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ABSTRACT

The information-seeking activity (ISA) of 16 rural health practitioners (occupational, physical, and respiratory therapists; radiological technologists; speech/language pathologists; and nurses) was explored using qualitative methods of participant observation, document collection, and in-depth interviews. Field notes and documents were collected in two rural nursing homes. Participants described situations in which they needed information to solve clinical problems. Contextual differences appeared in how in-house and external contract practitioners used time and resources. In-house staff were more connected to their community, facility, and work space; external staff had connections outside the work setting. Making connections emerged as the core strategy used. Access to time and resources was a core condition influencing ISA. Barriers to ISA were classified as internal, intangible, and tangible. Preferences included technology access and continued learning close to home. Conclusions were as follows: ISA is regulated by a work environment that dictates demands and resources; practitioners are influenced by and play an active role in modifying their environment and can be empowered by their environments in seeking information; and investment in a community of practice can make it easier for rural practitioners to seek information and serve as information resources. (Contains 45 references.) (Author/YLB)

INFORMATION-SEEKING ACTIVITY OF RURAL HEALTH PRACTITIONERS

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ABSTRACT

The information-seeking activity (ISA) of rural health practitioners was explored using qualitative methods of participant-observation, document collection, and in-depth interviews. Field notes and documents were collected in two rural nursing homes. Sixteen occupational, physical, and respiratory therapists, radiological technologists, speech/language pathologists and nurses described situations in which they needed information to solve clinical problems. The study identified how context influenced ISA; core strategies, conditions, and consequences; barriers and preferences.

Contextual differences appeared in how travelers and locals used time and resources. Locals were more connected to their community, facility and work space while travelers had connections outside the work setting. Making connections emerged as the core strategy used. Sub-dimensions were making connections with internal resources (skills and knowledge) and external resources (human and non-human). Core conditions were access to time and resources. Consequences were resolution, increased competence, and more questions. Barriers were classified as internal, intangible, and tangible. Preferences included technology access and continued learning close to home.

Conclusions were that (1) ISA is regulated by a work environment that dictates demands as well as resources; (2) practitioners are influenced by their environment and play an active role in modifying it; (3) practitioners can be empowered by their environments in seeking information; and (4) investment in a community of practice can make it easier for rural practitioners to seek information and to serve as information resources.

Objectives

This study examined how rural health practitioners sought information to solve clinical problems. It identified how context influenced information-seeking activity as well as the strategies, resources, and tools commonly used in practice. How practitioners acquired, filtered, and created information was viewed from the perspective of information *seekers* rather than *providers.*

Summary of Problem

Discovering how rural practitioners learn and use information-seeking skills is needed to understand the competencies required of today's rural health practitioners. This need to discover information-seeking behaviors used in practice is even more crucial today because of 1) increased patient expectations and 2) an explosion of health-related information. Historically, patients seldom questioned a practitioner's decisions. "Today's consumers are demanding more–and more detailed –health information and are taking a more active role in making medical and lifestyle decisions" (Resources for Rehabilitation, 1998, p. 9). Rural practitioners today seldom have enough time to access and critically appraise all the information that is available and often do not have the technological tools or skills needed to access and manage information effectively.

In an information-driven system, health professionals must be skilled in finding patient, scientific and technological information efficiently. Competencies needed by health practitioners were identified by the Pew Health Professions Commission (1995) as the ability to (a) use technology appropriately, (b) manage information, and (c) continue to learn. As the importance of information-technology grows, rural practitioners may have special challenges and opportunities in gaining competency in information seeking. Findings from this study can be used by both educators and practitioners to prepare students for rural practice and to strengthen the information-seeking skills of rural practitioners through continuing learning opportunities.

Orienting Frameworks

Theories and models from information science, situated learning, self-directed learning and continuing learning in the professions served as useful guides to inform this study.

Information science. Information science traditionally viewed information use from a system-theory perspective. This view concentrated on questions that matched a system's representation of information rather than a users' problems (Belkin, 1984). Newer models focus on the social as well as cognitive aspects of information-seeking (Allen, 1996). For example, social models examine how membership in a group influences information seeking. Cognitive models examine the complexity of an information-seeking task and have found that as complexity increases, success decreases as does the use of internal channels of information (Bystrom & Jarvelin, 1995). A gap still exists between the traditional systems-theory of providing information and users' natural process of information use (Kuhlthau, 1991). This study took a user's perspective and looked at groups of allied-health practitioners in natural contexts of practice.

