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MEASURING KNOWLEDGE USE IN ORGANIZATIONS

A Thesis

Presented to

The Faculty of Science

Of

Saint Mary's University

By

Micheline Daigle-LeBlanc

In partial fulfillment of requirements

for the degree of

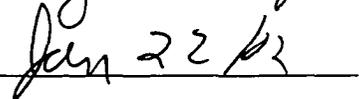
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ABSTRACT

MEASURING KNOWLEDGE USE IN ORGANIZATION

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It is a management truism that "you can't manage what you can't measure". To manage knowledge work effectively, one must first have an understanding of what comprises knowledge work. The intent of the current study was to develop a measure of knowledge work based on a definition that is both [a] grounded in the literature and [b] reflective of individual experiences. Toward this end, two studies were conducted. In the first, a series of qualitative interviews were conducted to develop an understanding of individuals' use of knowledge in the workplace. In the second, items derived from the interview results were used to construct a questionnaire, which was administered to a diverse sample to assess the psychometric properties of the instrument. In the current research, knowledge use is defined in terms of a discretionary investment organizational members choose (or choose not) to make to their employer in at least one of four forms: (1) the *application* of current knowledge to existing situations; (2) the *acquisition* of existing knowledge through research or learning; (3) the *creation* of new knowledge or innovation, and (4) the *packaging* of knowledge for the purpose of transmitting knowledge to others. The context in which knowledge work occurs in organizations was also examined, in an attempt to determine if knowledge use was linked to organizational rewards/recognition, support and/or opportunity.

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MEASURING KNOWLEDGE USE IN ORGANIZATIONS

Both management scholars (Drucker, 1998) and popular wisdom identify knowledge as the most valuable corporate resource of the 21st century. As a result, there has been considerable interest in how to manage organizational knowledge, knowledge workers, and knowledge work. Most of the existing literature in this area comes from the management / practitioner domain and has been driven by the pragmatic concerns of managers. However, there is also an emergent academic literature on organizational knowledge. For example, special issues of both the *Journal of Management Studies* (1993) and the *California Management Review* (1998) have addressed the topic of managing organizational knowledge.

Nonaka (1991) believed that the reason for the emergence of this new area of research is rooted in our socio-economic environment: "In an economy where the only certainty is uncertainty, the one sure source of lasting competitive advantage is knowledge" (p.96). Given an ever-increasing pace of change in the labour market, the advent of new technology, increased competition globally, and the short life-span of many products, the organizations that survive are those that consistently foster the creation of new knowledge, disseminate it effectively and throughout the organization, and incorporate it into their business practices and outputs (Nonaka, 1991). Firm resource theorists (e.g., Barney, 1991; Prahalad & Hamel, 1990) suggest that resources that are rare, inimitable and non-substitutable provide sources of sustained competitive advantage for organizations. To the extent that knowledge meets these criteria, it is a source of competitive advantage that may be exploited by the appropriate deployment of human resource strategies (Bamberger & Meshoulam, 2000). Hence, knowledge is a perishable commodity and can become obsolete overnight, and workers with new knowledge are sought by competing organizations all over the world (Drucker, 1998). Dove (1998) agrees that there is a fierce

competition worldwide for knowledge workers, and that “everybody needs more, faster than the system can produce them” (p.28).

By extension, this focus on organizational knowledge presents new challenges for managers. It is a management truism that "you can't manage what you can't measure". To manage knowledge work effectively, one must first have an understanding of what comprises knowledge work, and who are the individuals engaged in knowledge work. The involvement of both academics and practitioners in the literature has resulted in a variety of definitional problems and the intent of the current study is to develop a measure of knowledge work based on a definition that is both [a] grounded in the literature and [b] reflective of individual experiences. Toward this end, two studies were conducted. In the first, a series of qualitative interviews were conducted in order to develop an understanding of individuals' use of knowledge in the workplace. The primary intent of the first study was to develop items that would comprise the measure of knowledge work. In the second, items derived from the interview results were used to construct a questionnaire, which was administered to a diverse sample in order to assess the psychometric properties of the instrument. Both the factorial structure and concurrent validity of the instrument were assessed.

Towards a Definition of Knowledge Work

Kelloway and Barling (2000) have identified three definitions of knowledge work currently presented in the literature. First, knowledge work has been defined as a profession and "knowledge workers" have been differentiated from traditional "manual" laborers. Second, knowledge work has been described as an individual characteristic; i.e., knowledge work has been defined as the work done by highly educated individuals. Finally, knowledge work has been defined as an individual activity.

Knowledge Work as a Profession

Drucker (1998) initially coined the construct of 'knowledge worker', and defined it as those individuals whose work requires the use of mental rather than muscle power. This definition is indirectly adopted by other authors, who typically associate knowledge work (and by extension knowledge worker) with professional occupations and information technology (Dove, 1998; Harrigan & Dalmia, 1991, and Zidle, 1999), or with research and development activities (Davenport, Jarvenpaa & Beers, 1996, and Despres & Hiltrop, 1996). Kelloway and Barling (2000) note several problems with defining knowledge work as an occupational characteristic. First, this form of definition was seen as an elitist holdover from the separation of "thinking" and "doing" characteristic of scientific management and not reflective of current organizational needs and practices. Second, defining knowledge work in terms of occupation focuses on the "credentials" (i.e., occupational qualifications) possessed by individuals rather than their contribution to the organization. Finally, Kelloway and Barling (2000) note that this form of definition may obscure real differences by categorizing a diverse array of professions and occupations as "knowledge workers".

Knowledge Work as an Individual Characteristic

Knowledge work has been associated with individual (rather than occupational) characteristics such as higher education (Bentley, 1990), or creativity and innovation (Nonaka, 1991). As with occupational definitions, these definitions separate the 'thinkers' from the 'doers'. Choi & Varney (1995) criticized these definitions as too elitist and too narrow as they were restricted to white-collar professionals; they argued that the blue-collar worker who is required to make decisions in an organization could also be considered a knowledge worker. Similarly, Dove (1998) and Scarbrough (1999) defined knowledge workers as those who use

their head on the job, a concept that does not restrict knowledge work to the membership of any specific group: they are defined by the work that they do, which is more a function of the changing needs of the organization than of the occupational membership. While this strategy moves toward focusing on individual contribution, Kelloway and Barling (2000) note that, given the hierarchical nature of organizations, it potentially confounds the ability to contribute with opportunity to contribute. That is, individuals at higher levels of the organization are given the opportunity to engage in creative activities while equally able, but lower ranked individuals are not afforded the same opportunities.

Knowledge Work as an Activity

Finally, knowledge work has been defined as a type of activity in the workplace. For example, Drucker (1998) defines knowledge work as comprising those jobs in which incumbents work more with their heads than with their hands. In this approach the focus is on what employees actually do in their day-to-day activities (i.e., creation of ideas, Conn, 1984; work that entails high levels of cognitive activity, Helton, 1988; individuals who work with information to make decisions, Fox, 1990). In their investigation of knowledge work in thirty organizations, Davenport, Jarvenpaa and Beers (1996) describe at least four forms of knowledge use. First, employees may be primarily engaged in finding existing knowledge. Second, employees may be involved in creating new knowledge. Existing knowledge may be packaged by employees for other consumers or may be applied to a production process or problem. These four themes are also evident in the eight categories of firm knowledge use identified by Ruggles (1998). Kelloway and Barling (2000) accept this basic definition but extend it to specify that knowledge work is best understood as a discretionary organizational behavior. That is, individuals choose whether or not to engage in knowledge work in the workplace.

Thus, in the present study, knowledge work was defined as a dimension of work (Kelloway & Barling, 2000) rather than an activity inherent to specific occupational groups and/or occupational levels. Specifically, in the current research, knowledge use is defined in terms of a discretionary investment organizational members choose (or choose not) to make to their employer. Though use of knowledge will be expected to vary across occupational groups and organizational levels, I expect that use of knowledge will be manifested in the performance of work in at least one of four forms: (1) the *application* of current knowledge to existing situations; (2) the *acquisition* of existing knowledge through research or learning; (3) the *creation* of new knowledge or innovation, and (4) the *packaging* of knowledge for the purpose of transmitting knowledge to others.

Study 1: Establishing the ecological validity of the definition

As noted above, the existing literature on knowledge work is dominated by a practitioner's perspective in which anecdotal evidence, case studies, and speculative definitions abound. Because the existing literature, including the definitions of knowledge work proposed above, is not grounded in empirical experience my first study consisted of a qualitative exploration of the use of knowledge in the workplace. The principal goal of the research was to explore participants' use of knowledge in the workplace and to develop questionnaire items that reflected that use.

Method

Participants

Twenty-five (N=25) individuals were interviewed on their use of knowledge in the workplace. Participants were full time employees of a major tertiary care hospital, working in varying occupational groups and organizational levels. The sample consisted of 10 males, and 15

females. Of these, 10 were Managers, 9 were Professional (i.e., providing direct patient care), and 6 held Non-Management, Non-Professional positions. Participants' ages ranged from 25 to 50, with the average age being 38.8 years (SD = 9.05). On average, participants had been employed with the organization for 11.48 years (SD = 8.88), and had held their current position for an average of 5.52 years (SD = 5.40).

Procedure

Forty full time employees of a major tertiary care hospital were initially recruited for participation in this qualitative study, in collaboration with the organization's Director of Human Resources. A stratified random sample was designed specifically to explore variations across occupational groups and organizational levels in their use of knowledge in the workplace. The information management cell of the host organization's Human Resource Department produced a sample as requested: 10 Professionals, 10 Managers and 20 Non-Management/Non-Professionals. This sample size (N = 40) was my estimate of the number of participants required to 'ground' my data in actual experience.

Of the requested stratified sample, 25 individuals participated in the study. Of these, 10 (100% group response rate) were Managers, 9 (22% group response rate) were Professionals, and 6 (15% group response rate) were employed in Non-Professional, Non-management positions.

In order to ensure confidentiality of participants, initial contact with potential participants was made through their employer: all 40 individuals were sent a letter from the hospital's Director of Human Resources explaining the purpose and nature of the study. This initial contact was followed by a telephone call from a Customer Service Representative in the Human Resources Department, to determine whether or not each addressee would agree (or decline) to

participate in the study. The Customer Service Representative kept a 'blind' record of all calls and the responses of each addressee for researchers' records.

The researcher individually contacted by telephone, those who agreed to participate in the study, to set up an appointment to be interviewed. The researcher began each interview with a brief reiteration of the purpose and scope of the study and participants were again asked if they wished to participate in an audio-taped interview. All 25 indicated their willingness to participate and signed an informed consent form (See Appendix A) prior to being interviewed. On average, the interviews lasted one hour, which was sufficient to allow the researcher to gain in-depth insight of participants' use of knowledge in the workplace. The shortest interview lasted approximately 40 minutes, and the longest lasted two hours. Complete transcription of interviews yielded 182 pages of data.

Measures

All individuals participated in a semi-structured interview. The pre-determined interview questions are listed in Appendix C. Additional probes were proffered as required.

Method of Data Analysis

The data were systematically examined, coded, and categorized to find any dominant patterns or 'themes' of knowledge use. Initially, a theory driven approach was used to analyze participants' responses in accordance with predetermined categories, such as whether they find, create, apply and/or package knowledge in the performance of their work, and whether their discretionary investment of knowledge (if any) was linked to organizational support and/or opportunity. Following this, a data driven approach was also utilized, to enable the development of hypotheses on the use of knowledge in the workplace that did not fit into the original coding scheme.

Results

The intent of the current study was to develop a measure of knowledge use that is grounded in literature and reflective of individual experiences. In this section, I present substantive anecdotal evidence of knowledge use in the performance of work in each of its predetermined forms, consistent with the ‘themes’ introduced earlier. Each form of knowledge use is discussed in the following order: 1) applying current knowledge to existing situations; 2) finding existing knowledge through research or training; 3) creating new knowledge through innovation, and 4) packaging knowledge for the purpose of transmitting knowledge to other. Based on these findings, I conclude each of these segments with a table of items derived from interview texts.

The order of these forms of knowledge use is significant given that some application of knowledge is required for incumbents to perform their work. As expected, evidence of the application of knowledge is apparent throughout all interview texts. The presence and/or scope of the remaining three forms of knowledge use varied across occupational groups and organizational levels, as evidenced by quotations from participants interviewed for this study.

1) Application of Current Knowledge to Existing Situations:

In all the interviews I conducted, the *application* of existing knowledge was apparent, indeed it proved to be essential to the performance of work, regardless of occupational level or organizational group, as evidenced by interviewees’ own description of their responsibilities.

The Non-Management/Non-Professional group:

“Installing, repairing and installing (hardware), making up new codes, charging back to departments, (...). Looking after billing, ordering for the shop. Basically running the shop, the entire operation for the shop, from bringing in supplies to installing them.”

“My responsibilities would include registration of people coming in for an out patient visit, rebooking any appointments, booking any special tests. Also I do paperwork in the

office as well any incoming mail, blood work, making sure they doctors see everything they need to see and any letters that are back from dictation.”

The Professional group:

“You just go thorough the day, look after patients, rounds with the doctors, interactions with the families”

“(I) interpret a requisition from a doctor and perform x-rays based on the Department of Radiology’s policies and procedures. So I just position patients and do x-rays.”

The Managers group:

“Human Resource type things. (...) Time sheets, vacation planning, sick coverage, just those types of things, performance reviews...”

“Usually I come in the morning and there are people who have called in sick and it’s a scramble trying to cover off, finding people to replace them if you can. Scheduling to have about six weeks in advance so they know what they’re working, planning the day, and solving any issues. There’s a lot of putting out fires, whatever crops up.”

Fundamentally, all respondents illustrated that the application of existing knowledge is a dimension of work that is essential in the performance of their responsibilities in the workplace. In each of the examples listed above, respondents were required to apply knowledge they already possessed in order to do their work.

On the basis of these findings, I have developed a number of potential items to evaluate the application of current knowledge to existing situations in the workplace. They are summarized in the following table.

Table 1.1 Items measuring the application of knowledge, Study 1.

In my job....

1. I use a variety of skills
2. I make full use of my technical knowledge
3. I rely on my knowledge to solve problems
4. I use information
5. I interpret policies or procedures
6. I need a great deal of technical knowledge
7. I find it helpful to understand the ‘big picture’ and how my work fits into it
8. I couldn’t perform my job if I didn’t have the required knowledge

9. I make full use of my work-related knowledge
10. I am required to use technical knowledge to perform my work
11. I have a clear understanding of what I need to know to perform my work.
12. My work entails gathering the resources necessary to get the job done, and I know where to find those resources.
13. I make decisions about how to do the work.
14. I solve problems
15. I have to know how to get things done in my workplace.
16. People bring me their problems to solve.

2) Acquisition of Existing Knowledge Through Research or Training:

The evidence that respondents would conduct research or attend training to *acquire* existing knowledge is somewhat less clearly defined in interview texts. That is, when faced with a situation requiring the application of knowledge that they did not possess, most respondents indicated they would ask someone else for guidance or assistance.

As with the 'application' of knowledge, the acquisition of knowledge through consult with others was prevalent in most if not all interview texts. Group variations became more noticeable however, in the nature and scope of effort respondents indicated they would invest in the pursuit of knowledge. Whereas not all respondents chose to pursue their acquisition of knowledge further than to ask someone for assistance, responses overall suggest a progressive investment of effort that differentiated occupational groups and organizational levels. In the Non-Management/Non-Professional group for instance, respondents indicated that they would access the most obvious and/or available resources, such as a colleague, a procedure manual, or in the event they are dealing with dysfunctional equipment, the manufacturer:

"I've got to call someone that knows something about it. That's my first thought. If I run into something that I absolutely know nothing about, you have to act quick on it so you either have to call the manufacturer (...) they're more than willing to help you, and hopefully their technician is available. If that fails, I call (a colleague). (He) is always one that comes down to help me with something."

“If I can’t figure it out thorough the (procedure) manuals and such, I’ll go to (others) about it.”

The Professional and Managers demonstrated much similarity in how they sought to acquire existing knowledge. Typically, they proceeded as follows:

“Reading, observing, asking questions, professional publications as well, talking to others across the country...the Internet and I guess various media but I think I best learn by observing and then doing.”

“...a lot of times at work in our place, (you have to) seek the knowledge yourself. A lot of times you’re left looking up yourself. If other people are too busy to ask then you’d have to have someone that’s a little bit resourceful.“

The Professionals illustrated that their scope of research to acquire existing knowledge to solve current situations, was broader than respondents in the Non-Management/Non-Professional group. For instance, most Professionals respondents seemed to ascertain with relative ease, the most appropriate resource to contact to solve a problem, or initiative in undertaking to benchmark how similar situations were handled elsewhere in the country:

“typically I would consult with a more senior person who has been here or depending on what the situation is, I would go to use someone as a resource that I figure would... (have the most appropriate previous experience) before they came to emergency”

“I was told everyone must do the stairs before they go home and that’s the way it’s been done for years. And I was doing this and I started thinking why, why are we doing this exactly. (...) we’re spending a lot of time taking all these people to do the stairs just because someone told me I should do them. And so then I tracked down some e-mail addresses for some other physio’s across Canada and I e-mailed them all to kind of get a census of what other people do.”

Where the Professionals sought existing knowledge within their occupational group, the Managers displayed a propensity for a more organizational perspective:

“I look at my role as a managers is not to be the expert in everything. My role as the managers is to bring those people together, and motivate them and ensure they get the final product. I have a wonderful staff who each has varying skill levels and varying interests so that I can pick on or utilize or maximize, and I am sure they are given credit for it as well.”

“I don’t think I’ve seen these type of patients in probably twenty five years of my career, so it’s totally new, and basically what I’m doing is learning how they process their patients and what the patients needs are when they are here, and what resources they use when they discharge them. (...) I need to look at what each person’s role is in relation to that. I have started off by meeting on a regular basis so that I can get updated on what is going on ... and then I make rounds on a daily basis. Part of it is going and looking for the information yourself but the other part of it is the day to day conversation with the staff.”

“The way I approached (my new job) was to keep my mouth shut and attend as many meetings as possible to get familiar with who’s who and what’s what, what the lay of the land is. And volunteer for things that I could do. (...) One of the things that we had a sudden urgent problem where one of our secretaries left and there wasn’t anybody to take minutes at the executive meeting and I said well I’ll take them. And actually that was the best thing I could have ever done because I had to pay so careful attention not just to what was being said but how it was being said to kind of get the nuance of the politics. ...it gave me a much better perspective of how to deal with those people in the future. And it worked, I kind of was able to peg the personalities and so that was really worth while.”

