednarz, 2005) PPLI scholars are primarily drawn from the members of the nine Regional Task Forces in Pennsylvania. Each task force includes government and private organizations in the region with a role in the preparation for and response to natural and manmade disasters. The quality of the information they use for decision-making has a major impact on the health and safety of the citizens of their regions, making appropriate support of their information needs vital. These task forces are also of interest as examples of information-intense multidisciplinary work groups subject to the challenges of sharing, interpreting and acting on information across organizational, political, geographic, and disciplinary boundaries. Serving their information needs is a relatively new challenge for librarians.

The medical library community is extending outreach services to disaster preparedness professionals. Most prominently, in 2008 the National Library of Medicine (NLM) launched its Disaster Information Resource Management Center (DIMRC), "tasked with the collection, organization and dissemination of health information resources and informatics research related to disasters of natural, accidental, or deliberate origin". (National Library of Medicine, 2010) NLM is also promoting the development of regional Emergency Information Centers with Disaster Information Specialists/librarians serving as part of the disaster response team. However, professions such as emergency management and public safety are typically outside of the mainstream health and biomedical library clientele. Librarians' knowledge of the information practices of each profession involved is a baseline requirement for the development of information resources and services that effectively support preparedness work.

This study was undertaken as part of a National Library of Medicine Informationist Fellowship. As Fourie noted, the gap between theory and practical application is wide, and reinforced by academic language, low communication between researchers and practitioners, and a paucity of guidelines on turning research into practice. (Fourie, 2006) Reflections on the learning process, theoretical choices, and analysis experience will inform information science researchers and theorists who want to promote quality improvement, evaluation and research in the library practice community.

Disaster Preparedness as an Information Intensive Activity

Modern disaster planning research started in the 1950s when sociologists began studying how people and organizations plan for and react to disasters. (Quantarelli, 1985) Academic centers of disaster research formed, most notably the Disaster Research Center (DRC) founded in 1965 and currently housed at the University of Delaware. Quantarelli, for whom the DRC Resource Collection is named, codified principles of disaster planning in the 1980s that are still recognized today. (Perry & Lindell, 2003; Tierney, 1993) They illustrate that disaster planning is an inter-organizational effort with intensive information gathering and evaluation requirements. Quantarelli said that the principle activities of disaster preparedness planning are:

- Convening meetings for the purpose of sharing information;

- Holding disaster drills, rehearsals and simulations;

- Developing techniques for training, knowledge transfer and assessments;

- Formulating memoranda of understanding and mutual aid agreements;

- Educating the public and others involved in the planning process ;

- Obtaining, positioning and maintaining relevant material resources;

- Undertaking public educational activities;

- Establishing informal linkages between involved groups;

- Thinking and communicating information about future dangers and hazards ;

- Drawing up organizational disaster plans and integrating them with overall community-mass-emergency plans; and,

- Continually updating obsolete materials/strategies. (Quantarelli, 1985, p21)

A "big picture" understanding of information practice for disaster preparedness must include both communications and information science research findings. Quantarelli's principle activities require social networking. Bringing disparate entities together and keeping them in contact is as or more important than producing a written plan. (Perry & Lindell, 2003; Trainor, Aguirre, & Barnshaw, 2008) Plans go out of date, but relationships persist and influence disaster response. Drabek (2003) noted that there is a direct relationship between the size and variety of people in an emergency manager's professional network, the frequency of contact with network members, and the success of emergency responses. This is one of the most widely accepted factors influencing the efficacy of disaster responses. The planning process naturally provides networking opportunities and opportunities for increased knowledge of the capabilities and culture of the partnering agencies. Joint trainings, drills, and exercises held as part of the preparedness process also contribute to social network formation and maintenance. (Jalba et al., 2010; Lurie, Wasserman, & Nelson, 2006; Rebmann, Carrico, & English, 2008; Sauer, McCarthy, Knebel, & Brewster, 2009; Van Fleet-Green, Chen, & House, 2008) Librarians recognizing the importance of communication to preparedness may be more likely to become active members of the preparedness planning team.