Situated learning. When information-seeking activity is viewed as *situated learning*, the context becomes an important part of the learning event, not peripheral to it (Rogoff, 1984). Practitioners use the knowledge, people and tools of their settings in seeking information. It becomes an activity distributed over time, space, and people. This perspective places importance on the *distributive* nature of learning and on the tools involved (Star, 1996). The natural context, according to this more ecological view, includes meaningful and enriched information that enhances performance (Ma, Trombly, & Robinson-Podolski, 1999). This study examined *what* was learned in practice with *how* and *where* it was learned and used. It drew on the literature of several fields, including self-directed and continuing learning in the professions.

Review of the Literature

Self-directed and continuing learning in the professions. Tough (1979) initially looked at self-directed learning as learning projects consisting of learning episodes. Information-seeking activities of practitioners could be viewed as episodes in learning projects that are largely self-initiated and directed. Knowing how health practitioners identify information or knowledge gaps and seek to fill those gaps, helps in understanding the self-directed learning behaviors of practitioners.

Spear and Mocker (1984) shifted the focus of self-directed learning research to the learner and circumstances surrounding self-directed learning activities. Current paradigms associated with the literature on self-directed learning are threefold. Self-directed learning is seen (a) as contingent on external forces, (b) as a response to need, and (c) as activities inseparable from factors and events in a person's *life field*. The emphasis on external forces, activities, and life field is similar to the emphasis on situation and context in situated learning theory (Brown, Collins & Duguid, 1989; Lave, 1988).

Resistance or barriers to continued learning can arise from organizations, and methods of teaching, evaluating and credentialing that are controlled by institutions and organizations that have a vested interest in keeping learners dependent (Long, 1994). Hiemstra and Brockett (1994) describe how "learners who have never been encouraged to take responsibility for their own learning can remain unaware of the power they possess," (p. 89) and suggest that it may be a myth to think of self-directed learning as primarily done through reading and writing (Brockett, 1994). The ability to be self-directed in learning is constrained by the social context and the learner's perception of the situation. Practitioners need self-directed, lifelong learning skills that help them continue their self-education beyond their formal years of schooling (Candy, 1991). Continuing medical education, for example, is moving toward lifelong learning tailored to individual clinical practices (Manning &

DeBakey, 1992). Physicians must take the initiative in identifying their learning needs and goals as well as in selecting resources and strategies to help accomplish their goals (Fox, 1991).

Continuing learning in professions other than medicine, has only recently become an important area of research in professional practice. The effort to link professional education to practice has been a moving force in this research. The effort has been influenced by a growing debate over how to understand learning, knowing, and knowledge creation. Knowledge and practice are increasingly viewed as socially constructed and researchers seek to define the relationship between cognition and the social and cultural ecology in fresh ways (Guba & Lincoln, 1989). Cervero (1988), for example, stresses that both abstract knowledge and practice knowledge are needed to develop and improve wisdom and wise action in practice. Formal knowledge must be brought to practice events and reflected upon before new action is adopted.

A current model designed for researching professional practice is the Integrated Practice Perspectives (IPP) model developed by Donaldson and Kuhne (1997). It can be used to analyze the tensions between theory and practice and how context supports or limits professional competence. This model examines practice at three levels of specificity (a) *macro* in broad social and historical contexts, (b) *micro* in personal, subjective, real practice contexts and (c) *meso* where *macro* and *micro* levels interact. It was at the micro level that practice was examined in this research. This study focused on how information-seeking as a collective activity occurred and how it was both constrained and facilitated by surrounding conditions (Donaldson & Kuhne, 1997).

Studies of information seeking in the professions. A review of the literature from medicine and the human service professions suggest that personal experience and the opinions of other professionals are far more common sources of information for clinical decisions than information available from research findings (Sekerak, 1992). Convenience and habit were the most important

factors in choosing information resources among medical students, residents and physicians even in academic health centers (Northup, Moore-West, Skipper, & Teaf, 1983). "If it is not here, I can't be bothered" (Davidoff and Gadikian, 1991, p. 58) reflected the frustration of searchers who lacked time, transportation or inclination to find hard copies of information they knew existed somewhere. Interruptions and demands in the workday of continuing education professionals allowed little time for self-directed professional development such as reading or doing formal information searching (Donaldson, 1993). Rural Vermont therapists relied most frequently on personal and office collections of professional literature for clinical decisions and made virtually no use of bibliographic databases (Hall, 1995). Among rural practitioners, situational barriers added to the difficulty of seeking-information through formal channels. Lack of funds, inadequate hardware, infrastructure problems, insufficient knowledge of sources and how to use them were some of the problems identified among rural physicians (Dee & Blazek, 1993; Lundeen, Tenopir, & Wermager, 1994).