Many respondents, particularly in the Managers group, strongly believed in the value of continuous learning, for themselves, for their staff, and for the organization as a whole:

“I think your learning needs change as you stay in this position for a period of time.”

“(this position needs) someone that’s willing to keep learning, someone that’s very flexible, someone that’s willing to give the job one hundred ten percent, someone that’s really open, good people skills, someone that has an even temperament, doesn’t fly off the handle, thinks problems through before they react, who will investigate all the players if you plan to make a change in something.”

All respondents regardless of occupational group or organizational level, agreed that continuous learning was essential in the performance of their work. In this context, there was variation between groups. In the first group for instance, only a small fraction of respondents indicated that they had pursued additional training on their own:

“I took a medical terminology course because I wanted to familiarize myself with some of the terms that they use when they’re ordering a test or something. If you don’t know what a...whatever is, it helps. And I took that on my own. I did take a couple of computer courses on my own.”

“I have taken evening courses to gather knowledge that I can use at work and I have used that. (...) Also I subscribe to journals and magazines that have a technical nature about a product background so that I can be aware of new products that are on the market when they come here or so that I can recommend it as a solution if the unit needs it. I also subscribe to various internet resources. (...) if I have a problem I can't solve, then I call in a coworker to help me out. (...) I also (scavenge) and troubleshoot on my own.”

“I chose to do it by correspondence because that was easier for my lifestyle at that point and time. ... I actually took two courses. Actually I surprised myself that I hung on, here I am at this age at this stage in my life, getting back into studying and getting back into doing it full time.”

Several respondents conveyed their desire to learn, but were unsure of what was available, or disconcerted by a perceived lack of organizational support for education:

“I'd like to be given the opportunity to (learn), I don't know what I'd like to learn. I don't know what's out there to learn. And I'd like someone in this institution, whether its upper management or Learning and Development to say 'okay, people are going and taking needed courses'....I don't know what to ask for and don't know what's available. And maybe on my part I don't get on the net and look either.”

“even if (learning opportunities) were subsidized (by the organization) in giving you time off to go and attend the courses that would be fine. I know I tried to do my masters a few years ago... and I just gave up because I had to make up every second of the time and it was hard and I couldn't do it working full time so I gave up. There was no incentive for continuing it.”

In the Managers group, in-house learning opportunities were perceived by many to be insufficient and/or inadequate, and so contingencies were devised to ensure more appropriate learning opportunities were available:

“I find what (is offered) in-house is very basic ...so I have been paying. I've been budgeting every year to send my team downtown and myself to learn the basic office products and we've learned from that. So those are the only educational things. I wish there were a lot more management stuff offered. I don't see a whole lot come across my desk.”

“Learning needs are, we are always trying to keep going with continuing education.... Computer companies offer workshops and a yearly user group. Unfortunately it's always in (the US). You're looking at \$5,000.00 to \$6,000.00 to send one person down. So far we've managed to send one or two people every year. That has to continue. Or we're just going to stagnate.”

The most prevalent roadblock identified was the unpredictability of the workload: respondents (mostly Professionals) expressed frustration at not having the time or flexibility in their schedule during work hours to attend in-house seminars and workshops, even when these were deemed important to their performance at work:

“One thing that is hard in our work is that they have in-services frequently for people to update...but it’s very hard for people to go to those. It’s hard because the people work shift work and if you have to go to something on your day off, well to people who live far away or have children or whatever, getting a babysitter to come in on their day off and your days off are precious to you. And so a lot of people don’t come in unless it’s something that’s really (of interest to them)... And when you are at work there are in-services, say at lunch time or during a quiet time at work or what they think is a quiet time, ...But you’re not guaranteed that you’re going to be able to go to that either because of just the way your work is. It’s very unpredictable.”

One aspect of knowledge acquisition that distinguished the Managers group from the other two was with regard to the type of knowledge they pursued. For instance, respondents in the Non-Management/Non-Professional group and Professionals group typically expressed the need for more ‘content’ learning (new technology and procedures, computer skills), whereas Managers commonly wanted more ‘process’ training and education (such as the ‘people’ skills component of their jobs):

“What would I like to develop? ... How to motivate people. That’s a skill I would like to have. How can I get them, because I know what they can do, you’ve worked with them, but how can I convince you that you can do that?”

“My learning needs: I think that something that would help would be more training on interpersonal skills perhaps and public speaking. Human Resource aspects, you don’t get enough of that. Also keeping up with current technologies.”

Though all respondents indicated that they would conduct at least minimal research in order to find existing knowledge to solve a problem, variations were evident between groups, primarily in the extent to which they would pursue existing knowledge, from simply asking a colleague, to benchmarking, to collating pieces of information from various sources.

In essence, this suggests that the acquisition of knowledge varies between occupational groups and organizational levels in a manner that implies a progressive investment, from informal consultation by all groups, to more formal research in the Professionals and Managers. These results provided substantive data on how individuals acquire knowledge: the following items were developed to assess the various means by which individuals acquire existing knowledge, to address workplace situations.

Table 1.2 Items measuring the acquisition of knowledge, Study 1.

In my job...

17. I ask others for information
18. I ask others for advice
19. I learn new things while performing my work
20. I acquire new skills
21. I take training
22. I read technical journals or books
23. I consult with others
24. I look things up on the internet
25. I take additional courses on my own initiative
26. I seek new information on my own
27. I acquire new knowledge in the performance of my work
28. I call the supplier/manufacturer when required to solve a problem
29. When I encounter a problem, I do research to find a solution
30. I troubleshoot
31. I call other similar organizations/departments to see how they do certain things/practice
32. I subscribe to various professional publications
33. I subscribe to various internet sources for information relating to my work
34. I learn from the experience of others
35. I learn by observing others
36. I attend conferences to stay current

3) Creating New Knowledge Through Innovation:

The *creation* of new knowledge (or innovating) to solve existing problems differentiated itself from the previous two forms in that it was *not* depicted by all respondents. It was however present in all groups.

In each of the three groups discussed thus far, ideas were generated and/or, implemented to improve the safety standard of patients and/or staff, the delivery of patient care or the efficiency of a department. Unlike the examples of the previous two forms of knowledge use, there was less variation among groups in how respondents indicated they would create knowledge:

Non-Management/Non-Professional group:

“At (one facility) they are always going on about fire issues, (...) but if you’re not familiar with the building, basically you don’t know the layout of it, if there’s a fire, if there’s an alarm, you don’t know which emergency routes to take. So I said why wouldn’t we have a floor plan by the elevators. Just hallways and exits. Pull stations if you want to add a fire extinguisher. That was adapted by the hospital because someone from outside could find their way out of the building if they had to.”

“(...) head injury patients tend to wander. And sometimes they get out of the nurse’s way and slip away. And then they’d come down to me saying Mr. so and so is missing, and we have to find him. Well what does he look like? Have you ever tried to describe someone to somebody accurately? It’s hard to do. So I suggested that when these patients come in, why not take a Polaroid picture of them. Give one to security and one to the parking booth. That way if someone is missing we know what they look like. They thought that was a good idea.”

Professionals group:

“Because he’s so weak, even his neck muscles are weak that they can’t even hold up his head. (...) I asked his wife if she could rent or buy a western movie because he likes western movies. We got a TV in there and I got a chair that you wouldn’t just slump back in, but one that he actually had to work at holding his head up for. And let him watch this western movie and we got him sitting up in this chair. So that was a way of getting him to use his muscles and actually have some stimulation.”

“(...) doing mobile x-rays was a procedure that was very complicated to get the end result. I went to the Manager and said can we do this instead of that, to make things quicker and smoother, print everything and put everything up in one spot. She thought it was a good idea. Staff know where to go when they need to find something. ... the portables are right there now instead of being thrown in with everybody else. ... doctors come in when they want to look for (portable x-rays), there’s sixty out-patient films and they had to look through everything but now all mobiles are in one spot in a red folder.”

Managers group:

“they were getting injured, because when they were closing (organ) donors, obviously after surgery you have to close them, they were using needles and I said ‘why don’t you just use staples because they’re surgical staples.’ So to them that was a brand new idea, they had never conceived of that before that you could just use them. There’s no risk, it’s just little surgical staples. They tried it and we’ve been using them ever since.”

“I had a very tiny lady she kept falling out of bed and hurting herself. She was comfortable on the floor, so (...) we took the bed and put her mattress on the floor. Then the staff all thought I was off my deep end. We spent a lot of time with the staff saying this is why, then we brought the family and told them we were not being cruel, and the son burst out laughing, he said oh my gosh, she won’t hurt herself anymore. He helped the staff work through (because that’s not how they were taught in Nursing school).”

In each of the innovations cited above, the respondents proffered new knowledge to address existing problems *within* their scope of expertise, with positive repercussions throughout their department and in some cases, throughout the organization. In a few isolated cases however, respondents did provide examples of how they created knowledge of a magnitude that extend beyond the scope of their responsibility, and constituted an improvement of a greater scope: it involves the design and implementation of a plan to redirect all patients requiring diagnostic testing in Radiology, in a strategy that would maximize existing equipment and human resources involving several newly merged hospitals:

“I thought there has to be a way to make this better. So I called (other facilities) and I talked to the Managers (about) how they set up their program, how it was working, when the peaks and valleys were for the patients coming, staffing levels, those kinds of things. I liaisoned with (Managers whose areas) would affected...we worked together on a draft of how this would look like. ...(we) presented it to our director. I will admit that when we went to him, he had a few heart palpitations but we showed him our data, we showed him how we thought it would fly and he agreed to a three month trial. ...we sent (our users) letters letting them know that we wanted to trial this, ...we chose to start during the summer, last summer because that’s our quieter time.While this was going on we surveyed the patients while they were coming in to see how they like the system. ... the staff appreciated that they were no longer getting complaints.”

Although the creation of new knowledge was evident across occupations and organizational levels, the broad perspective illustrated in the above example was displayed exclusively by respondents in the Managers group.

These interview results served as the basis for the development of the following items:

Table 1.3 Items measuring the creation of knowledge, Study 1.

In my job...

37. I come up with new ideas
38. I solve problems
39. I create new ways of doing things
40. I make suggestions to improve current practices
41. I innovate
42. I generate new ideas to solve problems
43. I generate new ideas to improve current practices
44. I demonstrate creativity
45. I have a proven track record for my creativity
46. I invent things as I go along
47. I get strange or unusual requests that challenge me
48. My ideas are adopted by my employer
49. I never get feedback on my suggestions
50. Creativity is not fostered by my employer
51. I take old ideas and give them a new twist
52. I solve problems
53. I've come up with some very unorthodox ways of solving problems

4) Packaging Knowledge to Transmit it to Others:

The forms of knowledge use are again differentiated between groups, in that instances of *packaging* of information were non-existent in interview texts of Non Professional/Non-Management respondents, more prevalent in the Professional group, and most notable in the Managers group.

A few Professionals provided clear examples of packaging information for others' use:

"When I cross trained in (another area), there was no procedure manual. (...) So I made up a procedure manual right down to the turn the machine on and turn the machine off so you could go through that step by step and run that room."

"I think one of my more important contributions is being very vocal on these committees and changing the way (things) are taught. But I think that people who are very vocal about saying what's wrong with things are often lightning rods. The perception can be that I'm being negative about things. My intent is to improve things. But in my intent to improve things I'm pointing out things that are bad about the program and I think that

one always runs the risk of being regarded as a trouble maker when you do that. (...) What separates a truly thoughtful criticism from just bitching is an attempt to provide an alternate solution to the problem. And I'm always very careful to phrase things in terms of 'this doesn't seem to work why don't we try something else like this'. Because if you just bitch about things I think you lose credibility. there's a cost to be paid whenever you express an unpopular opinion but that doesn't stop me. I think ultimately it's better to be respected than liked."

In the first example listed above, the packaging of knowledge involved mostly the assembly of existing information. In the second example, the packaging of knowledge was preceded by the creation of knowledge. The combined forms of uses of knowledge are more often found in the management group, as again illustrated in the following:

"One of the really big challenges that we had in the department was because the department is so large. It was very difficult to organize how things were done. Each division sort of ran their own little show. And what we did was we went through an infrastructure review process (...) first of all we had to take it to the Departmental Executive and have it approved. That wasn't an easy thing because you have fifteen division heads and they all come from a very different perspective, (...) and we had to get them to agree to where the direction that we were heading in. And once we had that approved we had to take it to the Hospital Executive who looked at it from a totally different view point and they had to agree to it. And it was approved at all levels."

"we produced a year end report which had never been done for the program that was an analysis of all of our programs (...) and if you have information about your program it should be shared whether it's good or bad. So we did a very complete analysis, our outcomes, our successes, our challenges, communicating who all the key people are (...) It was really very well received and was circulated not only within the QEII but also to all of our -- what I call our care partners."

Respondents in the Managers group also expressed that *how* a message is communicated is often more important than *what* the message implied:

"I think the personalities of the people that I deal with are often the biggest challenges because they all have different personalities and they all have different little quirks. And I think that's the most challenging is to think about a way to approach them that will be beneficial to both, so that it's a win/win. And always to make it a win/win because if someone perceives that they're losing their back just goes right up and nothing gets accomplished."

"I went out into the hallway where the staff waits to get assigned their tasks. And I said guys we're really short. This is what I'm thinking we do. ..., do we want to try this

guys? Yes, let's try it. And just the positive aspects that came out of that weekend were tremendous. People helping each other out and volunteering from other buildings to help out in another building. And the thing is I didn't even think of that. That wasn't in my initial plan."

"I always go back to that in my mind that when you ask people then you go back to them and you respond to their response even if, you know what, I learned this too. It doesn't matter if you don't choose what they asked. They just want to know what you did and why you did it. That's all. They can live with a decision but please tell them how you go there and why you did it. And that's all they want. They want to be heard and know they were heard even if it doesn't come out the way they had hoped."

In summary, examples of packaging of knowledge for others' use appeared to vary across organizational levels and occupational groups: this form of knowledge use was significantly more prevalent in the management group than among the Professional group, and virtually not expressed by respondents in the Non-Management/Non-Professional group's interview texts.

Based on these findings, I developed the items listed below to measure the packaging of knowledge for the purpose of transmitting it to others:

Table 1.4 Items measuring the packaging of knowledge, Study 1.

In my job...

- 54. I train others
- 55. I offer feedback to others
- 56. I give advice to others
- 57. I explain procedures to others
- 58. I give information to others
- 59. I write policies or manuals
- 60. I document our procedures
- 61. I keep track of our work to avoid having to reinvent the wheel
- 62. I gather information from various sources before presenting it to others
- 63. I take knowledge from various sources and package it in new ways

Data Driven Approach

The data presented thus far consisted of participants' interview responses, which had

systematically been examined, coded, and categorized in accordance to pre-determined ‘themes’ or forms of knowledge use, by means of a *theory driven* approach. Following this, I used a *data driven* approach in which interview transcripts were reviewed for themes that were not part of the original coding scheme. Although not reflective of knowledge work *per se* many of these themes established the context in which knowledge work occurs in organizations. For instance, I looked at the organization’s *response* to knowledge use, in an attempt to determine if knowledge use was linked to organizational rewards/recognition, support and/or opportunity.

First, respondents were asked if they felt *rewarded* for their efforts at work. Most perceived rewards to be financial nature, and as such were not expected in the public health care sector. What appears to be valued perhaps as much as financial reward at all organizational levels and across all occupational group, is *recognition*.

Surprisingly, when the concept of organizational reward was broached with respondents in Non-Management/Non-Professional group, only a few respondents offered concrete examples, and these were adverse – describing the absence rather than the presence of rewards. Respondents displayed some bitterness toward the organization as they described how not only were their efforts not rewarded, they were frustrated:

“What happened when the merger took place, all the little jobs I used to do were taken over by different department (...) so I was left basically without a job. After fifteen years of service which was rather unsettling really. I felt I worked hard and had done a good job and I kind of felt I was given the dirty end of the stick as one might say, and then all of a sudden I had no job.”

“I put a lot of hope into when I got my papers and nothing came about. My registration, my national papers, I got them, actually there’s only two of us east of Toronto who’ve got them both. (...) And when I got it I didn’t get (...) a raise for it. I wasn’t recognized for it. Then I got my second one and I still wasn’t recognized or rewarded. And before the union came in, good or bad, we won’t discuss the union, I was the lowest paid in the shop out of all the technicians. And I had both papers and there were guys there with less time that I had.”

The Professionals group seemed to enjoy more recognition, and from various sources. For instance, interview texts of respondents in this group were fraught with examples of having received recognition by patients and their families for their efforts. The following is typical:

“Yes, patients always show their appreciation. Families are always very good. They send us cards. (...) Some people do mention particular names. I’ve also had a couple of difficult incidents at work. And I think your own team members do say listen you worked hard today or you had a hard day or you did well, I’ve gotten that recognition from people and in turn I say that to other people as well.”

Another source of positive reward for this group was offered by in-house customers (such as another department) in the form of future work, born of the satisfaction with previous work:

“The customer likes what they got. They thanked us very much for it and generally if there’s another project they’ll probably send it our way (...) The reward and recognition will come in the future in the form of other projects and general knowledge that certain techs in the department can perform these particular skills.”

Reward was also valued in the form of opportunity for continued learning and networking within one’s field:

“there is no financial reimbursement for being a star or for working your butt off. There really isn’t. In this day of cutbacks, they’d send me to the important conferences, and also I’m being asked to speak at important conferences, I’m being asked to sit on national committees and that’s more where my reward comes from.”

Undoubtedly the most commonly expressed source of recognition most often cited as being valued by Professionals respondent group, was the peer group:

“I think actually the people that I work with know I do it. Sometimes they don’t say a whole lot but if I’m away, if I’m on vacation and I come back the first thing they’ll say is ‘Oh my gosh this place went to pot while you were gone’. Well obviously that’s a little bit of recognition because they’re saying it does run smoother when you’re here.”

“The fact that they do tell me that they really are glad that I’m their educator and how comfortable they feel with me and they say we knew you’d know what to do. That sort of thing, it makes you feel good, it makes you realize that you are valued.”

Recognition from superiors however is often not anticipated by respondents, as evidenced in the following:

“Very rarely by management and I think that form takes an overall general recognition. Nothing personal. The peers, I guess more, that’s hard to say. Yes you do get recognized by them but I guess we don’t do it enough. (...) I find you get more satisfaction and recognition from families than anybody else.”