According to Taylor, (1991) career path experiences shape professional preferences for and use of information sources, and these preferences persist over the course of a career. The emergency managers, emergency medical personnel, emergency medical physicians, public safety, and public health professionals participating in PPLI arrive at their careers via different career paths. Comparing the career paths of emergency medicine and emergency management illustrates some of the differences that may affect information practice. Emergency medicine physicians are exposed to the peer-reviewed literature and concepts of evidence-based practice in medical school. Medical school curricula must meet accreditation standards and boards and licensure testing is required of physicians. In contrast, emergency managers often begin their careers in firefighting and or prehospital emergency medical services, gaining their career skills through participation in accredited state and national training courses. Certification as an emergency manager through the International Association of Emergency Managers (IAEM) added the requirement of a baccalaureate degree, in any major, to the existing training, examination, and work experience for certification in January 2010. (Bovyn, 2009) For those schools offering degrees in emergency management, there is no agreed upon curricular standard. (McCreight, 2009) Given these different career paths, differences in information practices in the two groups are likely. Librarians should be aware of this and fit their resources to the existing practices of each group, exploiting similarities in practice where ever possible to reach the largest user group possible.

Information Practices
An extensive search for published literature on information practice and disaster preparedness returned a small number of research studies on aspects of information practice in

disaster preparedness. (Clements-Nolle, Ballard-Reisch, Todd, & Jenkins, 2005; Turoff & Hiltz, 2008) Most studies found discussed information in either the pre-disaster, (Macintosh-Murray & Choo, 2002) or the disaster response phases. (Drabek & McEntire, 2002) Others discuss the information needs of a single profession without discussing inter-professional information practice. (Lurie et al., 2006; Marincioni, 2007; Rebmann et al., 2008; Sauer et al., 2009)

Articles found on information practice in disaster preparedness tend to focus on information resources used and the ones participants wish they had. Turoff and Hiltz's (2008) report for NLM on the information needs of the emergency preparedness community used their own "Networking Inquiry" study design that provided great detail on preferred information sources. They reported a need for human and technology-based methods for filtering information to reduce information overload. In general, their respondents did not use libraries as much as the Internet, and prized practical, readable information, especially if it was endorsed by their peers. The inclusion of librarians and academics in their study respondents may have produced a stronger call for Web 2.0 technologies than a study of only community-based respondents would produce. A Nevada study showed that disaster professionals wanted one state-sponsored website with reliable disaster information. It should have a secure access side to support their work and a public access side providing reliable information to the public. (Clements-Nolle et al., 2005) In a single-profession survey study, Marincioni (2007) reported that while 93% of US emergency managers made daily use of the Internet for disaster mitigation and/or preparedness use, only 1/3 indicated using technical or academic literature.

Information Theory and Models
None of the studies on information practice in disaster preparedness reported the use of a theoretical base or a model. Without an exemplar study showing the use of theory or models with our study population we turned to secondary resources on information behavior and theory to identify candidates for use in the present study. (Case, 2007; Fisher, Erdelez, & McKechnie, 2005) Taylor's (1991) IUE model was chosen as the primary organizing model. Many aspects of the IUE model make it a logical choice. It is limited to professional information use. Taylor hoped the IUE model would spur studies such as this of "differing populations working in varying contexts." (pg 231) It is user-centric rather than focused on information systems. Users are studied at the group level by profession, and the model focuses on information as a problem solving tool. Finally, while Taylor was interested in discovering differences between professions, his model also identifies similarities.

However, because the IUE model is described by Taylor as "tentative and descriptive" (1991, p. 219) we decided to consider other theories as potential modifiers of Taylor's model. Since preparedness work is communications-intensive, Dervin's (2003) Sense-Making metatheory was consulted because it crosses communication and information science boundaries, and has a lot to say about the way people address gaps in their information worlds. To find examples of theoretically oriented studies of professional intergroup information practice we turned to studies of other disciplines. A study of inter-organizational and inter-professional work groups in the UK National Health Service (Currie & Suhomlinova, 2006) alerted us to the utility of institutional theory for studying the influence of institutions, comprised of regulatory, normative, and cultural-cognitive forces, on organizations and the their impact on knowledge sharing between organizations and individuals in them. Other sources consulted included Briggle and Mitcham's (2009) description of Floridi's four types of information, and Byström's (2002) on work task complexity and information source choice.