Both situational factors and personal characteristics have been the focus of other studies. Institutional resources were found to be more influential than personal characteristics in a study of the information-seeking of securities analysts (Baldwin, 1996). Barnes (1996) compared work teams who had access to the same information. The teams which nurtured outside relationships in efforts to gather external information performed at a higher level than those teams that did not. Low-performing teams usually worked in crisis situations leaving little time to expand team boundaries for gathering external information. Too little or too little information could hinder efforts of work teams in accessing pertinent information (Barnes). Environments that supported use of research information by physical therapists were characterized by autonomy, flexibility, responsibility, variety, challenge, opportunities for professional development, and interaction with colleagues and specialists (Sekerak, 1992).

Studies of personal characteristics suggested that successful information seekers were active, initiating, interdependent, and experienced in network building and less successful seekers were, isolated, passive, non-initiating, less autonomous and inexperienced in network building (Zabari, 1985). These studies complement many studies in self-directed learning that suggest self-directed learners are competent, committed, confident, and have the least need for someone in authority to motivate, guide or coach them in learning (Pratt, 1988) while they benefitting from collaboration and consultation with others (Grow, 1991).

Previous research among health practitioners has focused on isolated aspects of information seeking, primarily among physicians. Data collection was largely with questionnaires and closed-ended questions, yielding sometimes incomplete or restricted answers. Among health-related professions, however, the study of information-seeking is in its infancy. With few exceptions, included Hall's (1995) research on the information sources and needs of physical therapists in private practice and Lundeen, Tenopir & Wermager 's (1994) study of information needs of rural practitioners in Hawaii, the health-related professions have either been lumped with physicians, dentists, optometrists, and other groups or not studied at all. Research is still needed that examines and compares information-seeking activities across disciplines and levels of experience (Kuhlthau, 1991). A grounded theory approach was chosen for this study because it examined different actors (non-physicians), in an understudied setting (rural practice), with a different lens (qualitative methods), than previous studies.

Research Questions and Method

While informed by previous research and theory, a grounded theory approach was used to discover the conditions, strategies, and consequences of information-seeking activity of rural health practitioners in this study (Strauss & Corbin; 1990). The primary research question was the

following: How do rural health practitioners seek information to solve clinical problems? Two questions emerged from initial interviews and data analysis: (1) how does the context of practice influence their information-seeking and (2) what strategies, resources and tools do they use. Further dimensions that emerged where what barriers rural practitioners encountered and what strategies, resources, and tools they preferred.

Participants and settings. One researcher spent a year working in two rural nursing homes as a practitioner and participant-observer. This allowed close examination of the events, questions, settings, tools and activities of information seeking among 16 practitioners who were physical, occupational, or respiratory therapists, radiological technologists, speech and language pathologists and nurses. All participants except the respiratory therapists, had at least a bachelor's degree in their professional field and had a range of professional service from a few months to 20 years. The two nursing homes, Hollyhock and Edgewater (pseudonyms), were in towns with populations of 4,000 and 12,000 people. Most therapy services at Hollyhock were provided by "in-house" practitioners who were employees of the facility. These practitioners were based primarily at Hollyhock with limited travel to other settings. Services at Edgewater were provided by practitioners who were employees of outside contract companies. These practitioners always traveled among settings. To capture a complementary focus on both practitioners and their work settings, interviews were conducted at the participants' work site when possible. Some practitioners needed to be interviewed in their own homes or a central office because they had no formal office and traveled among homes.

Units of analysis included individuals as well as clusters of professionals working in the same nursing home. Three data collection strategies were used: (1) participant-observation, (2) document collection, and (3) in-depth interviews including use of the critical incident technique (Flanagan, 1954). Nine months of field notes from participant observations and sixteen in-depth interviews

were the primary data sources. Secondary sources, used to expand the scope and insure trustworthiness, included printed documents: manuals, newsletters, surveys and postings found in the work settings. The triangulation of data gave a variety of perspectives on the activity.

An inductive method was used to develop themes and codes around the primary research question of how rural health practitioners seek information (Boyatzis, 1998). To maintain marginality, the researcher collaborated with a research partner and a research group who were knowledgeable in the grounded theory method but not involved in data collection. Subject checks were done by having each participant read his/her interview summary and by having one participant read the findings to verify if the summaries and findings *rang true* to their experience. To increase the trustworthiness of the primary researcher's interpretation, sorting of data into categories was done by an outside coder who was an information specialist for a rural hospital.