In fact, in the next example, lack of recognition by a supervisor was not only expected but excused:

“Well my peers tell me that I’m great all the time. It’s a great spot to work really nice to work there. They encourage you and they appreciate you and they let you know that. With the (patients) they say thank you are very appreciative of my treatment of them. (...) Not by my superior but that’s okay. He doesn’t recognize too much. But he’s a busy guy.”

Not all recognition is positive. A few respondents indicated that sometimes an absence of recognition is preferred, as in the following example where negative recognition was proffered by a supervisor to an subordinate who challenged the status quo:

“I was sort of putting my hand up to say well hey why? And she said this is it, this is how it’s done. It’s been done like this for fifteen years. Not only was I not recognized, I was not rewarded. I think she actually got on the defense about it.”

In at least two instances, recognition was not only withheld by a supervisor, but misappropriated. Though few in frequency, these instances have far reaching and lasting effects:

“there is very little recognition at this hospital for a lot of the work that’s being done. (several years ago) I remember walking out of the opening ceremonies (for our launch) because it was the big wigs that were there all congratulating each other on a wonderful job and I just walked out. They never even mentioned us.”

“...then the newsletter went around and I saw she took credit for my idea! I couldn’t believe it.”

Conversely however, there were respondents who had been recognized by their superiors, and this recognition effectively buoyed or sustained these respondents’ enthusiasm at work:

“the director, she’s very supportive of my team. She just retired but she was great. If we did something right during Y2K she wrote up something and sent it to HR for our personal file and there was recognition coming from her. “

“Yes, I get lots of pats on the back (...) certainly from my boss, she’s very good about that, very good about that I must say. And it keeps me going. And I would say pats on the back are every bit as important as anything else.”

”I do remember one where it was kind of a patient that we don’t usually have in our unit, and it was a very sad sad situation. ...it was a tough day and the day went well and my boss actually wrote me a letter, so that was very nice. “

Though recognition of achievements are typically expected from a ‘top-down’ perspective, it is evident by the following that Managers valued recognition they received from subordinates as well:

“Yes, I think by the staff. Some days you feel you’re not but other days they’ll do something like a flower on my desk or bring me a coffee when your just not expecting it. Or a thank you or we have to staff the area but we can be a little bit flexible when people have families, if you can change a day for them then they’re willing to do something for you down the road. It’s a two way street. You get what you (sow).”

Recognition as a means of organizational communication, be it between peers, or between subordinates and superiors (two-way), appears to be valued by all groups, regardless of occupational groups or organizational levels. However, recognition was noted by members of the Professional group to a much larger extent than even the other two groups combined, and most (but not all) of the expressions of recognition they related during their interview were peer to peer. In the Managers group, though instances of recognition were less frequently conveyed, they were nonetheless highly valued, often for several years after the fact.

“One of the difficulties working in the public sector is there are no financial rewards so that’s difficult to cope with. But certainly I do get praise from my superiors and my staff, which is much more important I think. (...) I have to say our CEO is excellent. I’m down on the totem pole, ... But it’s not unusual for me to get an e-mail from the CEO saying well done, I heard about this. Very rewarding, that’s very rewarding. I remember at another job I had, and people don’t realize how important that is, on my 10 year anniversary, I got a little hand written note from the CEO just saying thank you for all of your hard work and I

had that note on my refrigerator for five years. Little things like that make a lot of difference.”

“I can’t remember what the problem was. All I remember is my boss saying that’s an excellent idea (...), and he doesn’t ever say that. But I can’t remember what it was because that was like years ago.”

Based on these testimonials, I developed the following list of items to determine if the use of knowledge as a discretionary investment is linked to organizational support in the form of reward and/or recognition:

Table 1.5 Items measuring organizational support, Study 1.

In my job...

1. My peers often tell me they like my work
2. I am not recognized for my efforts
3. I am not rewarded for my efforts
4. There is no such thing as recognition for good work
5. There are no rewards for doing good work.
6. My employer does not show appreciation for my contribution
7. I receive praise from my boss
8. My employer takes the credit for my work
9. My contributions are recognized by my peers.
10. My contributions are recognized by my employer
11. My contributions are rewarded.

Reward was also valued in the form of opportunity for continued learning and networking within one’s field:

“there is no financial reimbursement for being a star or for working your butt off. There really isn’t. In this day of cutbacks, they’d send me to the important conferences, and also I’m being asked to speak at important conferences, I’m being asked to sit on national committees and that’s more where my reward comes from.”

Given that knowledge use was defined as a discretionary behaviour, I questioned respondents on if and how they demonstrated initiative in the workplace. I was particularly interested in having them discuss whether or not they chose to ‘go the extra mile’ and invest efforts that exceeded the scope of their responsibilities, to assist the organization in the pursuit of

its goals. In all groups, examples of initiative by respondents were evident. Similarly to the examples of acquisition of knowledge mentioned earlier, the extent to which respondents would invest of themselves varied. For some respondents in the Non-Management/Non-Professional group, showing up for work a few minutes early in the morning constituted initiative. However, others in this group demonstrated creativity and hard work in a manner that exceeded their responsibilities:

“Probably by starting early every day. ... Usually I come in twenty minutes to a half an hour before my scheduled time because I feel like if I don’t have that extra time to get everything organized that I’ll be behind for the rest of the day.”

“Had an early twenty’s fellow, he had a brain aneurysm, a stroke type thing, and he walked in, and he wasn’t happy with having to wear a brace. And everything he wore from top to bottom was (a popular brand name). So when I did the leather work on the finishing (of his brace) which is the band around the back, I actually took the leather and cut (the logo) out, put the white leather behind it on the black and then wrapped band. So he actually had a (brand name logo) on the back of his brace. He was happy, his mother thought that was cool. I just took it upon myself, nobody knew anything about it. “

Recognition also appeared to foster affective commitment to the organization (Harrigan & Dalmia, 1991; Kelloway & Barling, 2000; Meyer, Allen & Topolnysky, 1998; Organ & Paine, 1999; Ulrich, 1998). Respondents in the Professional group demonstrated their affective commitment by providing numerous examples of instances in which they exceeded expectations inherent to their positions. Concern for the patient seemed to underline their responses:

“As a staff nurse typically your role is to look after the patient and in this particular Emergency Department, the staff nurse has a lot of leeway in what he or she can and cannot do. There are many things we do, like if we have, a patient arrives complaining of chest pain, and if our inclination is that that pain is cardiac, then I would proceed and to an electrocardiogram and blood work and things that I think that this patient needs. There are many institutions where that is not allowed...whereas in this institution and other major institutions, we do blood work, we do EKG’s, we do chest x-rays if we think they’re warranted.”

“the night of the Swiss Air disaster when the plane went down and all of those people were killed. (...) I was home watching TV, saw this on the news and called the Charge Nurse and told her, I’m available, do you want me to come in and she said yes. We

organized extra staff coming in, physicians and all kinds of emergency equipment ready for whatever came through the door. Do the best that we could. There are disaster teams, disaster protocol but it's probably something that's in a binder on a shelf full of dust because it's not something that we see all of the time."

The Professional respondents also provided substantive evidence of Intrinsic Motivation.

The Professional group consists mostly of individuals who are directly involved in providing patient care. Many respondents expressed an altruistic satisfaction with their work:

"I feel a bit of a worker ant and do my job and go home and that's probably part of the reason why I have a hard time thinking of any real outstanding specific achievements beside the day to day helping people. Which is I guess an achievement."

"(in the event of an emergency) we have a couple of family rooms we utilize (...) it was two in the morning and (I) arranged, the cafeteria closes at one o'clock, arranged to have food for (the families involved). A cup of tea, coffee or whatever, sandwich..."

"I think it's when I've had an impact on a place or with a group of people that I find it rewarding."

"I'd like to think I do over and above as a matter of course. That's just me actually. Instead of just going in and doing the routine things, I like to talk to people. I like to take the time, I like to get to know them. And I let them get to know me as well. ...That kind of makes them feel comfortable, they see you as a person and I like to think I give a little extra all the time."

"It's a great job so every day is satisfying and successful I think. Basically ... I feel I'm successful if I make a patient feel comfortable and feel good about how they're doing on a test. It's very satisfying. And like I said I feel successful if the patient goes away feeling good and is happy with the session."

"He was my first quadriplegic, 15 years old...he dove into a shallow pool and ... he couldn't do a thing, maybe a little flicker for the first couple of weeks and after five weeks of working an hour and a half a day on him, and there were people I was working with who were saying 'you're spending too much time on him'. But I just I had to. He's fifteen, he has his whole life ahead of him, I couldn't not, you know. And by the end we were working on standing and he was able to kick his legs up in the air, lift his arms up in the air and then he went on to the rehab and he walked out of there with a walker or a cane on his own. ...so he's just a little glimmer in my eye. I do feel proud for that. He was my first quadriplegic I ever worked with and it was such a brilliant recovery. Warms my heart."

Organizational support was often deemed by the Managers group as being weak, at least with regard to the issue of time. Almost every respondent expressed the need to work long hours, often into the evenings and weekends in order to accomplish their tasks. The preoccupation with time – or lack of it was evident throughout their testimony. Many Managers expressed frustration at feeling that they are never able to go home “feeling that everything that could be done, had been done”, but most seemed to accept it as a ‘necessary evil’ associated with holding management responsibilities in today’s health care industry. The weightiness of responsibilities, the perceived need for continuous learning, and the time constraints within which Managers felt they had to ‘do it all’ was prevalent throughout this group’s interview texts.

The following example illustrates a concern expressed by many respondents of this group:

“...given that I was working twelve-hour days five days a week, plus taking these courses, studying three or four hours a night, writing papers, trying to do my old job, my new job and my studying and being a super mom, I wasn’t letting anything go. ...I never classified myself as a workaholic but maybe I turned into one. I was determined that I wasn’t going to let this beat me. So I had to look at what I was doing, what I could stop doing, what I could delegate, what I needed to let go of and focus on what needed to be done.”

Yet in spite of this expressed ‘lack of time’, one theme that emanated from the Managers group exclusively revolved around organizational opportunity: providing subordinates with opportunities to grow professionally was perceived by several management-respondents as being an important component of their role. In some examples altruism, as above, seems to underlie respondents’ motivations to facilitate these opportunities. Motivations also appeared to lean toward the fostering of departmental and organizational development:

“I see my role as a Manager, is to give opportunities to my staff... to learn, to take on responsibilities, and its amazing that when you give responsibilities to people you see their skills evolve and that’s one of the big rewards for me, you see their skills evolve and you learn from that.”

“I’d also help out with their development plan for the next year trying to facilitate any educational things that might need to happen.”

“...that unit that I have been for fourteen years, the attrition rate is very, very low. Very low turnover and if there is a turnover of staff, they’re usually going to critical care units or they have started taking a degree and they are moving on to their education opportunities within the institution or I’ve had one person go off to be an Expanded Role Nurse and another person has just gone off and is now a Nurse Manager. So I feel those are very much a success from the mentorship point of view that I have been able to work with them and develop them to the point that they can go on in their careers.”

“(to do this job) you have to be somebody who can develop relationships and trust people to do their job and give people enough leeway to enjoy their jobs too.... Somebody who ... able to listen as opposed to dictating the answers.... and hopefully we’ll get to the right solutions. Even though you know what the right solutions are at the beginning but get people to accept the buy in. Make them part of the process and hopefully at the end of the day they say this is okay.”

One organizational level / occupational group (Nurse Managers) in particular displayed cohesion, be it for the purpose of exchanging information, networking and/or in the provision of organizational / occupational support. Interestingly, this group can be defined as ‘straddling’ both the Professional and Manager groups as I have defined them.

“How and when it starts with a question. Has anybody done, seen, tried, whatever? And then you get the feed back. But the Managers in this building, we’ve really started to work together to ask why. Why are we doing this? And the worst answer we could ever get is it’s always been done this way. Then we really question because it can’t always stay the same and we’ve agreed to that. We challenge each other.”

Though not unique to the above group, gatherings among peers -- or affinity groups were deemed by most respondents as a valued (and popular) means to get information and support:

“...sitting around having coffee listening to others and we talk shop. And with talking shop you pass information, and we also gossip.”

“being able to communicate my ideas and observations with my fellow techs is also very important. (...) if I have a problem that I can’t solve, I call in a coworker to help me out. And usually another set of eyes or two is better than...it helps a lot and as we discuss the problem that’s when I gain insight into their experience with it and with problems in the past. (...) I also subscribe to various internet resources, one of which is a mailing list of biomed techs around the world and we share our troubleshooting problems and solutions.

In there we discuss problems that we have with equipment and their solution, we discuss new products that are on the market, we discuss problems that equipment have when they interfere with each other and we just discuss general stuff.”

“Sitting down having a coffee and discussing a difficult case And how they got to the end result, saying ‘oh, that’s a neat way of doing that, I never thought of doing it that way’.”

“I learn from (my coworkers) daily because there’s other educators in my group who have actually more experience as an educator than I do. And a lot of times just listening and watching how they do something it’s quite common that if I’m not comfortable doing something, re: teaching a particular topic, maybe it’s something that’s new to me, I will actually get one or two of them to come and listen to me present it and they’ll give me their comments and we tend to quite up front with one another. You’re overheads are not very good or you have too much on the page. Don’t bother with that, it’s too much detail. They’ll tell you some positive things too so we learn a lot from each other.”

Affinity groups were also perceived my Managers as a useful way of cultivating teamwork and collaboration among their subordinates:

“I think I’ve really brought the group together and one of the things I’ve done is give people their own lead. We have a big staff but I’ve identified leads....They all are multitasking but I brought them together as a team, where they work together as a team but they recognize each has expertise and can turn to them for that expertise. So I would have to say that focusing people on a collaborative team approach (was a success).”

“Probably the most positive aspect of my whole thing is that we are a team. There aren’t a lot of teams in (this division). There’s a lot of ‘this is my work’ or ‘she’s my supervisor’ or ‘she’s my director’ but my people we are a team and we are all specialists in certain areas.”

“Getting groups together (after a merger), some of them knew each other anyway as a Professional group, they had partied together. But to set up rotations, to have them rotate between the sites working together close on, you’re always going to get personality differences and just try to work through them. We’ve kind of initiated this year a work life program. It’s just getting off and getting people to look at, you know perhaps there are things that you have to take responsibility for to make your work life better. You can’t just dump. And I think that might work instead of them saying I have a problem here fix it. Getting them to work through it. Through our staff meetings, through talking through issues, getting two sides and not attacking personalities.”

As a complement to the items measuring the acquisition and the creation of knowledge, the following items were developed to assess if/how organizational environments encourage the investment or exchange of knowledge:

Table 1.6 Items measuring organizational opportunity, Study 1.

In my job...

1. I learn from my coworkers
2. My coworkers learn from me
3. I meet informally with my coworkers and we chat about our work
4. We hold staff meetings to exchange work-related information.
5. I exchange work-related information with my coworkers
6. I rely on my coworkers for work-related advice
7. When I encounter a problem, I ask a coworker for assistance
8. We talk shop at coffee or on break
9. Sitting around having coffee with my coworkers is a good way to learn
10. Being able to exchange information with my coworkers is important
11. Teams offer the opportunity to learn from each other's experience
12. I've developed a good network of people I can rely on
13. I work as part of a team
14. I consider myself a team-player
15. I have the opportunity to demonstrate initiative
16. I have the opportunity to offer suggestions to improve current practices
17. I have the opportunity to demonstrate my resourcefulness
18. I am expected to do as I am told
19. I am encouraged to ask questions
20. I am encouraged to contribute my ideas.
21. My employer provides me with opportunities for continuous learning
22. I have the opportunity to work on interesting new projects
23. I have the opportunity to acquire new skills through training
24. I have the opportunity to learn from my peers
25. My employer provides me with all the information I need to stay current
26. People here are not receptive to new ideas
27. People here do not accept change
28. I am not expected to contribute my ideas
29. I am encouraged to think of new ways to solve problems
30. I am encouraged to be creative.

The outcome of learning was perceived by some respondents to be beneficial, even cathartic in that it changed (even improved) their (and others') managerial skills:

"my director originally was a very authoritarian style Manager and that as he took more courses he kind of changed his style."

"Yes .. I don't know whether it's made me calmer. Calmer is not the right word for it. Enlightened, rather than think oh my gosh what do I do next, it's just like okay you have to make yourself stop and then you just do. It's like you go on automatic pilot."

Summary

A variety of themes were extracted as a result of the data and theory driven approaches described above. Of course, not every theme appeared with the same frequency. The frequency of responses in the different categories of knowledge use are listed in Table 1.7.

Table 1.7
Frequency of response

Type of knowledge use	Managers	Professionals	Other
Apply	10	9	6
Acquisition			
Ask someone	10	9	6
Call manufacturer	1	0	2
Surf the web	7	6	1
Benchmark	3	2	0
Procedure manual	5	8	4
Affinity groups	7	5	1
Creating knowledge (innovation)			
Within scope of expertise	9	6	4
Beyond scope of expertise	2	2	0
Packaging knowledge			
Existing information	5	8	0
Creation of information	1	0	0
Organizational support			
Recognition from superiors	8	8	2
Recognition from peers	4	6	3
Recognition from subordinates	5	0	0
Recognition from clients	3	6	4
Rewards			
- continuous learning opp	2	0	1
- networking opportunities	1	1	0
Absence of rewards	1	0	2
Time concerns	4	1	1
Continuous learning			
Organizational support	5	4	0
Organizational opportunity	7	4	0
Unpredictable workload	0	1	0
Pursue training on own	6	2	2

Managers N = 10; Professionals N = 9; Other N= 6

Discussion

The current study was undertaken to achieve two goals related to the development of a measure of knowledge work. First, qualitative interviews were conducted to develop an understanding of individuals' use of knowledge in the workplace. Second, items derived from these interview texts were developed.

Results support my hypothesis that knowledge use is present in at least one of its four forms. First, all participants discussed some aspects of knowledge application. Second, the acquisition of knowledge was also demonstrated in each of the occupational groups and organizational levels, but with variations in the sources used and the extent to which respondents would pursue the acquisition of knowledge. Third, the creation of knowledge or innovation seemed more variable across groups and may in effect be the form of knowledge use that is most discretionary. The creation of knowledge was most evident among professionals, who have more direct patient contact than did the respondents in other groups. Professionals' expressed creativity may be a result of seeking, and not finding existing means to address their patients' unique needs in a sector facing unprecedented resource constraints. Finally, examples of packaging knowledge for the purpose of transmitting it to others were almost exclusively expressed by respondents in the Managers group.