We chose to use the umbrella concept *information practice* to describe the focus of the study, while acknowledging that the concept *information behavior* is more widely used in the information science literature and the differences and similarities of each term are subject to debate. ("The behaviour/practice debate," 2009) The choice of information practice over information behavior was influenced by Savolainen's (2007) literature review of the assumptions implicit in each concept. In particular, we were won over by the assertions that information practice is a collaborative process, social as opposed to individual, that it includes communicative practices, and is embedded in a context. All of these conditions are relevant to the PPLI multidisciplinary work environment.

METHODS
This study uses qualitative descriptive methods. (Sandelowski, 2000, 2010) An open-ended interview guide as described by Patton (Patton, 2002, p. 343) was constructed to allow participants to tell their story in their own words and in a natural order while allowing the interviewer to direct the conversation if needed to cover key topics. The interview schedule was checked for library and information science jargon by non-librarians. It was approved as an exempt study by University of Pittsburgh IRB.

The study's 12 participants were recruited from the 45 PPLI scholars in training between February and November 2008 and previous PPLI graduates. Purposive sampling was used to meet the goal of maximum sample variation which increases representation of divergent viewpoints in the sample. (Patton, 2002) Recruitment targeted all major professional groups participating in PPLI, and residents of all three Pennsylvania Emergency Management Agency (PEMA) regions of the state, from both rural and urban environments. Recruitment by email invitation from the PPLI director was supplemented by in person recruitment by the principal investigator. Nine (20%) of the PPLI

Work Setting	Profession by education (Total n=12)	Related Experience
County government (n=4)		
Mental health/ mental retardation	Social work	F, E
Emergency management agency	Emergency management	F, E
Emergency management agency	Fire science and occupational safety and health.	F
Emergency management agency	Public administration	
State government, regional office (n=2)		
Public health agency	Nursing	
Public health agency	Nursing and Public Health	
State government (n=2)		
Emergency management agency	Information technology	M
Public health agency	Health administration	V
Federal government (n=1)		
Emergency management agency	Emergency management	F
Hospital (n=3)		
State run	Environmental health	F
Private	Information technology, Business	M
Private	Medicine	M

NOTE: M= military experience; F= firefighting experience; E= emergency medicine services experience; V= disaster volunteer experience

Table 1. Participants' Work Setting, Profession by Training, and Other Relevant Experiences

scholars enrolled in 2008 participated in the study. Three PPLI graduates working in a county emergency operations center (EOC) were recruited.

Interviews of between 30 and 45 minutes in length were conducted by the principal investigator (PI) either at PPLI session or in the participants' workplace. The PPLI training sessions afforded the opportunity to interview several participants per session at the convenience of the participants. Typically two to three interviews would be conducted back to back. They were audio recorded, transcribed, and checked for accuracy against the recording by the PI. Memos were written after each day's interviews summarizing initial impressions. Basic demographic information was collected from PPLI registration forms. Ten men and two women participated. The largest age group represented was 41-50 years. All had at least an undergraduate degree and five held masters or doctoral degrees.

We followed Miles and Huberman's advice to use an existing model for non-theory generating qualitative coding. (1994, p. 22) Taylor's IUE model guided initial open coding. The coding scheme was modified as needed to fit the data, separating information sources from Sets of People, where Taylor had placed it. Byström's (2002) division of information sources into two categories, people and documentary sources was used as an initial organizational scheme for sources. Taylor used Dervin's work on problem resolution types to create his own eight category scheme, but only described each category briefly. Dervin's (2003) fuller descriptions of problem resolution types were consulted for clarification. Codes were added until saturation was reached. Summary cover memos were written for all twelve participants. Tables created on the model of Miles and Huberman (1994) summarized each participant's responses related to the major concepts in the coding scheme. Then concept tables were created to bring together data on each concept across all participants.

RESULTS

Sets of People

Participants came from a variety of professional backgrounds. (See Table 1) They followed a variety of career paths to their present positions. Many had relevant volunteer and military experience. The private sector was represented as well as all levels of government from county to federal. Unique combinations of education, volunteer activities, career changes, and current work render almost every one of the 12 participants in the study individual cases, not "groupable."