Findings

"Making connections"emerged as a core information-seeking strategy and included making connections with internal resources of knowledge, skills, and experience. It also included making external connections with human and non-human resources. Human resources included professional colleagues, coworkers, supervisors, directors, consultants, patients and family, equipment providers, administrators and educators. Non-human resources included the tools of telephones, fax machines, and CB radios along with printed materials that were easily accessed and read. Computers and clinical literature were not observed to be primary resources but were perceived as potentially good sources. Practitioners often drew from one another's previous experience to recognize discrepancies, pose questions, and identify solutions. Everyone used talking with others as a primary strategy and used faxes, mail and computers in more limited ways. Strategies included "taking the technology with you" and "knowing how to get on the telephone and knowing who to call."

Primary conditions impacting information-seeking included time and resources as well as the urgency and importance of the questions. Questions that were too complex, lacked importance, urgency or benefit were not pursued. Barriers to being able to access information fell into three categories: (1) internal barriers like pride, anxiety, resistance, misinformation, or lack of skill or knowledge. Lack of familiarity, skills, or comfort with tools also caused delays in getting needed information. (2) Intangible barriers like lack of time, long distances, bad weather, restrictive policies, and isolation sometimes required practitioners to rely on their own resources rather than seek outside information. (3) Tangible barriers such as lack of computers and access to e-mail and the Internet, libraries and databases, equipment , money and space also restricted access. Barriers in the design of a facility also limited access. Practitioners expressed preferences for more computer-linked access to medical records, other people, and resources as well as more time and opportunities for continued learning and education "closer to home."

Consequences of information seeking led to resolving clinical problems, gaining competence, and to generating further questions. Patients often benefitted from practitioners successfully finding information that helped them resolve clinical problems. Successful seekers became providers of information and gained competence through using it in their practice and sharing it in conversations, in newsletters, or at meetings and in-service events. Sometimes seeking information resulted in not finding it or in identifying new problems that generated more questions and continued the process.

Discussion of Findings

"Making Connections" was the strategy that encompassed most of the patterns emerging from information-seeking activities of rural practitioners. Rural practitioners derived information from their internal connections utilizing knowledge and skills (including language and experience) and external connections (with human and non-human resources) that allowed them to utilize the knowledge and

skills of others. The internal connections were made in a *problem space*, a term sometimes applied to conceptual activities like thought or language (Olson, 1995). External connections were observable activities usually occurring in a work space, called *the setting space.* The internal and external connections are highlighted in the top half of Table 1.

Table 1. Strategies and Resources Rural Health Practitioners Used in Seeking Information.

Making Connections			
Internal Connections Made in *Problem Space* Recognizing the problem Resources: inner knowledge & skills (Language and experience) *What is the question? What do I know?* *What else do I need to know?* *How urgent or important is it?*		External Connections Made in *Setting Space* Recognizing the information sources Resources: work space, human & non-human *Where is the information that is needed?* *How can I access the information?*	
propositional knowledge	process & know-how	human resources	non-human resources
knowledge base: ability to recognize information	*skills*: ability to find information *experience*: ability to create it	co-workers; distant colleagues; patients, family & care-givers; community & organizations	physical space; tools: e.g. phone, fax, printed material, mail computer, video; time; money; continuing education events

The bottom half of table 1 illustrates the inner and outer resources practitioners used. They brought both propositional knowledge and knowledge of process and know-how to bear in recognizing their own limitations and knowledge gaps, deciding what questions were worth

pursuing, and how they would pursue needed information. The actions they took to locate further information in the larger environment involved connecting with human and non-human resources. These resources are illustrated in Figure 1 and described later in the discussion of question II.

Figure 1. Inner and outer resources used by health practitioners in information-seeking activities.

Question I: How Did Context Influence Information-Seeking Activity?

Rural practitioners' connections to (1) the community and (2) the building, staff and work space in which they practiced, influenced their information-seeking activities. The core condition, access to resources, was shaped by the context of practice. Practitioners who lived and worked primarily in one community drew more information from their communities. They had access to more interactions and resources within the building than practitioners who traveled and whose resources and interactions were more dispersed. When practitioners' work space and time overlapped with that of other practitioners, they sought information from the non-human and human resources available in the facility. Mobile practitioners, who spent less time in one place or with other practitioners, sought more information outside the facility and carried resources with them.

Locals with stability and longevity in a setting accumulated not only material resources but "social capital" or an investment in relationships (Coleman, 1988) that aided them in their information-seeking activities. For example, Ryan (pseudonym , a respiratory therapist, knew both the information resources and needs of his hometown and took a personal interest in patients. "It is not beyond us to run to the grocery store for a bottle of milk if they are not able to do it themselves." Another therapist who sought information on funding for a patient, described working closely with the caseworker saying, ". . . she made that extra phone call to the VFW because she knew him . . . she had a personal stake in it."