The ability to contribute is contingent on the possession of 'up to the minute' knowledge that the organization needs. But organizational climates that ensure knowledge workers have the opportunity to contribute (through affinity groups or peer mentoring programs), and/or support (by recognizing and/or rewarding) the contribution of knowledge, are also vital. To examine if and how organizational climates are linked to discretionary contributions of intellectual capital, I

used a data driven approach to determine if respondents' interview texts linked knowledge use with organizational support and/or opportunity.

Above all, respondents across all occupational groups and organizational levels valued reward and recognition for their contribution. Rewards in the form of opportunities to learn, and to do challenging work were highly prized, and appeared to sustain the contribution of knowledge workers. Opportunities to exchange information with peers were also deemed positive rewards, as an opportunity for both professional and organizational development. Similarly, recognition for a 'job well done' from peers, supervisors or clients was appreciated. Alternatively, negative recognition had notable adverse, and long lasting effects on the contribution of knowledge.

Organizational climates that offer support such as reward and/or recognition, and opportunities to learn and disseminate knowledge appear closely linked with affective commitment: Professionals for instance, enjoyed more reward and recognition from more varied sources than other respondents, and more often expressed altruistic satisfaction with their work, and Managers, who as a group expressed more concern around the issue of time (rather lack of it), consistently demonstrated initiative, routinely exceeding expectations of their position. Interestingly, in spite of their expressed concern for lack of time, the response rate for prospective participants in the stratified sample was highest among Managers (100%).

Of course, these interpretations are based on a relatively small group of respondents from one organization. In assessing the resultant measure of knowledge use, the data from Study 2 provides a more rigorous examination of these suggestions.

Study 2: Scale Development

The primary rationale for Study 1 was to explore the use of knowledge in the workplace

by: (1) reviewing the existing literature to offer a definition of knowledge work, and (2) examining if and how organizational members contribute their knowledge in the workplace by conducting a qualitative exploration of the use of knowledge in the workplace. The anecdotal testimonies collected through semi-structured interviews were systematically examined, coded, and categorized using a theory driven approach to analyze participants' responses in accordance with predetermined categories, such as whether they find, create, apply and/or package knowledge use in the performance of their work. Following this, a data driven approach unveiled categories of knowledge use that did not fit into the original coding scheme. From these analyses of the data, I developed items to measure each of the 'themes' or categories of knowledge uses illustrated in the interview texts.

The purpose of Study 2 is to establish the psychometric properties of the resultant measure of knowledge use in the workplace. The analysis proceeds in two phases. First, I established the factorial structure and internal consistency of the instrument. If the items developed in Study 1 represent internally consistent constructs then some support is gained for the measure of knowledge use. Second, I establish the concurrent validity of the instrument through two strategies; correlations with hypothesized correlates of knowledge use and examinations of known group differences.

Correlates of Knowledge Use

I examined several constructs that are believed to be reasonable correlates of knowledge use; affective *commitment* to the organization (Harrigan & Dalmia, 1991; Kelloway & Barling, 2000; Meyer, Allen & Topolnytsky, 1998; Organ & Paine, 1999; Ulrich, 1998), *organizational citizenship behaviors* (Organ & Paine, 1999); *reward / recognition* (Agarwal, 1998; Harrigan & Dalmia, 1991; Zidle, 1998) and opportunities for knowledge sharing such as through *affinity*

groups (Davenport, Jarvenpaa, & Beers, 1996; Harrigan & Dalmia, 1991; Nonaka, 1991; Ulrich, 1998, and Van Aken, Monetta & Sink, 1996), as well as opportunities for *continuous learning* (Dove, 1998; Drucker, 1998, and Katzell & Thompson, 1990).

Affective Commitment.

Meyer (1997) defined affective commitment to the organization as an emotional attachment or a psychological bond between individuals and an organization. This emotional attachment implies a 'psychological bond' that ties individuals to an organization. On that basis, committed individuals are more likely to continue membership with an organization than are employees who are not committed. But the relationship between commitment and employment continuance is complex. Much of the research on commitment is based on an assumption of reciprocity, where employees will remain with an organization on the condition that the organization provides them with desirable returns (Meyer, 1997). According to Meyer & Allen (1991), the nature of commitment may vary: employees may remain because they want to (affective), because they feel obliged to do so (continuance), or feel they have no other option for financial sustenance (normative). Commitment may also take many forms based on the constituency (Cohen, 1993) toward which the commitment is directed. That is, employees may be more committed to their work team (Cohen, 1993) or organizational leaders (Bass, 1985, and Yukl & Van Fleet, 1992), or to their own careers (Bird, 1994; Ulrich, 1998, and Zidle, 1998).

Kelloway & Barling (2000) believe that employees who want to remain with an organization are likely to exhibit positive attitudes toward that organization and be motivated to "help" that organization, by way of enhanced performance. There is a substantive body of research linking commitment to performance (e.g. Cropanzano, Jamer, & Konovsky, 1993). However Meyer (1997) presented meta-analytic results which differentiated between 'in-role'

performance (where organizational expectations for individual performance are based on the job description), and 'extra-role' (Katz, 1964) performance (which fall outside of defined roles, for example, a nurse staying on after her shift to provide support to a patient's family).

Following Kelloway and Barling (2000) I have defined knowledge use in organizations as discretionary behaviour – falling into the domain of extra-role performance. Affective commitment to the organization is thought to be correlated with the performance of extra-role behaviours (Meyer, 1997; Organ, 1988), leading to my first hypothesis.

H₁: Affective commitment will be positively correlated with the measures of knowledge application, knowledge acquisition, knowledge creation, and knowledge packaging,

Organizational Citizenship Behaviours

Organ & Paine (1999) believed that organizational citizenship behaviours are key to understanding how and why people contribute to organizations, especially when this contribution goes beyond what is expected of employees, as dictated by their job descriptions. Ulrich (1998) incorporated OCB in his description of knowledge workers: "employees with the most intellectual capital have essentially become volunteers" not in the sense that they work for no pay, but that they have options (p.16). That is, their intellectual capital provides them with alternatives as to where they choose work and how/whether they choose to use their intellectual capital in the workplace (Kelloway & Barling, 2000).

Unlike manual workers in manufacturing, knowledge workers own the means of production: their knowledge allows them mobility (Drucker, 1998). This ability to choose entails that they work for a particular firm essentially because they have an emotional bond to that firm (Ulrich, 1998). Harrigan & Dalmia (1991) concur, stating that knowledge workers

cannot be coerced into sharing their knowledge, that employees must *bond* with their employers to volunteer their knowledge.

Despite the conceptual links between knowledge use and organizational behavior (e.g., both represent discretionary extra-role behaviors), I suggest that knowledge use is separate from OCBs as typically defined. Specifically, knowledge use represents a very specific form of discretionary behavior that may not be directed at “helping” individuals or the organization. In contrast, organizational citizenship behaviors are specifically directed at helping other individuals or the organization.

H₂: Organizational citizenship behaviour will be positively correlated with the measures of knowledge application, knowledge acquisition, knowledge creation, and knowledge packaging,

Reward/Recognition.

Agarwal (1998) purported that in order to incite individuals to join, remain and remain committed to an organization, Managers must redesign reward systems to new realities based on (1) expectancy theory; (2) equity theory, and (3) need theory. Not only can expectations, perceptions of equity and need vary from individual to individual, but rewards can be extrinsic (i.e., salary & benefits, recognition from above) or intrinsic (i.e., sense of achievement from job performance, opportunities for growth and challenge).

Zidle (1998) also recommended that Managers recognize excellence regularly, rather than waiting to do so during an annual performance appraisal process. She advises managers to ask their employees how they are doing, what is going well and what is not: this not only makes employees feel valued but managers are then better equipped to match their employees with internal opportunities, resulting in a more satisfied, productive and committed workforce.

Today's workers may value and be motivated by peer recognition – according to Zidle (1998) almost as much as good pay. Similarly, Harrigan and Dalmia (1991) state that employees today seek rewards that reflect their need for personal recognition and skills growth, access and/or membership to renowned talented teams, and a broader sense of responsibility toward their work that breeds a sense of ownership: “They are eager to run that extra mile to deliver the goods” (p. 48).

Ulrich (1998) and Katzell and Thompson (1990) proposed that fostering an organizational climate that supports the celebration of goals can effectively energize a workforce. As a means of organizational appeal, an organizational culture that recognizes achievement often gives rise to positive ‘talk on the street’ as a desirable place to work.

Kelloway & Barling (1999) link organizational culture to employees’ discretionary investment of knowledge use. They suggest that an organizational culture can “encourage or prohibit” knowledge use, based on whether it increases employees’ ability, motivations and opportunity to use their knowledge at work (p.16).

H₃: Perceived support for knowledge use will be positively correlated with measures of knowledge application, knowledge acquisition, knowledge creation, and knowledge packaging.

Continuous Learning.

There has likely never been a greater need for the emergence of a learning (or thinking) culture in organizations: the increasing rapidity of change, with the growing demands on employees to perform at higher levels with diminishing resources, demands that business be conducted differently. Managers must be more concerned with the systems that may facilitate learning within the organization than with the individual characteristics of the worker.

Scarborough (1999) stated that it is evident that conventional management practices are severely challenged by knowledge work. The management of knowledge work must now be more concerned with the systems that may facilitate *learning* within the organization than with the individual characteristics of the knowledge worker. Continuous learning is not only crucial to elicit employees' commitment and keep them motivated, it is also crucial to an organization's competitive advantage (Dove, 1998; Drucker, 1998; Kelloway & Barling, 2000; Nonaka, 1991; Scarborough, 1999, and Zidle, 1998).

Today's knowledge workers are looking for more than money: traditional hooks (such as job security and a pension plan) do not generate the attitudinal commitment necessary for high performance. They are likely to stay with a particular company as long as they are provided with opportunities to continue to grow intellectually, and to be challenged with interesting projects (Zidle, 1998). Ulrich (1998) suggests that if the work is boring, employee motivation will wane. He recommends fostering an organizational climate that supports collaboration and teamwork, formal and informal mentoring relationships, and the celebration of goals (as did Katzell and Thompson, 1990), believing that these celebrations energize a workforce.

Zidle (1998) added that "a manager who encourages his people to upgrade their skills, acquire new or updated knowledge, enrich their current jobs and pursue their individualized career goals, will more likely get and keep highly skilled and quality people" (p. 18). For instance, organizations can effectively redirect their employees' commitment by enhancing their employability: by offering learning and development opportunities to their employees, employers can foster employees' commitment while enhancing their contribution to the organization. Meyer et al. (1998) refer to this as a rewrite of the psychological contract.

Continued learning is a collaborative effort, and a collective reward. Managers must also ensure that opportunities for lateral moves, job rotation, secondment to special projects not be overlooked as they too provide opportunities for skills enhancement (Gould & Levin, 1998). Employees want to know what is happening, and why and how it affects their jobs/careers. “Almost every employee attitude survey about communication suggests that there is not enough information sharing. (...) If employees understand why a company is doing something, they will more readily accept it” (Ulrich, 1998, p. 24), and by extension, to contribute to its goals.

H₄: Perceived opportunities for continuous learning will be positively correlated with measures of knowledge application, knowledge acquisition, knowledge creation, and knowledge packaging,

Affinity Groups.

Effective information sharing requires the forging of internal company alliances between knowledge workers: these alliances, or *affinity groups* (Davenport, Jarvenpaa, & Beers, 1996; Harrigan & Dalmia, 1991; Nonaka, 1991; Ulrich, 1998, and Van Aken, Monetta & Sink, 1996) consist of groups of peers that meet on a regular basis to share information, solve problems, discuss educational and developmental needs and discuss opportunities that would benefit the group and the organization as a whole. Affinity groups and other such employee-involvement initiatives have had a positive influence on organizational cultures, by engaging in systematic and coordinated strategic planning process, and achieve competitive advantage (Van Aken, Monetta & Sink., 1996). Good information flow can be highly beneficial, but substandard information flow (such as ‘too little, too late’ to be useful) can be disastrous. Rummler and Brache (1995) believed that effective communication has greater potential for creating competence than virtually any other management practice, because timely, relevant and clear

information are necessary to support superior performance. The alternative (shoddy information flow) aggressively promotes incompetence.

H₅: Measures of knowledge acquisition through peer affiliation will be positively correlated with measures of organizational opportunity.

Known Groups Validity

The exploratory qualitative analysis presented in Study 1 resulted in the suggestion that while some forms of knowledge use (i.e., application of knowledge) are found in all occupational levels, other forms (e.g., knowledge packaging) are found in only some levels. For example, in the qualitative analyses only managers reported engaging in knowledge packaging.

These analyses also suggest that though some forms of knowledge use are evident in all respondents' testimony (e.g., the application of knowledge), other forms of knowledge use (e.g., the creation of knowledge) were not expressed by all respondents. The creation of knowledge was however found in all occupational groups, most prevalently among the Managers' group than in other occupational groups.

H₆: Managers will report higher levels of creating knowledge than will other occupational groups.

Results of the exploratory qualitative analysis suggest that respondents in the Professional group would go to greater lengths to pursue existing knowledge through consultation with others than did respondents in the Non-Management/Non-Professional group. However, results also suggest that Managers demonstrate more initiative in pursuing knowledge than other occupational groups.

H₇: Professionals will report higher levels of acquiring knowledge through consultation will other occupational groups.

H₈: Managers will report higher levels of acquiring knowledge through initiative than will other occupational groups.

Respondents' testimonies also show that one form of knowledge use was differentially prevalent across occupational group. That is, reports of packaging knowledge were most prevalent among Managers, to a lesser extent by Professionals, and virtually not expressed by respondents in the Non-Management/Non-Professional group.

H₉: Managers will report higher levels of packaging knowledge than will Professionals.

H₁₀: Professionals will report higher levels of packaging knowledge than will Non-Managers / Non-Professionals.

Summary: The Current Study

The current study focused on establishing the psychometric properties of the knowledge use measure developed in study 1. After establishing the factorial structure and internal consistency of the scales, I examined the validity of each measure. In doing so the following hypotheses were tested:

H₁: Affective commitment will be positively correlated with the measures of knowledge application, knowledge acquisition, knowledge creation, and knowledge packaging,

H₂: Organizational citizenship behaviour will be positively correlated, but non-redundant with the measures of knowledge application, knowledge acquisition, knowledge creation, and knowledge packaging,

- H₃: Perceived support for knowledge use will be positively correlated with measures of knowledge application, knowledge acquisition, knowledge creation, knowledge packaging.
- H₄: Opportunities for continuous learning will be positively correlated with measures of knowledge application, knowledge acquisition, knowledge creation, and knowledge packaging,
- H₅: Measures of knowledge acquisition through peer affiliation will be positively correlated with measures of organizational opportunity.
- H₆: Managers will report higher levels of creating knowledge than will other occupational groups.
- H₇: Professionals will report higher levels of acquiring knowledge through consultation will other occupational groups.
- H₈: Managers will report higher levels of acquiring knowledge through initiative than will other occupational groups.
- H₉: Managers will report higher levels of packaging knowledge than will Professionals.
- H₁₀: Professionals will report higher levels of packaging knowledge than will Non-Managers / Non-Professionals.

Method

Participants

Two hundred and eight individuals (N=208) responded to a survey on use of knowledge in the workplace. Participants were full time, part time and temporary employees of various

organizations, working in varying occupational groups and organizational levels. A list of all occupations represented in the sample is presented in Appendix N.

The sample consisted of 88 males, and 117 females (3 missing values on gender). Participants' ages ranged from 19 to 65, with the average age being 40.4 years (SD = 9.40). On average, participants had 14.69 years of education (SD = 1.90), and had held their current position for 3.00 years (SD = 1.35). 82% of respondents were employed on a full time/permanent basis; 8.8% were employed on a full time/temporary basis, 6.8% held part time/permanent employment, and 2.4% held part time/temporary contracts.

Measures

To measure the use of knowledge in an organization, I developed an instrument consisting of six scales. All items on these scales were rated on a five-point scale from 1 ('Not at all') to 5 ('All of the Time'). The first four scales were developed to measure each of the following four forms of knowledge use: 1) the application of knowledge, using a 16-item scale (see Appendix J); 2) the acquisition of knowledge, using a 20-item scale (see Appendix K); 3) the creation of knowledge, using a 16-item scale (see Appendix L), and 4) the packaging of knowledge, using a 10-item scale (see Appendix M). Scores on each of the four knowledge use scales ranged from 1 to 5, with high scores representing frequent use of knowledge in the workplace.

To establish the concurrent validity of the four scales, two scales were developed to measure hypothesized correlates of knowledge use: 1) an 11-item scale measuring organizational support, and 2) a 30 item scale to measure organizational opportunity. Scores ranged from 1 to 5 with high scores on the first scale indicating perceived support (in the form of reward and/or

recognition) for contributing knowledge at work, and high scores on the second scale representing perceived organizational opportunity for learning and sharing knowledge.

Participants were also asked to complete two additional scales (Affective Commitment and Organizational Citizenship Behaviour) to establish concurrent validity of the knowledge use, organizational support and organizational opportunity scales. Affective commitment was measured by the Allen and Meyer (1990) scale (see Appendix H); it had acceptable internal consistency ($\alpha = .85$). Organizational citizenship was measured by a 16-item scale developed by Smith, Organ and Near (1983) (see Appendix I). Internal consistency for this scale on the current sample met the conventional cut off for reliability ($\alpha = .70$).

Each of the occupations represented in the sample was coded into one of three categories (Professional, Manager, Non-Professional/Non-Manager). The coding was performed by two independent raters. Of the 117 occupations assigned to categories, the raters agreed on 104 (89%). The 13 discrepancies (raters used somewhat different educational referents for the Professional group) were resolved through discussion. The resulting coding scheme is presented in Appendix N.

Procedure

A total of 620 survey packages were distributed through two primary methods: 1) 170 employees of a major television network in Atlantic Canada received a copy of the cover letter, questionnaire and return envelopes appended to their paychecks, and 2) by 'snowballing', i.e., asking family members, friends and acquaintances to complete the surveys and/or distribute them to other employed adults (see distribution of surveys through 'snowballing' in Appendix G). Each survey package contained a cover letter from the researcher (see Appendix E), a survey consisting of the previously described instrument (see Appendix F), and a return envelope

addressed to the university. Survey packages were delivered en masse, that is no individual meeting with participants took place in order to maintain participant anonymity. As noted above, this procedure resulted in 208 completed responses available for the analysis (33.5% response rate). Of these, approximately 17.8% were employees of a major television network in Atlantic Canada (in various occupational groups and organizational levels); 12% worked in the health care industry; 8.7% in education; 8.7% in administrative roles, and 8% were employed with a fireplace vendor, 7% were in education, and 10% of respondents did not provide demographic information on their occupation.

