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## INFORMATION SEEKING AND STOPPING AMONG UNDERGRADUATE INTERNS

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The information seeking behaviour of student interns was investigated from the perspectives of: sources of information and knowledge used; reasons for selecting these sources; ways of verifying the appropriateness of retrieved information; stopping the search process; and the effect of locus of control and learning style on their information seeking behaviour. Results show that the internet and colleagues were the most common sources of information, while contacts outside the organisation were also important. Interns' existing tacit knowledge ranked low as a source of information. Convenience of access to the sources of information and confidence in them were major determinants of the source chosen. Respondents with an internal locus of control were more satisfied with the *types* of information and with the *amount* of information retrieved, than those with an external locus of control.

### 1. Introduction

This exploratory small scale study investigates the information seeking and stopping behavior of undergraduate student interns and how individual-level psychological factors like locus of control and learning approach influences these two behaviors. The participants were 22 undergraduate information management students undertaking summer internships that ran from May to August in 2008. The study explores issues concerning: the range of sources of information and knowledge (both explicit and tacit) retrieved by student interns; their confidence in the quality of the information retrieved; whether the information was sufficient in quantity for the task; psychological factors affecting their information behaviour; and other factors that influenced students' decisions on where to seek information, and when to stop seeking it. It has relevance for KM in Libraries and Information Sectors in the following three areas:

- (i) It confirms the reliance by organisational members on colleagues' tacit knowledge to verify the relevance and accuracy of information retrieved to address significant specific tasks within the workplace,
- (ii) It explores the information seeking behaviour of new organisational members, as represented by student interns,

- (iii) It surfaces issues that indicate that information seeking training should not be confined to the acquisition of technical searching skills, but should also include less tangible factors such as evaluation of information and confidence building.

## **2. Literature Review**

The research was informed by a literature review that focused on the following four themes:

- (i) information seeking in professions,
- (iv) information seeking and stopping,
- (v) professional internships,
- (vi) the effect of locus of control on academic performance.

The following discussion provides a brief summary of earlier research.

### **2.1 *Information seeking in professions***

Information management, analysis, online searching, and data mining are considered desirable skills for organizations (O'Sullivan, 2002). The importance of information has led to numerous studies investigating the information seeking processes and characteristics of different professional groups. A number of studies indicate that engineers primarily rely on oral communication with colleagues as sources of information (Anderson, Glassman, McAfee, & Pinelli, 2001; Hertzum, 2000; Hertzum & Pejtersen, 2000). Colleagues are preferred sources because, even if they cannot provide the necessary information, they may offer to find out. This ability to "make commitments sets people apart from documents and makes people more versatile as information sources" (Hertzum, 2000, p. 10). Additionally, individuals are important sources because their experience and knowledge is often not recorded anywhere, nor shared with colleagues in a systematic manner (Hertzum, 2000). There is also a value-added element:

The primary way to become aware of relevant material is through interpersonal communication. This way, the material is normally supplemented with some advice, background information, and inspiration. (Hertzum & Pejtersen, 2000, p. 766).

Case (2007), provides a detailed summary of a range of information behavior studies undertaken on different occupational and professional groups including: scientists, engineers, social scientists, humanities scholars, health care providers, managers, journalists and lawyers.

## **2.2 Information seeking and stopping**

Information stopping has not been addressed comprehensively in the literature. Hert (1997) noted that,

At some point in an interaction, the respondent makes a decision to stop searching. Like the other components of the interaction, stopping is situated, and a specific stopping point cannot be identified prior to the actual search. (p. 71).

A key issue is when and why the decision to stop searching for information is made. In an early attempt to address this, Kraft and Lee (1979) posed 3 stopping rules: satiation (a desired number of documents have been retrieved); disgust (too many irrelevant documents have been retrieved); and combination (satiation or disgust, whichever comes first). Zach (2005) investigated the information seeking and stopping behaviour of senior managers in the arts. She concluded, among other things, that they were satisficers. That is, they had achieved a “good enough” option rather than the best possible result. Additionally, time constraints forced information stopping. In a study of academic information seekers – faculty staff, undergraduate and graduate students – time constraints were a major factor for faculty, while students stopped when they felt they had enough information to satisfy the requirements of assignments (Prabha & Silipigni, 2007), echoing the notion of satisficing.

## **2.3 Internships**

Internships have long been recognized as an important method for preparing students for professional careers (Siegler, Gentry, & Edwards, 1979; Weinberg, 1986). As Gardner (1999) suggests: hands-on experiences, informal apprenticeships with active professionals, and exploration of learning through other institutions (e.g. business and community associations) are fundamental ways for students to refine their skills and gain new insights into their professions. Morgan and Turner (2000) note that employers desire graduates “who are flexible and able to cope with and respond to the changing complexities of commercial life” (p. 454); that is, graduates who have developed relevant skills, such as information seeking, away from a purely academic setting. According to Patterson (1997), internships have three-way benefits: students gain real-world experience; academic programs can enhance their reputation; and employers can recruit potential staff from an improved pool of graduates.

Students may encounter a range of problems during their internships, including job stress and a lack of knowledge or skills. Murray-Harvey (2001) investigated the sources of support that students draw on to cope with practicum stress in a teacher training program, and found that seeking support from teachers was their primary coping strategy.