Practitioners' social capital within a community extended beyond their patients to colleagues, organizations, families, friends, and caregivers as well. These connections and shared experiences gave them access to community resources when a need to seek information arose. Bill, for example, was an occupational therapist who knew what parts local physicians sang in their church choirs. Because he was known and trusted by physicians, he was the person most able to get information

from them the fastest. Because he delivered meals-on-wheels, served in the volunteer fire department, and coached Y teams, he might be giving and receiving information at a ball game as easily as on the phone at work. These finding are supportive of other research that demonstrated that combined professional and personal lives were an important aspect of being a trusted member of a health-care team among rural therapists (Wills & Case-Smith, 1996).

Traveling practitioners, on the other hand, commuted among as many as 90 different communities and were connected to a wider variety of resources, both human and non-human, than locals. They carried a limited number of resources with them and connected by phone, fax, or CB radio to central offices, corporate consultants, and fellow practitioners who were often miles away. They drew on resources at a corporate level and at a personal level removed from their work settings rather than engaging in face-to-face information-seeking locally. Ed, a physical therapist, for example, would reflect on clinical questions while driving between assignments and later used his company's educational specialist or a former classmate to access information. Jane, a speech and language pathologist, when she had an urgent question about a patient's swallowing problems, called her corporate specialist in another State for advice.

Since traveling was a daily expectation for mobile practitioners, some were more open to traveling long distances to get continuing education than locals like Ingrid who preferred "continuing education closer to home." For travelers, contractual bonds rather than social bonds, determined the nature of some of their information-seeking activities. Since the company that employed Larry promised rural nursing homes a one-hour turn around on emergency X-rays, Larry sought information on an unfamiliar procedure from notes in his van and from his colleague on the CB radio. A local practitioner might have called a hospital technologist in his community.

In general, local practitioners had a dense, close-knit set of resources that allowed them to make greater use of social and face-to-face community connections. Traveling practitioners, on the other hand, tended to make use of a geographically larger, but loosely knitted network of fellow practitioners and resources. They often connected using communication technology rather than face-to-face interaction. Both locals and travelers developed support networks and connections but these differed by setting and the experience of the practitioner.

Locals "rubbed shoulders" and exchanged information with people in the break room, daily and weekly meetings, and in the hallways of their facilities more frequently than travelers. A nurse, for example, working near her hometown had extensive knowledge of her patients' family histories gained from living as well as working with families over many years. Travelers, however, gathered information from distant locations. The X-ray technologist, who knew little more than a patient's name, moved information from the bedside, to a radiologist on the East coast, back to the doctor's office or nursing home in less than an hour. He brought new skills and technology to his patients.

The various ways context influenced information-seeking found in this study also echoes the conclusions of environmental psychologists, continuing professional educators and ecological theorist. Cassidy (1997) argued that cognition, interaction, biological and geographical factors all influence behavior in a particular setting. Both Broffenbrenner (1983), who took an ecological perspective, and Lemke (1997) , who advocated an ecosocial system model, claim learning is influenced by a variety of social, cultural, and biological factors. Burton and Davis (1996) suggest that contexts with rich sources of information elicit better performance than impoverished contexts. Schell and Cervero (1993) found more effective clinical reasoning demonstrated in settings that provided the necessary social and physical supports to practitioners. This study confirmed previous research that context shaped learning activities in that practitioners used the resources most available and practical for them.

The location of a therapy room or treatment session in a building impacted the way information was sought. Those practitioners who were near the activity hubs, such as nurses stations, were involved in more information exchanges and so had better access to certain information. At Hollyhock, for example, therapy rooms were in the middle of the hall, directly across from a busy nurses station. Dana, an occupational therapist, went to the nurses station to ask questions and said she would "find out a lot . . . by asking about one thing and they would talk about other things." This "collateral learning," as opposed to "direct" learning, found also among physicians (Slotnick, Kristjanson, Raszkowski, & Moravec, 1998), was observed frequently among practitioners who interacted daily with staff at a facility.

At Edgewater, the therapy room was in a cul-de-sac-like part of the building away from major activity hubs. While the practitioners at Edgewater also made face-to-face connections with others, it took greater effort for them to connect. Location of the therapy room at Edgewater made it "easy to get in and out without getting involved in the politics of a place" according to a physical therapist who worked there. It also created problems similar to those found among rural school therapists who "had to arrange time to collaborate with other therapists" (Wills & Case-Smith, 1996, p. 374) because traveling limited the opportunity for spontaneous and informal face-to-face connections. The staffing patterns and building designs shaped a difference in degree of contact rather than a difference in kind.