Results

First, I examined the distributions for each measure to ensure there were no serious violations of univariate or multivariate normality and that all other assumptions were met. Negatively worded items were also recoded. All other values were within range. Items number 7 and 8 were deleted as they were missing their respective answer boxes on the survey form, and 63% of respondents left those two questions unanswered. The remaining cases with missing data appeared evenly distributed throughout the data and were retained. A departure from symmetry was visible as all variables had non-zero values for both skewness and kurtosis. However, as none of these values exceeded -2 or $+2$, and the sample was adequately large ($N=208$), skewness and kurtosis are not considered sufficiently severe to warrant transformation.

As the measures of knowledge use were written for this study, a principal components analysis with varimax rotation was conducted on each of the scales to establish the dimensionality of their items. To maintain an adequate 'subjects to variables' ratio for the analyses, potential scales were analyzed in groups (e.g., all of the knowledge application items were analyzed and then all of the knowledge creation items and so on). For the current analyses,

I chose to maintain a subjects to variable ratio of 10 to 1. Although this is lower than some guidelines, it is consistent with common practice in exploratory factor analysis (Tabachnick & Fidell, 1996).

Application of knowledge scale

The correlation matrix for the first scale measuring the application of knowledge was suitable for factoring: a number of correlations exceeded 0.30, Bartlett's test of sphericity was significant and Kaiser-Meyer-Olkin's measure of sampling adequacy was greater than .6, at .820. Using the Kaiser-Guttman eigenvalue greater than 1 rule, five components were extracted and rotated to a varimax solution, which was confirmed with an examination of the scree plot. The item factor loadings, communalities, proportions of variance for individual factors, are shown in Table 2.1. I initially computed scales comprising all items that loaded .32 or above on a given factor (Tabachnick & Fidell, 1996). Using these scale definitions I computed internal consistency estimates (Cronbach's alpha) for each factor. As shown, only two factors met the conventional cutoff of α greater than or equal to 0.70 and were extracted for interpretation from the first scale, that of 'application of knowledge'. Together, they accounted for 61.7% of cumulative variance.

Factor 1, which accounted for 16.26% of the rotated item variance, was labeled 'problem solving' as it relates to the construct of applying knowledge to solve problems suggested by Davenport et al., (1996). Factor 2, labeled 'technical knowledge', corresponds to the concept of applying knowledge to production process (Davenport et al., 1996), which implies some technical knowledge requirements in the application of knowledge. It accounted for 14.07% of rotated item variance. Item 1 presented some interpretive ambiguity as it loaded on three factors: 'problem solving' (.418), 'technical knowledge' (.342) and a third factor (.489). Given that the

item loadings were not substantially different from one another, Item 1 ('I use a variety of skills') was deemed too ambiguous for interpretation, and was deleted. Item 15 ('I have to know how to get things done in my workplace') had double loadings greater than .3. Given that it loaded significantly higher on a factor that was not extracted for interpretation, this item was also deemed to ambiguous for interpretation, and was deleted.

Acquisition of knowledge scale

The correlation matrix for the scale measuring the acquisition of knowledge showed numerous correlations that were greater than .3 making the matrix suitable for factoring. Bartlett's test of sphericity was significant and Kaiser-Meyer-Olkin's measure of sampling adequacy was .820. Using the Kaiser-Guttman eigenvalue greater than 1 rule, five components were extracted and rotated to a varimax solution, which was confirmed with an examination of the scree plot. The item factor loadings, communalities, proportions of variance for individual factors, and internal consistency estimates for the factors are shown in Table 2.2. Scales were computed for all items loading at .32 (Tabachnick & Fidell, 1996). I computed internal consistency estimates (Cronbach's alpha) for each factor. As shown, four factors met the conventional cutoff of α greater than or equal to 0.70 and were extracted for interpretation from the second scale, that of 'acquisition of knowledge'.

The first factor, labeled 'initiative' accounted for 15.60% of rotated item variance. Highly loading items on this factor all referred to informal knowledge acquisition, which corresponds to

Table 2.1

(Mean, Standard Deviation, Factor Loadings, Communalities and Proportion of Variance for Principal Components Extraction with Varimax Rotation for Items Measuring the Application of Knowledge)

Items	Mean	SD	Factor 1 Problem Solving	Factor 2 Technical Knowledge	Factor 3	Factor 4	Factor 5	Communalities
1. I use a variety of skills	4.27	.78	.418	.342		.489		.584
2. I make full use of my technical knowledge	3.57	.97		.746				.680
3. I rely on my knowledge to solve problems	4.31	.70			.358	.723		.687
4. I use information	4.36	.80				.715	.417	.703
5. I interpret policies or procedures	3.44	1.06					.693	.605
6. I need a great deal of technical knowledge	3.23	1.05		.820				.717
7. I find it helpful to understand the 'big picture' and how my work fits into it	3.92	1.08					.570	.423
8. I couldn't perform my job if I didn't have the required knowledge	4.09	1.00			.400		.454	.461
9. I make full use of my work-related knowledge	4.11	.84			.631	.309		.538
10. I am required to use technical knowledge to perform my work	3.49	1.02		.791				.700
11. I have a clear understanding of what I need to know to perform my work.	4.17	.68			.778			.669
12. My work entails gathering the resources necessary to get the job done, and I know where to find those resources.	4.01	.86	.691					.638
13. I make decisions about how to do the work.	4.12	.84	.746					.638
14. I solve problems	4.03	.84	.770					.668
15. I have to know how to get things done in my workplace.	4.39	.68	.399		.503			.550
16. People bring me their problems to solve	3.37	1.05	.689					.610
Proportion of Variance			16.26%	14.07%	11.44%	10.75%	9.17%	
Cronbach's Alpha			.7133	.7771	.5921	.5945	.2833	

Table 2.2

(Mean, Standard Deviation, Factor Loadings, Communalities and Proportion of Variance for Principal Components Extraction with Varimax Rotation for Items Measuring the Acquisition of Knowledge)

Items	Mean	SD	Factor 1 'initiate'	Factor 2 'OJT'	Factor 3 'consult'	Factor 4	Factor 5 'observe'	Communalities
17. I ask others for information	3.06	.96			.852			.762
18. I ask others for advice	2.75	.86			.824			.706
19. I learn new things while performing my work	3.42	1.11		.649				.691
20. I acquire new skills	3.04	1.13		.718				.687
21. I take training	2.55	1.15	.311	.693				.580
22. I read technical journals or books	2.37	1.10	.592	.502				.638
23. I consult with others	3.17	.96		.387	.500		.371	.581
24. I look things up on the internet	2.56	1.22	.601		.376			.561
25. I take additional courses on my own initiative	2.19	1.23	.722	.345				.643
26. I seek new information on my own	3.22	1.16	.565					.447
27. I acquire new knowledge in the performance of my work	3.18	1.09		.635				.584
28. I call the supplier/manufacturer when required to solve a problem	2.40	1.34				.602		.444
29. When I encounter a problem, I do research to find a solution	3.32	1.12				.764		.644
30. I troubleshoot	3.24	1.12				.727		.589
31. I call other similar organizations / departments to see how they do certain things/practices	2.31	1.07	.324					.496
32. I subscribe to various professional publications	1.94	1.20	.689		.305	.480		.606
33. I subscribe to various internet sources for information relating to my work	1.69	1.06	.732	.328				.578
34. I learn from the experience of others	3.21	.98						.847
35. I learn by observing others	3.16	1.05					.891	.839
36. I attend conferences to stay current	2.24	1.24	.393	.621			.874	.563
Proportion of Variance			15.60%	15.36%	11.01%	10.61%	9.86%	
Cronbach's alpha			.8072	.7878	.7448	.6698	.8675	

Ruggles (1998) concept of acquiring knowledge by accessing valuable information from outside sources. The second factor accounted for 15.36% of rotated item variance was labeled 'On the job learning', as it relates to Zidle's (1991) belief that organizations must provide knowledge workers in order to maintain their competitive advantage. It also supports Scarborough's (1999) assertion that organizations must provide organizational systems that facilitate learning. The third factor accounts for 11.01% of the rotated item variance. It was labeled 'consulting others', as it links with Nonaka's (1991a) concept of socialization, as well as with Ulrich's (1998) belief that knowledge workers need organizational climates that foster teamwork and collaboration in order to thrive. The fourth factor, labeled 'learning by observation' accounted for 9.86% of rotated item variance. It relates to the notion that learning by observing others helps to identify and address learning needs among group members, while increasing employee motivation (VanAtken et al., 1994).

There were a number of items with double and triple loadings, which made interpretation more ambiguous. Items 21, 22, 24, 25, 32, and 36 had double loadings and were interpreted as part of the factor on which they loaded higher. Items 23 and 31 had triple loadings, but loaded notably higher on one factor and were interpreted accordingly.

Creation of knowledge scale

The scale for the creation of knowledge yielded a correlation matrix that showed numerous correlations that were greater than .3 making the matrix suitable for factoring. Bartlett's test of sphericity was significant and Kaiser-Meyer-Olkin's measure of sampling adequacy was .917. Using the Kaiser-Guttman eigenvalue greater than 1 rule, three components were extracted and rotated to a varimax solution, which was confirmed with an examination of the scree plot. The item factor loadings, communalities, proportions of variance for individual

factors, and internal consistency estimates for the factors are shown in Table 2.3. Scales were computed for all items loading at .32 (Tabachnick & Fidell, 1996). I computed internal consistency estimates (Cronbach's alpha) for each factor. Though two factors had exceeded the conventional cut off of α greater than or equal to 0.70, the second factor was not extracted for interpretation as both items loading on that factor were identical, therefore one of them (item 52, 'I solve problems') was deleted. Therefore a single factor was extracted for interpretation: factor 1 ('innovate'), accounted for 41.86% of rotated item variance. It relates to Ruggles (1998) idea that knowledge work consists in part to the generation of new knowledge.

Packaging of knowledge scale

The correlation matrix for the scale measuring the packaging of knowledge showed several correlations exceeding .3 making the matrix suitable for factoring. Bartlett's test of sphericity was significant and Kaiser-Meyer-Olkin's measure of sampling adequacy was .858. The item factor loadings, communalities, proportions of variance for individual factors, and internal consistency estimates are shown in Table 2.4. Scales were computed for all items loading at .32 (Tabachnick & Fidell, 1996). I computed internal consistency estimates (Cronbach's alpha) for each factor. Three components exceeded the conventional cut off of α greater than or equal to 0.70, and were extracted for interpretation, accounting for 75.477% of cumulative variance.

Factor 1 was labeled 'inform others' as it encapsulates Ruggles' (1998) construct of transferring knowledge to others, and Nonaka's (1991a) articulation of knowledge from tacit to explicit. Factor 2 accounted for 20.158% of rotated item variance. It was labeled 'keep track' and resembles Ruggles' (1998) representing knowledge through documentation. Factor 3, is labeled 'gather' because it encompasses some aspects of knowledge acquisition in that it implies research activities preceding the packaging of information for others. This factor is closely

Table 2.3

(Mean, Standard Deviation, Factor Loadings, Communalities and Proportion of Variance for Principal Components Extraction with Varimax Rotation for Items Measuring the Creation of Knowledge)

Items	Mean	SD	Factor 1 'Innovate'	Factor 2	Factor 3	Communalities
37. I come up with new ideas	3.13	1.00	.783			.696
38. I solve problems	3.78	.91	.305	.881		.889
39. I create new ways of doing things	3.12	.99	.803			.696
40. I make suggestions to improve current practices	3.26	1.01	.787			.715
41. I innovate	3.13	1.04	.800	.338		.754
42. I generate new ideas to solve problems	3.13	1.03	.761	.445		.778
43. I generate new ideas to improve current practices	3.06	1.02	.796	.319		.743
44. I demonstrate creativity	3.35	1.06	.813			.741
45. I have a proven track record for my creativity	3.26	1.09	.757		.316	.684
46. I invent things as I go along	2.71	1.13	.763			.625
47. I get strange or unusual requests that challenge me	2.71	1.10	.502			.319
48. My ideas are adopted by my employer	2.73	1.12	.571			.407
49. I never get feedback on my suggestions	2.11	.97			.746	.610
50. Creativity is not fostered by my employer	2.06	1.18			.781	.610
51. I take old ideas and give them a new twist	2.70	.96	.683			.523
52. I solve problems	3.79	.92	.337	.862		.882
53. I've come up with some very unorthodox ways of solving problems	2.59	1.12	.562		.310	.490
Proportion of Variance			41.86%	14.28%	9.53%	
Cronbach's alpha			.9369	.9144	.5423	

Table 2.4

(Mean, Standard Deviation, Factor Loadings, Communalities and Proportion of Variance for Principal Components Extraction with Varimax Rotation for Items Measuring the Packaging of Knowledge)

Items	Mean	SD	Factor 1 'inform others'	Factor 2 'keep track'	Factor 3 'gather'	Communalities
64. I train others	2.83	1.14	.679			.536
65. I offer feedback to others	3.33	1.00	.847			.782
66. I give advice to others	3.32	1.00	.884			.829
67. I explain procedures to others	3.24	1.04	.836			.795
68. I give information to others	3.61	1.03	.801			.742
69. I write policies or manuals	1.81	1.12		.729		.676
70. I document our procedures	2.26	1.25		.884		.832
71. I keep track of our work to avoid having to reinvent the wheel	2.88	1.28		.651	.472	.651
72. I gather information from various sources before presenting it to others	3.06	1.26			.867	.871
73. I take knowledge from various sources and package it in new ways	2.61	1.19	.347		.843	.834
Proportion of Variance			36.08%	20.16%	19.24%	
Cronbach's alpha			.9024	.7443	.8302	

aligned with Davenport et al's (1996) concept that employees use knowledge by packaging it for other consumers. It also relates to Ruggles' (1998) description of a category of knowledge use he refers to as 'transferring', where existing knowledge is disseminated to other parts of the organization.

Second Order Factor Analysis

I conducted a second order factor analysis using the ten scales measuring knowledge use. All assumptions were within acceptable limits, and there were no multivariate outliers. The correlation matrix showed numerous correlations that were greater than .3, Bartlett's test of sphericity was significant and Kaiser-Meyer-Olkin's measure of sampling adequacy was .811. Using the Kaiser-Guttman eigenvalue greater than 1 rule, three components were extracted and rotated to a varimax solution, which was confirmed with an examination of the scree plot. Scales were computed for all items loading at .32 or above (Tabachnick & Fidell, 1996). I computed internal consistency estimates (Cronbach's alpha) for each factor. Only one factor exceeded the conventional cut off of α greater than or equal to 0.70, and was extracted for interpretation. Factor 1 ('knowledge'), accounted for 29.10% of the rotated item variance. There were a number of double and triple loading, which lent some ambiguity to the interpretation.

Organizational Opportunity scale

The correlation matrix for the scale measuring organizational opportunity for knowledge use showed several correlations exceeding .3 making the matrix suitable for factoring. Bartlett's test of sphericity was significant and Kaiser-Meyer-Olkin's measure of sampling adequacy was .881. Using the Kaiser-Guttman eigenvalue greater than 1 rule, six components were extracted and rotated to a varimax solution, which was confirmed with an examination of the scree plot. They accounted for 67.75% of cumulative variance. The item factor loadings, communalities,

Table 2.5

(Mean, Standard Deviation, Factor Loadings, Communalities and Proportion of Variance for Principal Components Extraction with Varimax Rotation for second order factor analysis using knowledge use scales)

Scales	Mean	SD	Factor 1 'knowledge'	Factor 2	Factor 3	Communalities
Track	2.84	1.13	.844	-.123		.728
Gather	2.32	.99	.732	.352		.660
Inform	3.26	.89	.697	.278	.269	.636
Innovate	3.00	.80	.604	.482	.161	.622
Initiate	3.19	.97	.549	.327	.169	.437
Observe	3.00	.76		.814	.145	.684
Consult	2.89	.84	.254	.765	-.126	.666
OJT	2.34	.83	.398	.465	.384	.522
Techknow	3.43	.88			.899	.811
Probsolve	3.82	.68	.534		.543	.583
Proportion of Variance			29.09%	20.25%	14.16%	
Cronbach's alpha			.8288			

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proportions of variance for individual factors, and internal consistency estimates for the factors are shown in Table 2.5. Scales were computed for all items loading at .32 or above (Tabachnick & Fidell, 1996). I computed internal consistency estimates (Cronbach's alpha) for each factor. All six factors met the conventional cutoff of α greater than or equal to 0.70. However, only one of these was interpreted as double and triple item loadings lent much ambiguity to the interpretation. Once double and triple loadings were assigned to the factor where their loadings were highest, five of these six factors had only a single item remaining, and were omitted from this analysis. Most of the items on the organizational opportunity scale loaded highly on Factor 1. It accounts for 16.28% of the rotated item variance and, like the scale, was labeled 'opportunity' as it relates to Wall, Jackson and Davids' (1992) formula for intellectual capital. They believe that in addition to possessing the ability and the motivation to contribute their knowledge, employees have to be provided with the opportunity to do so by the organization. Items 72 and 76 presented some interpretive ambiguity as they loaded on two other factors, but were included as their loadings were significantly higher on Factor 1. Items 89, 71, 77 and 91 loaded significantly higher on factors that were not interpreted which presented some interpretive ambiguity, and were deleted.