For example, two participants have computer science degrees. One of these also has a business degree and works in business continuity for a health system. The other works in emergency planning for the state. Neither was directly involved in the management of a computer system at the time of the study. Both have military backgrounds and have worked in other types of organizations. The computer science degrees are highly relevant to their information practice as is their military experience. On those they are the same, but in current career they are different. To sidestep such problems it was necessary to redefine and "unbundle" profession, coding separately for education and training, past occupations, volunteer activities, and current occupation(s).

Two very important factors influencing communication practice, past occupation and volunteer activities, are not mentioned by Taylor. To illustrate their importance, in our sample 3 of the 12 have been in the military, and 5 of the 12 are or have been volunteer or professional firefighters. These experiences familiarized them with the communication principles embodied in incident command structure (ICS), now used as a standard for managing flow of information in disaster situations. It also created a shared body of experience and sense of group belonging facilitating communication. One non-firefighter reported:

> When I first took over this job and I started attending some of the meetings, it was very, very difficult for a lot of people to open up to me because I didn't have a lot in common with them because I seem to see -- it's almost like a brotherhood like firefighters, police officers… military people. They seem to click with their own and I don't want to use the word distrustful of outsiders, but they tend to take what they do very seriously and they should. They're very proud of what they do, and I think sometimes it's hard for them to open up, and to be casual…and I think I sort of deviated from what I wanted to say here is that I think sometimes they're very proud of their information, what they got, and they want to either keep it to themselves or it's my realm and I don't want you in my realm. I'll take care of this.

The study data supports Taylor's emphasis on the importance of education as a shaper of information behavior. Two examples illustrate the influence of academic preparation on the use of peer-reviewed journal literature, and the influence of a degree in computer science on information handling practices.

The three participants who said they use the peer-reviewed journal literature were an MD and two degree-holding nurses. The other nine participants have college degrees, but none of them mentioned using journal literature. The MD noted that the police strike teams he works with make decisions based on practical experience, but have no evidence base for them, making it hard to persuade them of the importance of medical standards, such as use of tourniquets, from arguments built on evidence-based literature.

Those with computer science degrees described consistent use of information management techniques that none of the other groups claimed, such as using a consistent scheme for naming files, regularly archiving and weeding stored information, and quickly sorting email into useful and non-useful categories. Their educational background continues to influence their information practice even though it no longer defines their profession.

Findings on Information Practice

Information Definitions

The most common definition of information given by participants was a "tool for decision making." This was endorsed by five participants, using definitions such as "facts that I need to know to make a good decision," "material that I can use to help make decisions with," or "it's key to getting things done." Several individuals defined information as a higher form of data. One participant said "it's data brought together compiled, masticated, massaged and pumped out in a form that makes it useable for decision makers." Two participants focused on information as a process. One said, "Information means sharing resources and communicating well with other agencies I guess as it pertains to emergency management." The other said is the "sharing of knowledge, materials." Information was seen as separate from the container in most cases. An emergency room physician said he would be happy with the information he needed in verbal, print, or electronic form, with the decision dictated by the environmental conditions at the time of need.

Information Sources

Study participants held many source preferences in common. They generally preferred the Internet to libraries, and highly valued their social networks and lists of experts they knew as information sources. Two types of professional training produced discernable differences in practice. First, those with health and medical degrees regularly used peer-reviewed journal literature, and in some cases libraries, while other participants did not. Second, those with computer science degrees described use of sophisticated information searching and management skills not reported by other participants.

Participants preferentially turn to trusted organizations and individuals with expertise for information. For organizational information they sometimes use print newsletters, and other organizational publications, but the Internet and email are their primary channels for information. Most participants do not value the peer-reviewed literature. The only participants who used the peer-reviewed literature were the emergency medical physician and the two public health nurses. The physician had access to a library in his hospital; no other participant had an organizational library at work. Libraries were seen as less useful than the Internet:

> There is a state library. There -- I've used in the past the local hospital medical library, but I haven't used that in the past -- recent past. I just find I guess most of the time I'm finding the information specific to my needs good enough, you know, online.