The impact of meeting and work space arrangements on information-seeking were subtle but evident over time. At Edgewater, the director of nurses conducted the weekly team meetings from behind her desk with other practitioners standing or sitting around the edges of the room. Quick and efficient meetings occurred with each discipline making a report and asking few questions. At Hollyhock, the rehabilitation director conducted the weekly team meeting while sitting around a

table with other practitioners. More casual conversation occurred and when a question arose the charts and resource books were easily accessed in the same room or just across the hall. The two meeting rooms were classic examples of sociofugal (seating arranged around the perimeter) and sociopetal (face-to-face around small central areas such as tables) settings found to discourage and encourage interaction respectively (Cassidy, 1997). During nine months of observation at Hollyhock, the pharmacist, the doctors, nurses, and the chief administrator frequently met in the therapy room. Nurses or other weary staff would take sanctuary there because it offered a quiet and welcoming place to work. In contrast, offices of physicians as described by Dee (1990), were a private area in which they reported consulting printed resources but not people available in their offices (Gruppen, 1990, Dee & Blazek, 1993).

In summary, "local" practitioners lived and worked in one or two locations while "travelers" dropped in and out of many practice situations and carried their tools with them. Travelers were bound by employment contracts and sought information from outside the setting, such as from corporate specialists. Travelers had less time in a setting but broader connections and resources than locals who had more time in one setting but fewer resources. Locals were connected by social bonds to their communities more than travelers. Having both time and resources and using the full spectrum of resources available tended to enhance effectiveness of information-seekers. Information seeking was tied to both time and resources as illustrated in figure 2. Locals tended to be in the upper left quadrant and travelers in the lower right quadrant.

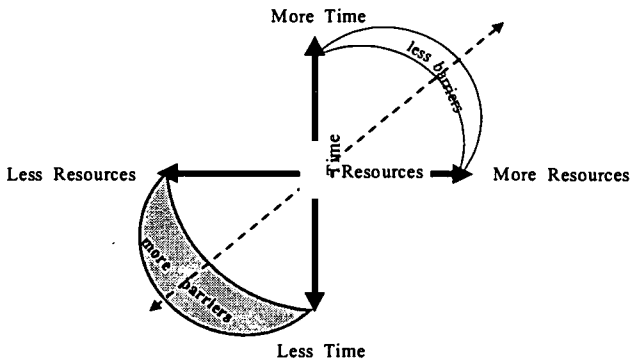

Figure 2. Relationship of Locals and Travelers to Time and Resources

Question II: What Strategies, Resources and Tools Did Practitioners Use?

Rural practitioners derived information from their internal connections utilizing knowledge and skills they had within themselves and external connections that allowed them to utilize the knowledge and skills of others.

Making internal connections. Internal connections are made in a conceptual space and are primarily problem focused. The *problem space* is where a discrepancy or problem is recognized, a question is posed, and solutions or sources are identified. For example, someone remembered a previous situation or recognized a repeating pattern. Conditions impacting the problem space include the urgency and importance of the question as well as the time and resources available or required to answer it. The problem space is often shared conceptually among practitioners. The strategies used tap into their skills and their personal, process knowledge or "know-how" as well as more codified knowledge (scientific and technical) of their professions (Eraut, 1994; Schon, 1987).

Allen (1996), an information-science specialist, suggested that the impetus for information-

seeking activity is a failure of some kind. The rural practitioners in this study seemed to fit this interpretation, when they reported snags or gaps in their knowledge that triggered information-seeking activity. In Allen's cognitive model, a knowledge gap occurs when something unusual happens that activates an information need and information seeking. A person's knowledge structures, based on past experience, cannot account for the anomaly.

The practitioners in this study described the conscious cognitive process they used but also alluded to emotions such as frustration, confusion, or embarrassment that were conditions shaping the strategies they chose. Affect, "in the sense that the doctor feels unhappy" may be the cause of much new learning according to Slotnick et al. (1998, p. 11). Kuhlthau (1993) similarly reported that an affective process often served as the impetus to seek new information. The affective aspects of facing a knowledge gap often determined how a person sought information. Patients often asked questions of a family member or friend before they would approach a health-care professional and professionals would ask a trusted colleague or friend before asking an expert or stranger.