Table 2.6

(Mean, Standard Deviation, Factor Loadings, Communalities and Proportion of Variance for Principal Components Extraction with Varimax Rotation for Items Measuring Organizational Opportunity for Knowledge use)

Items	Mean	SD	Factor 1 'opportu nity'	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Commu nalities
64. I learn from my coworkers	3.39	1.02		.824					.724
65. My coworkers learn from me	3.37	.96		.750					.680
66. I meet informally with my coworkers and we chat about our work	3.15	1.28		.517					.605
67. We hold staff meetings to exchange work-related information.	3.15	1.40		.465	.396		.507		.499
68. I exchange work-related information with my coworkers	3.58	1.08		.549			.440		.635
69. I rely on my coworkers for work-related advice	3.22	1.11		.739					.723
70. When I encounter a problem, I ask a coworker for assistance	3.26	1.12		.632					.576
71. We talk shop at coffee or on break	2.74	1.31					.783		.684
72. Sitting around having coffee with my coworkers is a good to learn	2.91	1.30					.778		.684
73. Being able to exchange information with my coworkers is important	4.06	.989							.741
74. Teams offer the opportunity to learn from each other's experience	3.97	1.14	.320				.582	.364	.648
75. I've developed a good network of people I can rely on	3.91	1.04					.528	.420	.648
76. I work as part of a team	4.17	.98							.557
77. I consider myself a team-player	4.32	.88	.743				.316	.642	.662
78. I have the opportunity to demonstrate initiative	3.80	1.10						.805	.766
79. I have the opportunity to offer suggestions to improve current practices	3.63	1.11	.789					.823	.746
80. I have the opportunity to demonstrate my resourcefulness	3.66	1.13	.842						.678
82. I am encouraged to ask questions	3.66	1.20	.712			.348			.771
					.337				.820
								.320	.607

83. I am encouraged to contribute my ideas.	3.68	1.19							.734
84. My employer provides me with opportunities for continuous learning	3.10	1.30			.827				.831
85. I have the opportunity to work on interesting new projects	2.93	1.21	.375		.648				.597
86. I have the opportunity to acquire new skills through training	2.86	1.25			.847				.796
87. I have the opportunity to learn from my peers	3.45	1.07		.383	.637				.713
88. My employer provides me with all the information I need to stay current	2.87	1.19			.656				.636
89. People here are not receptive to new ideas	2.23	1.07					.896		.851
90. People here do not accept change	2.23	1.08					.893		.819
91. I am not expected to contribute my ideas	2.00	1.17					.594		.470
92. I am encouraged to think of new ways to solve problems	3.38	1.19	-.314		.354				.663
93. I am encouraged to be creative.	3.36	1.22	.662		.316				.658
Proportion of Variance			16.28%	12.35%	12.26%	9.67%	9.01%	8.18%	
Cronbach's alpha			.8436	.8710	.8829	.7765	.8432	.7939	

Organizational Support scale

The scale measuring organizational support for knowledge use, through reward and/or recognition of employees' contribution yielded a correlation matrix that showed numerous correlations that were greater than .3 making the matrix suitable for factoring. Bartlett's test of sphericity was significant and Kaiser-Meyer-Olkin's measure of sampling adequacy was .858. Using the Kaiser-Guttman eigenvalue greater than 1 rule, two components were extracted and rotated to a varimax solution. The item factor loadings, communalities, proportions of variance for individual factors, and internal consistency estimates for the factors are shown in Table 2.6. Scales were computed for all items loading at .32 or above (Tabachnick & Fidell, 1996). I computed internal consistency estimates (Cronbach's alpha) for each factor. Factors 1 (labeled 'lack of appreciation') and 2 (labeled 'praise') accounted for 37.95% and 27.81% of rotated item variance respectively. Both are closely linked to Zidle's (1998) and Harrigan & Dalmia's (1991) belief that knowledge workers need recognition for their contribution in the workplace. It also relates to Katzell & Thompson's (1990) assertion that organizational climates that celebrate goals enjoy higher levels of affective commitment from their employees.

Table 2.7

(Mean, Standard Deviation, Factor Loadings, Communalities and Proportion of Variance for Principal Components Extraction with Varimax Rotation for Items Measuring Organizational Support for Knowledge Use)

Items	Mean	SD	Factor 1 'lack of appreciation'	Factor 2 'praise'	Communalities
94. My peers often tell me they like my work	3.36	1.07		.733	.548
95. I am not recognized for my efforts	2.07	.98	.769		.622
96. I am not rewarded for my efforts	2.08	1.06	.883		.785
97. There is no such thing as recognition for good work	1.88	1.04	.839		.710
98. There are no rewards for doing good work.	1.87	1.08	.880		.779
99. My employer does not show appreciation for my contribution	1.94	1.04	.879		.809
100. I receive praise from my boss	2.95	1.25		.753	.642
101. My employer takes the credit for my work	1.92	1.19	.439		.251
102. My contributions are recognized by my peers	3.34	1.07		.810	.656
103. My contributions are recognized by my employer	3.04	1.19	-.366	.798	.771
104. My contributions are rewarded	2.73	1.22	-.377	.719	.659
Proportion of Variance			37.95%	27.81%	
Cronbach's alpha			.8821	.8518	

Correlational Analysis

Hypothesis 1 predicted that affective commitment would be positively correlated with the measures of knowledge application, knowledge acquisition, knowledge creation, and knowledge packaging. As shown (see Table 2.7), affective commitment has a positive and significant relationship with seven of the ten scales of knowledge use. Affective commitment correlated with 'problem solving', $r(206) = .23, p < .01$; 'technical knowledge', $r(204) = .21, p < .01$; 'On the job learning', $r(203) = .25, p < .01$; 'innovate', $r(194) = .12, p < .05$; 'inform others', $r(204) = .24, p < .01$; 'keeping track', $r(203) = .15, p < .01$, and 'gather', $r(205) = .22, p < .01$. However, affective commitment was not significantly correlated with knowledge use measures of 'initiative', $r = .06$; 'consulting others', $r = .11$, and 'learning by observation', $r = .08$.

Hypothesis 2 predicted that Organizational Citizenship behaviour would be positively correlated with measures of knowledge application, knowledge acquisition, knowledge creation, and knowledge packaging. Results show that OCB was significantly correlated, but not redundant, with eight of the knowledge use scales. Specifically, OCB was significantly correlated with 'problem solving' $r(192) = .23, p < .01$; with 'initiative' $r(191) = .23, p < .01$; with 'On the job learning' $r(190) = .19, p < .01$; with 'learning by observation' $r(192) = .17, p < .01$; with 'innovate' $r(186) = .26, p < .01$; with 'inform others' $r(192) = .33, p < .01$; with 'keep track' $r(190) = .38, p < .01$, and with 'gather' $r(191) = .32, p < .01$. OCB was not significantly related to the 'technical knowledge' $r = .07$, and the 'consulting others' $r = .12$ scales of knowledge use.

Hypothesis 3 predicted that perceived support for knowledge use would be positively correlated with measures of knowledge application, knowledge acquisition, knowledge creation, and knowledge packaging. As shown in Table 2.7, 'lack of appreciation' was not significantly

correlated with any of the ten scales of knowledge use. However, measures of 'lack of appreciation' were significantly and negatively correlated with measures of 'affective commitment' $r(194) = -.32, p < .01$; with 'opportunity' $r(192) = -.39, p < .01$, and with 'praise' $r(194) = -.40, p < .01$.

Hypothesis 4 predicted that opportunities for continuous learning would be positively correlated with measures of knowledge application, knowledge acquisition, knowledge creation, and knowledge packaging. Results show that measures of organizational opportunity for continuous learning were significantly and positively correlated with: 'problem solving' $r(201) = .37, p < .01$; 'technical knowledge' $r(199) = .22, p < .01$; 'On the job learning' $r(199) = .38, p < .01$; 'learning through consultation' $r(199) = .35, p < .01$; 'learning by observation' $r(201) = .17, p < .01$; 'innovate' $r(193) = .35, p < .01$; 'inform others' $r(200) = .41, p < .01$; 'tracking through documentation' $r(199) = .28, p < .01$; 'gathering information' $r(200) = .28, p < .01$; 'affective commitment' $r(200) = .43, p < .01$; 'ocb' $r(191) = .27, p < .01$, and 'praise' $r(195) = .61, p < .01$. Opportunity was also significantly and negatively correlated with 'lack of appreciation' $r(192) = -.39, p < .01$.

Hypothesis 5 predicted that measures of knowledge acquisition through peer affiliation would be positively correlated with measures of organizational opportunity. Results show that 'opportunity' was significantly and positively correlated all three measures of knowledge acquisition through peer affiliation: with 'on the job learning', $r(199) = .378, p < .01$; with 'consult', $r(199) = .347, p < .01$, and with 'observe', $r(201) = .174, p < .01$.

Table 2.8 Intercorrelations of Variables for Study 2

Variable	Mean	SD	α	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. PbSolve	3.83	.68	.7133															
2. TechKno	3.44	.88	.7771	.31														
3. Initiate	2.34	.83	.8072	.25	.19													
4. On-the-Job	2.89	.84	.7878	.39	.26	.56												
5. Consult	3.00	.76	.7448	.13	.04	.30	.38											
6. Observe	3.19	.97	.8675	.14	.16	.29	.37	.46										
7. Innovate	3.00	.80	.9369	.49	.13	.40	.43	.43	.36									
8. Inform	3.26	.89	.9024	.46	.27	.34	.36	.31	.32	.62								
9. Track	2.32	.99	.7443	.32	.10	.37	.27	.16	.07	.29	.47							
10. Gather	2.84	1.13	.8302	.32	.09	.47	.41	.38	.32	.53	.49	.48						
11. Affect	3.27	.78	.8513	.23	.21	.06	.25	.11	.08	.10	.23	.15	.22					
12. O.C.B.	3.77	.40	.6992	.23	.07	.23	.20	.12	.17	.26	.33	.39	.32	.31				
13. Opportun	3.60	.97	.8436	.37	.22	.13	.38	.35	.17	.35	.41	.29	.28	.43	.28			
14. Appreciate	1.96	.85	.8821	.41	.01	-.02	-.14	-.13	-.02	.11	.00	-.05	-.05	-.33	-.09	-.39		
15. Praise	3.06	.93	.8518	.23	.10	.14	.38	.24	.18	.33	.30	.15	.26	.47	.25	.62	-.40	

Note: Decimal points are omitted.

Known Groups Validity

To assess known groups validity I conducted a multivariate analysis of variance (MANOVA) with occupational group (3 levels: Professional, Managerial, Other) as the independent variable and the ten scales of knowledge use as the dependent variables. Using Pillai's criterion, multivariate tests of significance revealed that there are significant differences in the dependent variables across groups. A significant multivariate effect $F(10, 160) = 1.943$, $p < .05$ was obtained. Means for each occupational group are presented in Table 2.8. Further analysis of univariate results were examined to determine which of the DVs contributed most significantly to the multivariate effect. Examination of our univariate / between-subjects test for each DV indicates a significant effect on 'initiate' ($F = 9.231$), $p < .05$; on 'On the job' learning ($F = 4.555$), $p < .05$; on 'innovate' ($F = 6.073$), $p < .05$; on 'inform' ($F = 7.792$), $p < .05$; on 'track' ($F = 15.341$), $p < .05$, and on 'gather' ($F = 5.856$), $p < .05$.

Hypothesis 6 predicted that Managers would report higher levels of knowledge creation than would other occupational groups. Univariate results (mean differences) support this hypothesis and suggest some group differences on measures of knowledge creation: Managers 'innovate' ($M = 3.22 (.72)$) more frequently at work than do Professionals ($M = 3.04 (.77)$), or Others ($M = 2.82 (.85)$), however, post hoc analysis (Scheffe) was not significant.

Hypothesis 7 predicted that Professionals would report higher levels of knowledge acquisition through consultation than would other occupational groups. Results do not support this hypothesis. In fact, results show that Managers consult with others ($M = 3.10 (.65)$) slightly more often than do either the Professional group ($M = 3.00 (.79)$) or the Other group ($M = 3.02 (.74)$), however post hoc analysis (Scheffe) reveal that these mean differences were not significant.

Hypothesis 8 predicted that Managers would demonstrate more initiative than would other occupational groups. Results partially support this hypothesis as Managers reported that they demonstrate initiative slightly more frequently ($M = 2.49 (.83)$) than do either the Professional group ($M = 2.46 (.84)$), but mean differences (Scheffe) were not significant. However, post hoc analysis (Scheffe) revealed that mean differences between Professionals ($M = 2.46 (.84)$) and Others ($M = 2.04 (.74)$) were significant on this prediction.

Hypotheses 9 and 10 respectively predicted that Managers would report higher levels of knowledge packaging than would other occupational groups, and that Professionals would report higher levels of knowledge packaging than would the Other occupational group. As anticipated, results showed a pyramidal structure of knowledge packaging: Managers reported higher levels of packaging knowledge than did both the Professional group and the Other group, and Professionals reported higher levels than did the Other occupational group: 'inform' ($M_{\text{Managers}} = 3.56 (.91)$, $M_{\text{Professional}} = 3.27 (.82)$, $M_{\text{Other}} = 3.07 (.82)$); 'track' ($M_{\text{Managers}} = 2.65 (.97)$, $M_{\text{Professional}} = 2.42 (.99)$, $M_{\text{Other}} = 2.00 (.88)$), and 'gather' ($M_{\text{Managers}} = 3.06 (1.00)$, $M_{\text{Professional}} = 2.94 (1.14)$, $M_{\text{Other}} = 2.54 (1.12)$). Post hoc analyses (Scheffe) indicate that mean differences were significantly different between Managers and Professionals (hypothesis 9) on 'inform' (.019), but were not significant on either 'track' or 'gather'. Mean differences between Professionals and Others (hypothesis 10) were significantly different on 'track' (Scheffe ($p = .035$)) but not significant on 'inform' or 'gather'.

Table 2.9

Univariate test for MANOVA with 3 occupational groups and 10 knowledge use scales.

	Managers (mean score)	Professionals (mean score)	Other (mean score)	(F)	(df)	Sig.
Initiate	2.489	2.463	2.047	9.231	10/160	p < .01
OJT	2.942	3.015	2.677	4.555	10/160	p < .01
Innovate	3.218	3.036	2.828	6.073	10/160	p < .01
Inform	3.568	3.272	3.073	7.792	10/160	p < .01
Track	2.656	2.428	2.000	15.341	10/160	p < .01
Gather	3.065	2.948	2.542	5.856	10/160	p < .01

Discussion

The intent of the current study was to develop a measure of knowledge use based on the qualitative data collected during Study 1, and to assess its psychometric properties in Study 2. The context in which knowledge work occurs in organizations was also examined, in an attempt to determine if knowledge use was linked to organizational support and/or opportunity.

The results of a principal component factor analysis suggest a more involved structure for knowledge use than anticipated. That is, the dimensionality of items on each scale revealed more factors than the initial four-form model of knowledge use. Specifically, data suggest that the application of knowledge scale is composed of problem solving and technical knowledge; the acquisition of knowledge consists of initiative, consulting others, learning by observation and learning on the job; the creation of knowledge scale revealed a single factor labeled innovate, and finally, the packaging of knowledge is composed of lack of appreciation and praise. These

ten factors accounted for a significant portion of item variance and were found to be internally consistent, indicating a more elaborate structure of knowledge use. This structure expands rather than refutes the original hypotheses by identifying more discrete forms of knowledge use than originally anticipated.

Results also supported a link between the investment of knowledge and the context of knowledge use. Most of the items on the organizational opportunity scale had significant loadings, accounted for moderate to large amounts of the item variance, and were internally consistent, which suggests that the opportunity factor was well defined. These findings substantiate Wall, Jackson and Davids' (1992) formula for the role of opportunity in the investment of intellectual capital. In addition, the data revealed a two-factor model of organizational support, composed of lack of appreciation and praise. Both corroborate Zidle's (1998), and Harrigan & Dalmia's (1991) assertion that knowledge workers need recognition for their contribution in the workplace.

Correlational analyses provide partial support for my first hypothesis, which predicted a positive and significant relationship between knowledge use and affective commitment. Though results support a relationship between affective commitment and seven of the ten factors of knowledge use, correlations were not significant between affective commitment and the acquisition of knowledge on three of the four factors that comprise the scale (initiative, consulting others and learning by observation). While these findings differ from what was expected and appear counterintuitive, they may be based on the notion that behaviours inherent to these factors are not perceived to help the organization so much as they are required in the performance of work. Participants may also perceive the acquisition of knowledge to be outside

of their role (Katz, 1964, Meyer, 1997, and Organ, 1988) in that, the employer would bear the responsibility of providing existing knowledge to its organizational members.

As anticipated in my second hypothesis, measures of Organizational Citizenship Behaviour were significantly and positively correlated with most measures of knowledge use. Results support my third hypothesis, in that measures of lack of appreciation were not significantly correlated with knowledge use. Furthermore, measures of lack of appreciation were negatively and significantly correlated with affective commitment, opportunity, and praise, which also lends support to the notion that appreciation is highly valued by organizational members.

Hypothesis 4 was also supported: opportunity was significantly and positively correlated to most measures of knowledge use, with affective commitment, with ocb, and praise, but was negatively correlated with lack of appreciation.

Surprisingly, OCB did not correlate significantly with consulting others, as predicted in Hypothesis 5. However, there are numerous studies that support the premise that consulting others through affinity groups or internal alliances is deemed an effective way of information sharing, problem solving, discussing educational and developmental needs and opportunities that would benefit the group and the organization as a whole (Davenport, Jarvenpaa, & Beers, 1996; Harrigan & Dalmia, 1991; Nonaka, 1991; Ulrich, 1998, and Van Aken, Monetta & Sink, 1996). This concern for the organization and/or the group is consistent with definitions of OCB.

Hypothesis 6 was supported, in that results show that Managers innovate (creation of knowledge) more than Professionals and Others. However, results do not support Hypothesis 7, which predicted that Professionals would acquire knowledge through consultation more so than would other groups, as results suggested in Study 1. In the current study, results show that

participants in the Managers' group consult with others more than do participants of other groups. Managers also demonstrate more initiative than other occupational groups (supporting Hypothesis 8), and do so more frequently than do either the Professional group or the 'Other' occupational group participants. As anticipated, results reveal a three-tiered order of packaging knowledge: Managers reported higher levels of packaging knowledge than did both of the other occupational groups (Hypothesis 9), and Professionals reported higher levels than did the 'Other' occupational group (Hypothesis 10).

General Discussion

The purpose of this research was to develop a measure of knowledge use (Study 1), and establish its psychometric properties (Study 2). I assessed the factorial structure and internal consistency of an instrument consisting of items developed in the first study, to determine if it represents internally consistent constructs of knowledge use. Results offer considerable support for the instrument, and provide strong evidence of a more elaborate structure of knowledge use than initially anticipated: a factor analysis revealed at least ten factors from the initial four scales. Subsequently, I established the concurrent validity of the instrument through two strategies: correlations with hypothesized correlates of knowledge use and examinations of known group differences. Again, results provide considerable validation of the measure as evidenced by the strong support of most hypotheses.