"Lessons learned" reporting the experience of their peer organizations are highly prized as a way to avoid "reinventing the wheel," a phrase used by many participants. They noted that concerns about security of

sensitive preparedness information have made it more difficult to access. It may only be on secured websites or entirely off the Internet. While these valued operational documents are scarce, there is a glut of other information delivered daily via email leading to information overload. Participants with information science backgrounds reported success in managing the overload, but many others felt they were falling behind, being forced to ignore information that might be useful, and unable to create an effective personal system for storing and recalling information at a later date. Many want filters that will automatically sort and prioritize their incoming email, and make it easier to identify the most relevant documents for them on the Internet.

Information Seeking

For many participants information seeking is a multi-step, iterative process. It frequently involves a complex mixture of consulting the Internet, experts in and out of the organization, and pertinent documents. It ends either with "satisficing"- accepting less than full information as adequate - or a forced decision point dictated by outside forces. The following narrative is edited to emphasize the steps in the process during one extended information seeking episode.

> First, I questioned my boss and she gave me a little of the negative history surrounding it, 'cause I hadn't received it up until that point. 'Cause it was all smooth sailing and I had no reason to question 'cause I didn't know enough to question. ... We… have legal counsel. So, I consulted her and ... I re-read all of the information that was on the website so I was more familiar and then I consulted the national … director. .. I read [the program guidelines] just to see what I needed to know just so I could anticipate questions.… I was fortunate enough to go to the national conference … there was a gentleman who presented… and it was a great overview …and one of the things I wasn't familiar with is how the rules change during an emergency … there's these complexities that I wasn't really aware of. … I really studied his presentation so that I would understand even the definitions of emergencies and disasters and why the rules change and what the history is for some of that... I had asked our legal to do is could she draft a little "ditty" is the word I used—informal, just a couple of sentences, is there some type of blanket statement that I could use … Well, six weeks later I got a seven page white paper. So, all that did was really show how complex the issue is and it's really not—there isn't a simple answer.

DISCUSSION

On the whole, the IUE model provided a useful set of factors to pay attention to in the data analysis process. While as a model it doesn't claim causal relationships, and doesn't clearly specify the relationship of all the parts, it did serve as a very useful data classification scheme. Several main sections were added to the four IUE categories as coding progressed. These were Information Definitions, Information Sources, and Information Behaviors. The following sections report how well the four main factors in Taylor's model worked as an analysis framework.

Sets of People

Taylor (1991) divided sets of people by occupation into two categories, professions and entrepreneurs. Unfortunately, his definition of profession is unclear, and he offers only definition by example for entrepreneur. In essence he said profession is defined by some combination of educational credentials, what you do, and where you do it. Clearly none of the participants in the current study are entrepreneurs, but defining their profession using Taylor's criteria is problematic. This problem is intensified by the increased prevalence of career changes during a person's working life. Past career experience, not included in Taylor's model, especially military and firefighting experience, heavily influenced information practice in our study.

Two of non-demographic characteristics that Taylor briefly mentions, media use and social networks, deserve updated definitions and separate status as categories outside of Taylor's placement under sets of people. According to Taylor media use is the channel for information delivery. He gives examples such as the print orientation of scientists, a choice largely changed to electronic today. For this study, media use was added as a fifth main category and renamed Sources. Information type and channel were considered separately under sources. Social networks were considered a channel for information and examples of networking were coded for comparison by occupation and setting. These modifications allow a clearer distinction between people and information in the model.

Problems

Taylor's assertions that problems are associated with an IUE, closely linked to profession, and change over time posed no problems to the analysis. The four dimensional axes he chose as characterizing problems - well structured/ill structured, complex/simple, assumptions agreed upon/not agreed upon, and familiar/new patterns - were not used much in the analysis. If the data included observations of group problem-solving sessions, these might have played a very important role in identification of differences in problem definition and problem solving between professional groups.