The practitioners in this study generally had less access to outside resources and may have had to rely on inner resources more than urban counterparts. Inner resources grew in importance as outer resources grew scarcer. This situation led some rural practitioners to became more creative and self-reliant in improvising with the tools at hand. Experience and insight based on observation and ability to problem-solve sometimes replaced reliance on outer authorities and commercially produced resources. Because travelers, especially, were constantly moving from one physical space to another, the resources that did not fit into their cars had to fit into their heads. When equipment was not available, for example, a practitioner might use a can of soup to simulate weights, or have a patient sit on the washing machine when no vibrator was available. They drew information and resources from the immediate setting when outer resources were scarce.

Making external connections. External connections were made in what is referred to here as a *setting space* or the external environment. The setting space of allied-health practitioners differed from that of physicians and is one of the reasons the research on information-seeking of physicians does not necessarily speak to the conditions of other rural practitioners. The mechanisms by which physician learning takes place focuses more on their use of literature (Gruppen, 1990; Worth, 1997), consultation, and continuing education as reported by Slotnick et al., (1998), . . . that physicians' major approach to required information were reading, consultation, and the combination of reading and consultations (p. 7).

Reading and formal continuing education were not the major ways the rural practitioners in this study sought new information. One reason for the difference may be that physicians have a large, well organized body of clinical literature and requirements for continuing medical education (CME). The literature bases of allied-health professions are much smaller and less overlapping than in medicine. The mandate for CME, well established in medicine, is just emerging for many allied-health profession who face other contextual or situational factors, such as travel, status, and skills that differ from those of physicians. The rural practitioners in this study had neither the autonomy, the privacy, nor the status afforded physicians. They were part of a loosely affiliated health care team who shared space and fairly equal footing with each other. They shared questions and resources informally and often across disciplines. Physicians were more likely to seek and share information with fellow physicians. While allied-health practitioners sought information from physicians, the reverse, physicians seeking information from allied-health practitioners, was rarely observed or reported.

Rural practitioners in this study were often frustrated by the lack of access to the latest medical information but they were also closer to the source of some problems and resources than physicians.

Some professions saw their patients daily and had frequent contact with a variety of caregivers, family and health team members. The situation of being part of a shared community and moving into the patient's environment, even for short periods of time, gave the rural practitioners different opportunities and perspectives on resources for seeking information.

The social model of information-seeking (Allen, 1996) and activity theory (Engeström, 1992; Vygotsky, 1979) also fit well with the experiences of practitioners in this study. People who share experiences will share knowledge structures as seen in the cluster of radiological technologists who had developed their own customized instructions. When a new radiological technologist, needed to learn how to do an unfamiliar procedure, he contacted a colleague and found his most useful guide to be the informal protocols written down by previous technologists in his job. The technologists shared a common language or knowledge structure based on experiences that were customized to their work activities. The technologists approach to everyday problems seems in keeping with earlier studies in which expertise was found to be accomplished interactively (Engeström).

Information-seeking in rural settings can be a very interdependent process. Rural practitioners, like good neighbors, managed to get along with fewer resources. Rural communities are known for sharing resources; one neighbor may have a pickup truck and another, a hydraulic jack. They do not both own the same resource but they borrow from one another. Likewise, practitioners may not have technological skills and the access to knowledge bases beyond their personal areas of expertise and experience. They may, however, be trusted and connected with a community of people through whom they can find the information resource that is needed. The focus of most computer use in rural nursing homes, for example, was for documentation rather than information seeking. The computers were dated, like old cars, and the facilities did not have staff to maintain the technology or train the staff in information searching. However, resourceful practitioners did access Internet

resources at a local library, through an information specialist they knew or even a relative, often a son or daughter, who had the skills they lacked. One nurse, for example, asked an information specialist and another asked a son to help them do searches of the clinical literature. These ventures into the clinical literature occurred infrequently and often took months to carry out due to emotional and physical barriers.

The scarcity of human resources in rural settings led some practitioners to highly value the people they did have. While many practitioners were isolated from daily contact with people in their own profession, they formed positive relationships with practitioners in similar professions. Human resources were preserved and developed instead of replaced or fired. A nurse who came to a rural setting from an urban environment, where staff were regarded as "disposable," said that attitude was not acceptable in her rural community. Instead, she learned to value and work with the people available.