The qualitative interviews conducted in Study 1 provided rich anecdotal evidence of how individuals choose (or choose not) to contribute their knowledge in the workplace. In addition, these interviews revealed a progressive investment of knowledge, in that the application of knowledge precedes performance. As such, all employees apply knowledge they already possess to current work-related situations, as failing to do so subsumes non-performance. Therefore the

application of knowledge may only be discretionary to the extent that an individual either does not possess, or willing withholds knowledge that is necessary to the performance of their work. The acquisition of knowledge is likely the form of knowledge use that is most essential in today's market place, given the pace of technological change, globalization, and demographic trends. Given the group variations in how existing knowledge is acquired, the impetus for organizational leaders to ensure that their employees have the support and opportunity to continue to learn and/or to share information. Where existing knowledge is insufficient, inexistent or unaffordable, employees will increasingly be called upon to create knowledge or innovate to solve new problems at work. Though results of both Studies 1 & 2 suggest some group variation on measures of creating knowledge, future research could investigate whether innovating is more a function of an individual's motivation (discretionary contribution) or personal characteristic (creativity), rather than being linked to organizational or occupational membership. As results show that the creation of knowledge was most evident among professionals, who have more direct patient contact, altruistic motivations may be worthy of further exploration. Conversely, as examples of packaging knowledge for the purpose of transmitting it to others were almost exclusively expressed by respondents in the Managers group, this form of knowledge use appears to be more closely related to membership in an organizational level.

The discretionary contribution of intellectual capital in its various forms also appears to be linked to the organizational climate. Results in both studies offer strong evidence that organizational support (such as reward and/or recognition for one's contribution of knowledge) and organizational opportunity (for continuous learning and sharing of knowledge) appeared to sustain the contribution of knowledge workers.

Potential Limitations

The results in the current studies are promising. However, there are potential limitations. One issue of concern in the current study is that data rests on one source (self-reports), thus introducing the potential for common method variance, which inflates correlations (Crocker & Algina, 1986). Collecting data from more than one source (or constituent) can alleviate the potential for mono-method bias, given that self-reports introduce the potential for false-positive and false-negative information. For instance, study participants may have exaggerated their contribution of knowledge in the workplace, or they may have understated their investment out of humility or altruism. Alternatively, managers' or peers' perceptions of participants' contribution of knowledge could differ significantly from those reported by respondents, and yield a broader perspective of participants' investment of intellectual capital.

While mono-method bias is a potential concern, the available evidence suggests its implausibility in the current study. First, mono-method bias would likely have resulted in a factor analysis revealing one factor, whereas results in the current study clearly showed multiple factors. In addition, mono-method bias would likely have resulted in inflated correlations between all scales whereas an examination of correlation matrices revealed a number of non-significant correlations between scales. Finally, mono-method bias would likely not have yielded significant group differences whereas differences were evident between groups. Nonetheless, future research should incorporate multiple source data.

Another potential limitation of the present study is of a methodological nature. Though the sampling technique was adopted in order to get a diverse sample, it was ultimately a sample of convenience. Therefore, more research is needed to establish the validity and utility of the measures in other contexts.

Directions for Future Research & Practice

Based on the results of the current study, this measure of knowledge use merits more extensive investigation. Future research could use the scales developed to test hypotheses about knowledge work, particularly as they relate to organizational commitment, as suggested in this study. There is strong evidence that eliciting the commitment of knowledge workers increases their knowledge use (Cropanzano, Jamer, & Konovsky, 1993). Hence, gaining greater understanding of the role of correlates of knowledge use (such as commitment) could provide useful insight into why, and how individuals choose (or not) to invest their intellectual capital in their employer-organization.

Another direction for future research would be to examine the differences in knowledge use according to occupational group and/or organizational level. Though results in Study 1 indicate that above all, respondents across all occupational groups and organizational levels valued reward and recognition for their contribution, Study 2 underlined interesting differences. For instance, Managers received more praise for their efforts than Professionals and Others, yet Professionals expressed significantly higher levels of lack of appreciation than did Managers and Others. One would expect, given Managers' own admission that they value recognition and praise (Studies 1 & 2), they would express more appreciation to their subordinates (i.e., Professionals and Others), yet results indicate otherwise. Results also offer strong indications that Managers do more problem solving, possess more technical knowledge, demonstrate more initiative and innovation than do other occupational groups and/or organizational levels. Managers record higher levels of informing others, tracking and gathering information, and learning through consultation and observation, whereas Professionals seem to learn on the job to

a greater extent than other groups. Managers also register higher levels of affective commitment and organizational citizenship behaviour than both Professionals and Others.

Conclusions

Though the current research is more geared toward the development of a measure of knowledge use, it can serve as a solid launching pad for future research whose findings are likely to have more practical implications, particularly with regards to the role of opportunity in knowledge use. Given the pace of change and the perishable nature of knowledge today, organizations will have to provide their members with opportunities for continued learning and information sharing in order to survive. As Scarborough (1999) stated, conventional management practices are severely challenged by knowledge work, and must now be more concerned with facilitating learning within the organization than with the individual characteristics of the knowledge worker. Continuous learning is not only crucial to elicit employees' commitment and keep them motivated, it is also crucial to an organization's competitive advantage (Dove, 1998; Drucker, 1998; Kelloway & Barling, 2000; Nonaka, 1991; Scarborough, 1999; Zidle, 1998).

Furthermore, the ability to contribute is contingent on the possession of 'up to the minute' knowledge that the organization needs. Hence, organizational leaders must not only ensure that knowledge workers possess the knowledge required, but that workers are operating in a climate that provides them with the opportunity to contribute, and/or that supports or recognizes their contribution of knowledge. According to Drucker (1998), the survival of organizations depends on how they manage knowledge work. If this is so, future research into knowledge work will be of increasing importance.

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Appendix A

CONSENT FORM (Study 1)

Saint Mary's University, Department of Psychology
The measurement of knowledge use in organizations
E. Kevin Kelloway and Micheline Daigle-LeBlanc

Consent Form

I understand that the purpose of this research project is to learn how people choose to use their knowledge in the workplace. The research consists of an interview being conducted by Micheline Daigle-LeBlanc, under the supervision of Dr. Kevin Kelloway of Saint Mary's University. I understand that participation in the interview will require approximately 1 hour of my time during which I will be asked questions about my current job and how I acquire, share, and contribute knowledge in the workplace.

I understand that my participation in the interview is completely voluntary, that I may refuse to answer questions, and that I may withdraw from participation at any point without penalty. I understand that my participation is for research purposes only and that I will not be compensated for my participation in the interview. I understand that the interview will be taped and that all information provided will be held in complete confidence. Only members of the research team will have access to the tapes or transcripts. Results will be reported in summary form only. Individual participants will not be identified. I understand that in no way will my responses or participation in the research be disclosed to others.

(Please indicate your willingness to participate with an [X]).

I hereby

consent to participate in the interview

Signed: _____

Name: _____

Date: _____

Thank you. Please return the completed form in the envelop provided.

If you have any questions/concerns about this research, please do not hesitate to contact Micheline Daigle-LeBlanc (902) 473-3332 or Dr. Kevin Kelloway (902) 491-8652. You may also contact Dr. Arla Day (902) 420-5846, Chair, Department of Psychology Ethics Committee, or Dr. Victor Catano (902) 420-5845, Chair, Department of Psychology.

Appendix B

LETTER TO PARTICIPANTS (Study 1)

Director, Human Resources

Bethune Building, Rm 144

1278 Tower Road

Halifax, NS B3H 2Y9

Tel: (902) 473-6136 **Fax:** (902) 473-5756

June 26, 2000

Dear _____:

The Department of Human Resources is pleased to support the research project being conducted by Micheline Daigle-LeBlanc, graduate student in Organizational Psychology, and Dr. Kevin Kelloway of the Department of Management, both with Saint Mary's University in Halifax. The purpose of the project is to learn how people choose to invest their knowledge in the workplace. The results of this work will assist us in learning how individuals help an organization meet its goals. We have had the opportunity to review the interview tool to ensure that the data collected will be of interest to our organization, and are satisfied that the study results may help shape our approach to recruitment in the future.

The research is being conducted as part of Micheline Daigle-LeBlanc's Master's thesis, which is a study of the use of knowledge in the workplace. We would very much appreciate your support in the project. Forty individuals were selected at random for participation in this research, and your name was among them. Your participation in this study is completely voluntary. All information collected as part of this study will be held in complete confidence.

In the next few days, a Customer Service representative from a major tertiary care hospital's Department of Human Resources will call you to determine whether or not you choose to participate in this study. Should you agree to participate, your name will be forwarded to Micheline who will then contact you to arrange a convenient time to meet for a one-hour interview. All information collected as part of this study will remain confidential, and only the researchers will have access to the information collected.

We thank you for your consideration of this opportunity. If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

Angela Gillis

Director, Human Resources

Appendix C

INTERVIEW QUESTIONS (Study 1)

1. Introduction and explanation (purpose and format, and get permission to tape record).

- *I am conducting research on the use of knowledge in an organization. I will be asking you some questions about how you do your work. The best way we have found to do this is to ask you to describe some of the most important incidents that you have encountered in your jobs – what the situations were and what you actually did.*
- *This interview should last no more than one hour, and is part of a research project that should lead to a better understanding of how people contribute what they know to the organization, and should have applications for selection, succession planning, etc.*
- *With your permission, I would like to record the interview so I can pay more attention to you and not have to take so many notes.*

2. Emphasize Confidentiality of Responses:

- *Everything you say in this interview will be kept strictly confidential, and will not be shared with anyone else in the organization. Your name was selected at random. Your data will be transcribed 'blind' – without your name or anyone else's attached – and included with data from everyone else I am interviewing. Okay. I'll start the tape and we can begin.*

3. Job responsibilities:

- *What is the title of your present job?*
- *Whom do you report to? (no name, just title)*
- *Who reports to you? (no name, just title)*
- *What are your major tasks or responsibilities?*
 - (probe: *how much time do you spend on each of these activities? – ensure proper sequence*).
 - (probe: *more detail, and/or other possible incidents?*)
- *What do you typically do in a given day?*
- *What do you typically do in a given week?*
- *What do you typically do in a given month?*

4. Behavioral events:

- *Would you describe in detail, the 5-6 most important situations you have experienced on the job –*
- *2 or 3 high points or major successes,*
 - *2 or 3 low points or key failures*

Success #1

- *What events led up to it?*
- *Who was involved?*
- *What was going through your mind at the time?*
- *How did you feel?*
- *What did you want to do about it?*
- *What did you actually do or say? (who said what? Where did it happen? How did you 'achieve/react'? what happened then?)*
- *How did you know to do that? Or How did you reach that conclusion?*
- *What was the outcome? What happened? How did you feel about the outcome (i.e., pleased, disappointed, that you performed/reacted (in)adequately?)*

Success #2

- *What events led up to it?*
- *Who was involved?*
- *What was going through your mind at the time?*
- *How did you feel?*
- *What did you want to do about it?*
- *What did you actually do or say? (who said what? Where did it happen? How did you 'achieve/react'? what happened then?)*
- *How did you know to do that? Or How did you reach that conclusion?*
- *What was the outcome? What happened? How did you feel about the outcome (i.e., pleased, disappointed, that you performed/reacted (in)adequately?)*

Success #3

- *What events led up to it?*
- *Who was involved?*
- *What was going through your mind at the time?*
- *How did you feel?*
- *What did you want to do about it?*
- *What did you actually do or say? (who said what? Where did it happen? How did you 'achieve/react'? what happened then?)*
- *How did you know to do that? Or How did you reach that conclusion?*
- *What was the outcome? What happened? How did you feel about the outcome (i.e., pleased, disappointed, that you performed/reacted (in)adequately?)*

Failure #1

- *What events led up to it?*
- *Who was involved?*
- *What was going through your mind at the time?*
- *How did you feel?*
- *What did you want to do about it?*
- *What did you actually do or say? (who said what? Where did it happen? How did you 'achieve/react'? what happened then?)*
- *How did you know to do that? Or How did you reach that conclusion?*
- *What was the outcome? What happened? How did you feel about the outcome (i.e., pleased, disappointed, that you performed/reacted (in)adequately?)*

Failure #2

- *What events led up to it?*
- *Who was involved?*

- *What was going through your mind at the time?*
- *How did you feel?*
- *What did you want to do about it?*
- *What did you actually do or say? (who said what? Where did it happen? How did you 'achieve/react'? what happened then?)*
- *How did you know to do that? Or How did you reach that conclusion?*
- *What was the outcome? What happened? How did you feel about the outcome (i.e., pleased, disappointed, that you performed/reacted (in)adequately?)*

Failure #3

- *What events led up to it?*
- *Who was involved?*
- *What was going through your mind at the time?*
- *How did you feel?*
- *What did you want to do about it?*
- *What did you actually do or say? (who said what? Where did it happen? How did you 'achieve/react'? what happened then?)*
- *How did you know to do that? Or How did you reach that conclusion?*
- *What was the outcome? What happened? How did you feel about the outcome (i.e., pleased, disappointed, that you performed/reacted (in)adequately?)*

-
- *What aspects of your work performance do you rate as most important? Why?*
 - *Is it possible to be loyal to your employer but still disagree with some rules and regulations? Give example.*
 - *What do you do when you encounter a procedure that you are unfamiliar with? (or a situation that momentarily throws you off?) How do you react? Describe your thought process at the time?*
 - *Compared to others with a similar background in your field, how would you rate yourself?*

- *What judgment calls have you had to make. What was the outcome? How did you feel about the outcome? Would you do anything differently? How?*
- *Do you feel that at any time during your employment with this organization, your employer failed to fulfill their obligation to you?*
- *Describe to me how your job related to the overall goals of your department and this hospital?*
- *What were the biggest pressures from your last job?*
- *Of all the work you've done, where have you been most successful? Why?*
- *What do you look for in a boss?*
- *Do you consider yourself to be more of a leader or follower? (If leader, describe your leadership style)*
- *What leadership abilities do you feel you have?*
- *What skills would indicate you are a positive influence on the team with whom you work?*
- *Who has the most influence on the development of your career?*
- *If I were to ask a coworker / supervisor to describe you, what would they say?*
- *What would your greatest adversary say about you?*
- *Describe a time when you or your work was criticized and how you dealt with it.*
- *What is your biggest priority as a*
- *What would be your ideal job?*
- *Can you think of an instance where you demonstrated creativity?*
- *Can you think of any incentives/programs/benefits/opportunity this organization could/should provide to enhance morale? (Such as?) Or (Why not?)*
- *How would you rate this organization's leadership? Why?*
- *The following is a quote from this organization's Vision Statement:*
We are regarded as a trustworthy health care partner; responsive to the needs of those we serve. We are an organization committed to excellence, quality and innovation – a place where people are valued and want to work and learn.

In your opinion, does this organization fulfill all of these visions? (probe for details, i.e., if not all, then which ones, for what reasons, how to improve).

- *What motivates you?*
- *Do you like working here? Why/Why not?*
- *Describe a difficult situation that challenged your problem-solving skills? How did you resolve the situation? What would / could you have done differently? How did you feel about the outcome?*
- *Give me an example of a time when you did more than what was expected of you?*
- *Describe the best person you ever worked for.*
- *Can you think of a time when you came up with a totally new idea to solve a problem? What was the outcome?*
- *What goals have you set for yourself and how do you plan to achieve them?*
- *Have you thought about what your learning needs might be for this position and about how you might meet them?*
- *Think about being in an unfamiliar job situation: how do you proceed to learn what you need to know to perform well in the job?*
- *Think about the last workshop / seminar / training program you attended. What did you learn? Did you have/take the opportunity to use it in your work?*
- *Do you prefer working alone or as part of a team? Why?*
- *What has been your most important job-related innovation or contribution?*
- *What do you expect from a colleague with whom you work closely?*
- *Describe how you have been recognized / rewarded for your contribution (by your boss/ this organization).*
- *Can you describe a time when you demonstrated initiative in the workplace?*
- *What skills have you developed in this job? What skills would you like to develop in this job?*
- *Describe various ways with which you seek/learn new knowledge/information/skills on your own? Do you currently use this new knowledge/information/skills at work? How?*

→ *Do you feel you can express ideas freely?*

→ *Describe when/how you learn from your coworkers / they learn from you.*

→ *Can you give me a specific example of a time when you generated a new idea on your own to: solve a problem / make an improvement in your workplace?*

5. Characteristics needed to do the job:

→ *What do you think it takes for someone to do this job effectively, (i.e., characteristics, knowledge, skills, or abilities). If you were hiring or training someone to do your job, what would you look for?"*

6. Conclusion and summary:

→ *Thank you very much for all your help. I know your time is valuable, and I appreciate you sparing so much of it to help me with this research project.*

Appendix D

COVER LETTER - KNOWLEDGE USE SURVEY (Study 2)

Saint Mary's University, Department of Psychology
The measurement of knowledge use in organizations
E. Kevin Kelloway and Micheline Daigle-LeBlanc

Dear Participant;

The attached questionnaire is part of a research project being conducted by Micheline Daigle-LeBlanc, graduate student in Organizational Psychology, and Dr. Kevin Kelloway of the Department of Management, both of Saint Mary's University. The purpose of the project is to examine how people use their knowledge in organizations and to develop a measure of knowledge use in organizations. We are writing to ask you to participate in our research by completing and returning the attached questionnaire.

Of course participation in the research is completely voluntary. Although we hope that you answer all of the questions on the survey, please feel free to ignore any that you do not want to answer. Responses to the survey are completely anonymous so we ask you NOT to put any identifying information on your survey. We will be reporting our results as group totals only and in no way will individual respondents be identified. Completed surveys will be held in confidence by the researchers.

In completing the survey, you may note that some questions are asked several times (or similar questions are asked). This is a necessary part of the measurement development process and we appreciate your patience in completing the measure.

Your participation in this project is very important to us. Should you require further information about the study or would like to receive a short summary of the research results (available this Summer), please feel free to contact:

Micheline Daigle-LeBlanc (902) 435-9756 (action@accesswave.ca) or
Dr. Kevin Kelloway, (902) 491-8652 (kevin.kelloway@stmarys.ca)

Thank you for your consideration of this matter.

E. Kevin Kelloway, Ph.D.
Professor of Management

Micheline Daigle-LeBlanc

Appendix E

KNOWLEDGE USE SURVEY (STUDY 2)

Please rate how often you do each of the following things.

- | | |
|----------------------------|----------------------|
| 1 = Not at All | 4 = Most of the Time |
| 2 = Some of the Time | 5 = All of the Time |
| 3 = About Half of the Time | |

In my job....