Setting

Taylor's settings include components and characteristics of the organizations in which sets of people work. Aspects of setting that influence information practice include the work domain, organizational reward system, the physical environment, information resources in the setting, connections to outside sources and organizations, bureaucratic structure, and degree of specialization of

employees. These concepts were useful in analysis, especially when supplemented by consideration of regulatory, normative, and cultural-cognitive factors that shape organizational environments according to institutional theory. (Currie & Suhomlinova, 2006; Scott, 2008) Institutional theory was especially useful when considering what drives information practice. For example the regulatory environment has a very strong influence on the priorities of public agencies and the resources available to them.

Taylor thought that the professions of the people would be a stronger influence than their settings. The present study bore that out. For example, a financial administrator in a county emergency management agency had very different information practices than the emergency manager. The financial manager emphasized creating a permanent record of financial decisions and transactions, and managing the flow of that information closely. The emergency manager emphasized having access to a large and diverse body of information and many personal contacts that allowed him to respond flexibly to any emergency that arose.

Problem Resolutions
Taylor derived his eight types of problem resolutions from Dervin's work. His descriptions proved to be too cursory for confident application in analysis. The PI referred to the original sources, and found the language challenging as a non-theorist, but persistence over time yielded more clarity on the boundaries between categories, making them useful for analysis. The problem resolution categories enlightenment, problem understanding, instrumental, factual, conformational, and projective can be addressed, at least partially, with formal information sources such as written documents or expert opinions. From the standpoint of study participants, the categories motivational and personal or political were often very important, although the sources are out of the scope of library practice. Paying attention to them proved quite useful in considering the forces driving information behavior in the study participants.

Taylor discusses information handling, especially methods of reducing information overload, under problem resolution. Information overload was found to be a problem of its own and was pervasive in the study participants. As such, it was moved to the setting category, as a part of the environment generated by the work environment.

Components Added to the Model
We added a coding category for information definitions. This initially contained Floridi's four types of information, information about something, information for something, information as something, and information in something. (Briggle & Mitcham, 2009) To accommodate participants' definitions, information as a process, and information defined by its container were added to the list. In general participants found it easier to talk about what they did with information (decision-making, sharing,) than to define its essence.

Limitations
This study is exploratory in nature. It utilized a modest sized sample and only one form of data collection. The sample, drawn from a group that self-selected to participate in leadership training, and volunteered to participate in this study, may be different in substantive ways from the general population of disaster preparedness leaders in the USA. Ideally a fuller case study should be done, adding observational data, closer examination of the information resources used in the disaster preparedness fields, and a more thorough evaluation of the utility of existing information sharing vehicles used by practitioners to the existing interview data. Because all of the data is based on recall rather than observation it is possible that important resources and nuances of information practice have not been captured.

Implications for Information Practice Research
If information science researchers want the average library practitioner to use theory in research to improve practice, then they should consider creating more tools that reduce the burden on the practitioner to understand theory. Using the study presented as an example, three years elapsed from the initial idea to the completed study. This was sufficient time for the PI to become comfortable with the world of information theory and models. Additionally, the learning process was aided by the completion of public health theory and research methods classes completed as part of the fellowship program. However, most library practitioners do not have this opportunity. While organizations such as the Medical Library Association call for their members to incorporate research into library practice, practitioners would be happier with "more practical, less theoretical" approaches. (Grefsheim, Rankin, Perry, & McKibbon, 2008)

The PI experienced two time periods of greatest theoretical struggle, first during the initial research proposal writing phase, and later during the data analysis phase. The first phase presented a steep learning curve. Perhaps there were more appropriate models or theories to use, but decisions were "satisfied" and made when time considerations forced decisions. The second period of struggle was during data analysis, when the attempt to fit the data into Taylor's model required a return to the theory literature and further thought. As an aid to practitioners who want to engage in research, information science theorists should consider producing more tools that illustrate abstractions of theory with concrete examples from the everyday experience of the library practitioner.

Finally, information science researchers who want their work to improve library practice should consider publishing their results with two audiences in mind, other researchers and practitioners. These results should be published in journals read by the target audiences, and at the appropriate

theoretical level. Other models of communicating science to practitioners like *The Guide to Community Preventive Services* (http://www.thecommunityguide.org/) that distills the evidence on the effectiveness of public health interventions for program planners, could prove valuable models for translating information science research into library practice.

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