Non-human resources. Clinical literature and current texts and reference materials were in short supply in rural settings. They were expensive and difficult to access and hence, were not a primary source of information. Since access to resources was the major determining factor in what resources were used, current information that was not delivered to the site in a user friendly format did not play a significant role in information-seeking. Some practitioners did read company manuals, newsletters and routinely used the catalogues, phone books and brochures they received in the mail because they were at their fingertips. Those practitioners who did report using the clinical literature accessed it through their private subscriptions or more commonly through an intermediary such as an education, information or clinical specialist in their company. Most rural practitioners were health specialists with pressing priorities making it difficult to also be information specialists. They were paid for answers, not questions and productivity, not reflection. Given that practitioners usually have

inadequate support staff for using current information technology, using the tools and resources at hand to access clinical literature was difficult. Non-print resources, such as videos and audio tapes of conferences were mentioned by three of the practitioners as useful but were not major or common sources of information. These sources required additional equipment to access. Hence, the practitioners accessed these resources away from the work site, using car tape decks and home VCRs. These methods were not convenient, and like libraries, were seldom used.

Continuing education and learning. Time and money for continuing education was at a premium and were reported as barriers to formal, continued learning. Heavy caseloads made it difficult to schedule time off and some practitioners got little financial support for attending continuing education programs. This finding was similar to that of Wills and Case-Smith (1996) who found that none of the subjects in their study of rural therapists in Ohio was satisfied with the time available for continuing education. One conference a year was considered a generous allowance by subjects in the Ohio study which was confirmed by participants in this study. Hence, practitioners reported fulfilling continuing education requirements by correspondence, choosing conventions that covered many topics, or continuing education programs in places where they had a personal contact and could save on housing costs. Continuing education in the minds of many participants was linked with requirements for licensure rather than on information needs based on clinical problems.

None of the participant in this study reported formal continued learning opportunities in the workplace as major sources of information. Learning from on-site training, mentoring, in-services or on-line learning were never mentioned. Although these methods were found to be keys in changing practice (Jennett & Swanson, 1994b), this study suggests that they may be underused or undervalued in rural settings. These settings did not have technology readily accessible to support on-line learning, for example. Hence, there appears to be a lag in the espoused shift towards more

self-directed methods of continuing learning by professional educators and the actual on-site resources for such learning. Nor were informal methods of learning perceived as preferences by rural practitioners. While they reported wanting up-to-date books and computer access to information, no one asked for more in-service programs, mentors or on-line learning experiences. Those who did report that mentors were an important source of new information, did not have mentors at the work site; they connected with them by phone. These findings suggest a discrepancy between an espoused increasing reliance on digital sources of information and customized work site learning and the actual activities in practice.

Conclusions

1. Information seeking activity is regulated by a work environment that dictates demands as well as resources. The work environment was a source of constraints as well as resources. The demands imposed by workload, time-pressures, the work space, the weather, conditions of traveling or mediating messages through imperfect technology all served as constraints to seeking information. Environmental stresses clearly impacted the type of information and method of information-seeking practitioners used. The phone and conversations took precedent over pursuing written information. Urgency and conservation of resources such as time and money often controlled to what length or expense a practitioner could go for information. The rural practice settings also offered resources that supported information seeking activities. The rural work environment offered time, space, and relationships of stability and longevity for some locals and other broader connections for some travelers.

2. Rural practitioners are influenced by their environment and play an active role in modifying it as they engage in information-seeking activities. While the environment influenced practitioners, they also played an active role in modifying it as they engage in information-seeking activities. *Who*

and *what* were available shaped the information-seeking activities practitioners engage in. Expertise often resided in the person who knew the most about the situation, regardless of status or job. Practitioners were extremely practical in using the people and resources in their settings. Practitioners also modified the environment through their information-seeking efforts. Practitioners needed to "take the technology with them," according to one interviewee. Travelers also drew on their experience in other places to bring fresh perspectives and connections with outside experts to bear on the information needs of a rural setting.

3. Rural practitioners can be empowered by their environments in seeking information. The determining factor may not be the *quantity* of resources but the *quality* of the one's that are available, and the commitment practitioners to share resources. The larger task may not be finding information, as much as filtering the information found. To be able to critically appraise the value and appropriateness of information used in solving a clinical problem may depend more on inner resources than external ones. Being good stewards and sharing the resources at hand can be as powerful a resource for information seeking as having the latest in computer technology on every desk. Likewise, having the"coping technology" to accompany the learning technology may be needed more than having the latest database on a computer and no skill in access it.

4. Investment in a community of practice can make it easier for rural practitioners to seek information and to serve as information resources. Those practitioners with an investment in "social capital,"often were effective at getting the information they needed and were sought out as providers if information by others.

Limitations of the Study

A limitation of the study was that the respiratory therapists did not have educational levels equivalent to other practitioners as originally planned. The researcher was not able to find any

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