- | | |
|--|--------------------------|
| 1. I use a variety of skills | <input type="checkbox"/> |
| 2. I make full use of my technical knowledge | <input type="checkbox"/> |
| 3. I rely on my knowledge to solve problems | <input type="checkbox"/> |
| 4. I use information | <input type="checkbox"/> |
| 5. I interpret policies or procedures | <input type="checkbox"/> |
| 6. I need a great deal of technical knowledge | <input type="checkbox"/> |
| 7. I find it helpful to understand the 'big picture' and how my work fits into it | <input type="checkbox"/> |
| 8. I couldn't perform my job if I didn't have the required knowledge | <input type="checkbox"/> |
| 9. I make full use of my work-related knowledge | <input type="checkbox"/> |
| 10. I am required to use technical knowledge to perform my work | <input type="checkbox"/> |
| 11. I have a clear understanding of what I need to know to perform my work. | <input type="checkbox"/> |
| 12. My work entails gathering the resources necessary to get the job done, and I know where to find those resources. | <input type="checkbox"/> |
| 13. I make decisions about how to do the work. | <input type="checkbox"/> |
| 14. I solve problems | <input type="checkbox"/> |
| 15. I have to know how to get things done in my workplace. | <input type="checkbox"/> |
| 16. People bring me their problems to solve | <input type="checkbox"/> |
| 17. I ask others for information | <input type="checkbox"/> |
| 18. I ask others for advice | <input type="checkbox"/> |
| 19. I learn new things while performing my work | <input type="checkbox"/> |
| 20. I acquire new skills | <input type="checkbox"/> |
| 21. I take training | <input type="checkbox"/> |
| 22. I read technical journals or books | <input type="checkbox"/> |
| 23. I consult with others | <input type="checkbox"/> |
| 24. I look things up on the internet | <input type="checkbox"/> |
| 25. I take additional courses on my own initiative | <input type="checkbox"/> |
| 26. I seek new information on my own | <input type="checkbox"/> |
| 27. I acquire new knowledge in the performance of my work | <input type="checkbox"/> |
| 28. I call the supplier/manufacturer when required to solve a problem | <input type="checkbox"/> |
| 29. When I encounter a problem, I do research to find a solution | <input type="checkbox"/> |
| 30. I troubleshoot | <input type="checkbox"/> |
| 31. I call other similar organizations / departments to see how they do certain things/practices | <input type="checkbox"/> |
| 32. I subscribe to various professional publications | <input type="checkbox"/> |
| 33. I subscribe to various internet sources for information relating to my work | <input type="checkbox"/> |

- 34. I learn from the experience of others
- 35. I learn by observing others
- 36. I attend conferences to stay current
- 37. I come up with new ideas
- 38. I solve problems
- 39. I create new ways of doing things
- 40. I make suggestions to improve current practices
- 41. I innovate
- 42. I generate new ideas to solve problems
- 43. I generate new ideas to improve current practices
- 44. I demonstrate creativity
- 45. I have a proven track record for my creativity
- 46. I invent things as I go along
- 47. I get strange or unusual requests that challenge me
- 48. My ideas are adopted by my employer
- 49. I never get feedback on my suggestions
- 50. Creativity is not fostered by my employer
- 51. I take old ideas and give them a new twist
- 52. I solve problems
- 53. I've come up with some very unorthodox ways of solving problems
- 54. I train others
- 55. I offer feedback to others
- 56. I give advice to others
- 57. I explain procedures to others
- 58. I give information to others
- 59. I write policies or manuals
- 60. I document our procedures
- 61. I keep track of our work to avoid having to reinvent the wheel
- 62. I gather information from various sources before presenting it to others
- 63. I take knowledge from various sources and package it in new ways
- 64. I learn from my coworkers
- 65. My coworkers learn from me
- 66. I meet informally with my coworkers and we chat about our work
- 67. We hold staff meetings to exchange work-related information.
- 68. I exchange work-related information with my coworkers
- 69. I rely on my coworkers for work-related advice
- 70. When I encounter a problem, I ask a coworker for assistance
- 71. We talk shop at coffee or on break
- 72. Sitting around having coffee with my coworkers is a good opportunity to learn
- 73. Being able to exchange information with my coworkers is important
- 74. Teams offer the opportunity to learn from each other's experience
- 75. I've developed a good network of people I can rely on
- 76. I work as part of a team
- 77. I consider myself a team-player
- 78. I have the opportunity to demonstrate initiative
- 79. I have the opportunity to offer suggestions to improve current practice

- | | |
|---|--------------------------|
| 80. I have the opportunity to demonstrate my resourcefulness | <input type="checkbox"/> |
| 81. I am expected to do as I am told | <input type="checkbox"/> |
| 82. I am encouraged to ask questions | <input type="checkbox"/> |
| 83. I am encouraged to contribute my ideas. | <input type="checkbox"/> |
| 84. My employer provides me with opportunities for continuous learning | <input type="checkbox"/> |
| 85. I have the opportunity to work on interesting new projects | <input type="checkbox"/> |
| 86. I have the opportunity to acquire new skills through training | <input type="checkbox"/> |
| 87. I have the opportunity to learn from my peers | <input type="checkbox"/> |
| 88. My employer provides me with all the information I need to stay current | <input type="checkbox"/> |
| 89. People here are not receptive to new ideas | <input type="checkbox"/> |
| 90. People here do not accept change | <input type="checkbox"/> |
| 91. I am not expected to contribute my ideas | <input type="checkbox"/> |
| 92. I am encouraged to think of new ways to solve problems | <input type="checkbox"/> |
| 93. I am encouraged to be creative. | <input type="checkbox"/> |
| 94. My peers often tell me they like my work | <input type="checkbox"/> |
| 95. I am not recognized for my efforts | <input type="checkbox"/> |
| 96. I am not rewarded for my efforts | <input type="checkbox"/> |
| 97. There is no such thing as recognition for good work | <input type="checkbox"/> |
| 98. There are no rewards for doing good work. | <input type="checkbox"/> |
| 99. My employer does not show appreciation for my contribution | <input type="checkbox"/> |
| 100 I receive praise from my boss | <input type="checkbox"/> |
| 101. My employer takes the credit for my work | <input type="checkbox"/> |
| 102. My contributions are recognized by my peers. | <input type="checkbox"/> |
| 103. My contributions are recognized by my employer | <input type="checkbox"/> |
| 104. My contributions are rewarded. | <input type="checkbox"/> |

Now we would like you to rate your agreement/disagreement with the following items using the scale presented below

- | | |
|--|---------------------------|
| 1 = Strongly Disagree | 4 = Agree |
| 2 = Disagree | 5 = Strongly Agree |
| 3 = Neutral, neither agree nor disagree | |

- | | |
|--|--------------------------|
| 1. I would be very happy to spend the rest of my career in this organization | <input type="checkbox"/> |
| 2. I enjoy discussing my organization with people outside it | <input type="checkbox"/> |
| 3. I really feel as if this organization's problems are my own | <input type="checkbox"/> |
| 4. I think I could easily become as attached to another organization as I am to this one | <input type="checkbox"/> |
| 5. I do not feel like 'part of the family' at my organization | <input type="checkbox"/> |
| 6. I do not feel 'emotionally attached' to this organization | <input type="checkbox"/> |
| 7. This organization had a great deal of personal meaning for me | <input type="checkbox"/> |
| 8. I do not feel a strong sense of belonging to my organization | <input type="checkbox"/> |
| 9. I help others who have been absent. | <input type="checkbox"/> |
| 10. I am punctual | <input type="checkbox"/> |
| 11. I volunteers for things that are not required. | <input type="checkbox"/> |
| 12. I take undeserved breaks. | <input type="checkbox"/> |

- 13. I orient new people even though it is not required.
- 14. My attendance at work is above the norm.
- 15. I help others who have heavy work loads.
- 16. I coast towards the end of the day.
- 17. I give advance notice if unable to come to work.
- 18. I spend a great deal of time in personal phone conversations.
- 19. I do not take unnecessary time off work.
- 20. I assist my supervisor with his or her work.
- 21. I make innovative suggestions to improve my department.
- 22. I do not take extra breaks.
- 23. I attend functions not required but that help company image.
- 24. I do not spend time in idle conversation.
- 25. People in this organization are willing to share knowledge/ideas with others.
- 26. This organization is good at using the knowledge/ideas of employees.
- 27. People in this organization keep their best ideas to themselves
- 28. People in this organization share their ideas openly.
- 29. People with expert knowledge are willing to help others in this organization.
- 30. I am rewarded by my manager for sharing information with people in the organization.
- 31. My manager would like me to share more information with other people in the organization.
- 32. My manager has told me to share more information with other people in the organization.
- 33. My manager doesn't really care if I share information or not
- 34. Managers seem to be serious about getting workers to share information with each other.
- 35. My organization has a special knowledge-sharing initiative underway.

Does your employer make use of, or provide, any of the following?

	YES	UNCERTAIN	NO
1. An Intranet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. An organizational directory.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. An Intranet forum where employees can ask questions and post answers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Email discussion forums where employees can ask questions and post answers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Software that is designed to encourage information exchange.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. A server set-up so that documents can be easily shared.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. An Internet Connection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. A library or resource collection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. A means of sharing information with coworkers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Access to technical experts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

These last few items are for descriptive purposes only. No attempt will be made to identify individual respondents.

Year of Birth _____

Gender: Male Female

Highest level of education completed: _____

Current Occupation _____

Length of Time with Current Employer: _____

Are you employed Full time Part time

Is your current job Temporary (e.g., Fixed Term Contract)

Permanent (No Fixed Term)

Thank you for your participation. Please return the questionnaire in the envelope provided (NOTE: Postage has been paid).

Appendix F

Affective Commitment Scale (Study 2)

Allen, N.J., & Meyer, J.P. (1990).

I would be very happy to spend the rest of my career in this organization

I enjoy discussing my organization with people outside it

I really feel as if this organization's problems are my own

I think I could easily become as attached to another organization as I am to this one

I do not feel like 'part of the family' at my organization

I do not feel 'emotionally attached' to this organization

This organization had a great deal of personal meaning for me

I do not feel a strong sense of belonging to my organization

Appendix G

Organizational Citizenship Scale (Study 2)

(Smith, Organ & Near, 1983)

Helps others who have been absent.

Punctuality.

Volunteers for things that are not required.

Takes undeserved breaks.

Orients new people even though it is not required.

Attendance at work is above the norm.

Helps others who have heavy work loads.

Coasts towards the end of the day.

Gives advance notice if unable to come to work.

Great deal of time spent with personal phone conversations.

Does not take unnecessary time off work.

Assists supervisor with his or her work.

Makes innovative suggestions to improve department.

Does not take extra breaks.

Attends functions not required but that help company image.

Does not spend time in idle conversation.

Appendix H

APPLICATION OF KNOWLEDGE SCALE (Study 2)

In my job....

1. I use a variety of skills
2. I make full use of my technical knowledge
3. I rely on my knowledge to solve problems
4. I use information
5. I interpret policies or procedures
6. I need a great deal of technical knowledge
7. I find it helpful to understand the 'big picture' and how my work fits into it
8. I couldn't perform my job if I didn't have the required knowledge
9. I make full use of my work-related knowledge
10. I am required to use technical knowledge to perform my work
11. I have a clear understanding of what I need to know to perform my work.
12. My work entails gathering the resources necessary to get the job done, and I know where to find those resources.
13. I make decisions about how to do the work.
14. I solve problems
15. I have to know how to get things done in my workplace.
16. People bring me their problems to solve.

Appendix I

ACQUISITION OF KNOWLEDGE SCALE (Study 2)

In my job...

17. I ask others for information
18. I ask others for advice
19. I learn new things while performing my work
20. I acquire new skills
21. I take training
22. I read technical journals or books
23. I consult with others
24. I look things up on the internet
25. I take additional courses on my own initiative
26. I seek new information on my own
27. I acquire new knowledge in the performance of my work
28. I call the supplier/manufacturer when required to solve a problem
29. When I encounter a problem, I do research to find a solution
30. I troubleshoot
31. I call other similar organizations / departments to see how they do certain things/practices
32. I subscribe to various professional publications
33. I subscribe to various internet sources for information relating to my work
34. I learn from the experience of others
35. I learn by observing others
36. I attend conferences to stay current

Appendix J

CREATION OF KNOWLEDGE SCALE (Study 2)

In my job...

37. I come up with new ideas
38. I solve problems
39. I create new ways of doing things
40. I make suggestions to improve current practices
41. I innovate
42. I generate new ideas to solve problems
43. I generate new ideas to improve current practices
44. I demonstrate creativity
45. I have a proven track record for my creativity
46. I invent things as I go along
47. I get strange or unusual requests that challenge me
48. My ideas are adopted by my employer
49. I never get feedback on my suggestions
50. Creativity is not fostered by my employer
51. I take old ideas and give them a new twist
52. I solve problems
53. I've come up with some very unorthodox ways of solving problems

Appendix K

PACKAGING OF KNOWLEDGE SCALE (Study 2)

In my job...

54. I train others

55. I offer feedback to others

56. I give advice to others

57. I explain procedures to others

58. I give information to others

59. I write policies or manuals

60. I document our procedures

61. I keep track of our work to avoid having to reinvent the wheel

62. I gather information from various sources before presenting it to others

63. I take knowledge from various sources and package it in new ways

Appendix L

ORGANIZATIONAL OPPORTUNITY SCALE (Study 2)

In my job...

64. I learn from my coworkers
65. My coworkers learn from me
66. I meet informally with my coworkers and we chat about our work
67. We hold staff meetings to exchange work-related information.
68. I exchange work-related information with my coworkers
69. I rely on my coworkers for work-related advice
70. When I encounter a problem, I ask a coworker for assistance
71. We talk shop at coffee or on break
72. Sitting around having coffee with my coworkers is a good to learn
73. Being able to exchange information with my coworkers is important
74. Teams offer the opportunity to learn from each other's experience
75. I've developed a good network of people I can rely on
76. I work as part of a team
77. I consider myself a team-player
78. I have the opportunity to demonstrate initiative
79. I have the opportunity to offer suggestions to improve current practices
80. I have the opportunity to demonstrate my resourcefulness
81. I am expected to do as I am told
82. I am encouraged to ask questions
83. I am encouraged to contribute my ideas.

84. My employer provides me with opportunities for continuous learning
85. I have the opportunity to work on interesting new projects
86. I have the opportunity to acquire new skills through training
87. I have the opportunity to learn from my peers
88. My employer provides me with all the information I need to stay current
89. People here are not receptive to new ideas
90. People here do not accept change
91. I am not expected to contribute my ideas
92. I am encouraged to think of new ways to solve problems
93. I am encouraged to be creative.

Appendix M

ORGANIZATIONAL SUPPORT SCALE (Study 2)

In my job...

- 94. My peers often tell me they like my work
- 95. I am not recognized for my efforts
- 96. I am not rewarded for my efforts
- 97. There is no such thing as recognition for good work
- 98. There are no rewards for doing good work.
- 99. My employer does not show appreciation for my contribution
- 100. I receive praise from my boss
- 101. My employer takes the credit for my work
- 102. My contributions are recognized by my peers.
- 103. My contributions are recognized by my employer
- 104. My contributions are rewarded.

Appendix N

OCCUPATIONAL GROUPS (Study 2)

**(15% of respondents did not provide demographic information)*

MANAGERS (17% of respondents)	PROFESSIONALS (40% of respondents)	OTHER (28% of respondents)
Assistant News Director Manager Supervisor, Technical & Adm staff Manager, Technical Service Executive Director Project Manager Retail Supervisor Project Coordinator Manager Operations School Director Supervisor of Student Teachers Laboratory Supervisor Warehouse Manager Client Services Administrator Officer (OHS&E) President Communications & Ops Manager Materials Management Business Owner Office Manager Volunteer Coordinator Service Coordinator Sales Manager Vice President Office Coordinator Sales Coordinator Research Administrator	Senior Account Executive Nurse Communications Officer Lawyer – civil servant Social Worker Banking Officer Electronic Technologist Research Coordinator Research Technologist News Editor Dental Hygienist Director Writer – Producer (TV Commercial) Writer – Producer Broadcaster Teacher Career Counsellor Financial Advisor Trainer (Supt) Dentist Medical Equipment Trainer Videographer Information Technology Analyst Senior Technology Specialist (IT) Reporter Sales Executive Medical Laboratory Technologist Systems Engineer Continuing Education Trainer Head of Technical Department (School) Media Systems Analyst Chartered Accountant Web Page Designer / Programmer Resource Counsellor Software Tech Implementation & Supp Technician Technical Specialist Meteorologist Finance Employment Coordinator Police Officer Public Relations HR Advisor Accountant Real Estate Sales Power Engineer	Assistant Electrician Broadcast Technical Operator IT Support Administrative Assistant Medical Assistant Human Resources / Accounting Accounting Clerk Dental Assistant Paramedic Scheduler Master Control Operator Sales Assistant / Research Retail Tour Guide Sales / Retail Change Agent Customer Assistance Administration Teaching Assistant Front Desk Clerk Order Entry Clerk Installation Service Technician Engineering Assistant Production Assistant Government Sales Representative Military Waitress Secretary Reception / Administration Camera Operator Client Service Service Technician Insurance Sales Customer Service Representative TV Technician Warehouse personnel Chimney sweepers Officer Clerk Shipping / Receiving Bricklayer Executive Assistant

Appendix O

DISTRIBUTION BY SNOWBALLING

Number of Surveys	Distributed to Members of the Following Organizations:
10	Cooperators' Insurance – Bouctouche, New Brunswick
20	Maritime Fireplace- Moncton, New Brunswick
25	Agriculture Canada – Charlottetown, Prince Edward Island
25	Revenue Canada - Saint John, New Brunswick
10	Revenue Canada - Halifax, Nova Scotia;
15	Dentist – Fall River, Nova Scotia
10	Banker – Dartmouth, Nova Scotia
10	Nova Scotia department of Justice
15	Auburn High School
25	Ecole du Carrefour, both in Dartmouth, Nova Scotia
20	Nova Scotia Association of Health Organizations;
10	Military Family Resource Centre – Halifax, Nova Scotia
30	MSHJ Research – Halifax, Nova Scotia
55	Soccer parents
30	Department of National Defense – Halifax, Nova Scotia
25	RCMP – Nackawic Detachment, Nackawic NB
20	Sussex Elementary School, Sussex New Brunswick
10	Passport Canada – Ottawa, Ontario
15	Canada Post – Halifax, Nova Scotia
65	family members, neighbours and friends