#### **2.4 Locus of Control and learning approach**

Biggs (1987) conceived of learning approaches as a combination of motivation and strategies for learning. Locus of control is a measure of how individuals view control over their own actions. It has been suggested that an *internal* locus of control supports self-directed courses of action (Zimmerman, 2000). Locus of control has been investigated as a potential variable of performance in education especially in relation to deep learning. Deep learners are those who are intrinsically motivated and strive to integrate what they already know to what they are learning. On the other hand, surface learners are those who are extrinsically motivated and who favor superficial learning strategies like rote memorization (Biggs, Kember, & Leung, 2001). Individuals who are high on one approach are typically low on the other approach. As noted by Watkins (1987), early studies by Ramanaiah, Ribich and Schmeck (1975), Watkins (1984), and Watkins and Astilla (1984) demonstrated a relationship between deeper level learning and an internal locus of control. Reynold's (1988) study of 589 undergraduates showed a correlation between an internal locus of control and a high academic self-concept, i.e. "individuals' self-concept and self-efficacy beliefs that are formed specifically toward academic.....domains" (Bong & Skaalvik, 2003, p. 6). Wilhite (1989) concluded that locus of control can be a better predictor of academic achievement than academic self concept in certain academic contexts.

Although locus of control and learning approach has not been studied directly in the context of information seeking and stopping, they might be important factors that influence these processes.

### **3. Method**

The study was designed to explore the Student interns' information seeking and stopping behavior, in particular the following five research questions were addressed:

- (i) What sources of information and knowledge (both explicit and tacit) did student interns seek?
- (ii) What were the student interns' reasons for selecting these sources?
- (iii) How did the student interns verify the appropriateness of information once retrieved?
- (iv) How did the student interns decide that they had retrieved sufficient information?
- (v) Did the student interns' loci of control and learning strategies affect their information seeking behavior?

A mixed methods approach was adopted, involving a semi-structured interview involving 20 questions that was administered to 22 Bachelor of Science [Information Management] students in Hong Kong to gain insights on their information seeking behavior during their summer internship that ran from May to August in 2008. This interview focused on students' information seeking process for a significant non-routine

task in the workplace. Quantitative data was obtained from closed questions involving Likert five-point style ranking, while open-ended questions provided qualitative data. The quantitative data was analysed using SPSS. Qualitative data was analysed using NVivo. Additionally, students completed Rotter's (1966) *Locus of Control Scale* to measure their locus of control and Biggs, Kember, and Leung's (2001) *Study Process Questionnaire* to identify whether they were deep or surface learners.

The survey focused on students' information seeking process for a significant non-routine task in the workplace. The questions addressed issues relating to the following five areas:

- (i) Sources of information and knowledge (both explicit and tacit),
- (ii) The student interns' reasons for selecting these sources,
- (iii) Ways of verifying the appropriateness of information once retrieved,
- (iv) How the student interns decided they had retrieved sufficient information,
- (v) Whether the student interns' locus of control and learning strategies affected their information seeking behaviour

#### 4. Results

The following results contain quantitative responses, drawn from the Likert scale questions, and qualitative responses from the open ended questions. Numbers in brackets indicate the number of interns who responded in open-ended questions to the related issue. Some apparent discrepancies in the numbers of qualitative responses are explained by non-completion, or lack of accompanying detail, by some of the subjects.

##### 4.1 *Identifying information needs*

The interns' information needs were based on specific tasks that they were delegated to complete by their workplace supervisors. Previous research has indicated that the initial stages of the search process often include uncertainty and apprehension (Chu, 2008; Kuhlthau, 2004). Student interns are, to a large extent, in an unfamiliar situation, so their uncertainty is likely to be amplified in the work environment. This uncertainty is reflected in their reliance on their supervisors' judgment (10) and consulting peer workmates (3) to indicate the types of information required. Six interns made their own assessment of the information needs, relying on prior experience (1) and preliminary exploration of databases (4).

##### 4.2 *Sources of information*

The interns used a range of different information sources, when seeking information for different tasks, and seeking information for the same task. The most commonly consulted source for information was the internet (mean=4.05) followed by colleagues in the organization (mean=3.53).

*Table 1. Information sources consulted by students for their tasks*

Information source	Mean	SD
Used the internet or other online sources	4.05	1.35
Asked someone in your receiving organization	3.53	1.43
Used a library	2.63	1.46
Asked your friends	2.37	1.30
Had some of the information already	2.26	1.63
Asked an information services professional	1.89	1.20
Hired consultants or research firms	1.63	1.12
Asked someone from another organization	1.47	1.72
Asked your family members	1.37	0.76
Other media (e.g. newspaper, TV, radio)	1.17	0.71

*Note:* Participants were responding on a scale of 1-5, with 1 as the least commonly used and 5 as the most frequently used information source.

Table 2 summarizes the determinants that influenced student interns to consult particular information sources.

Table 2. Determinants in selecting a particular information source

Reason for selecting source	Mean	SD
Convenience or easy access to the source	4.26	0.65
Confidence in the source	4.11	1.05
Familiarity with the source	3.68	0.67
Information was in an easy to use format	3.47	1.02
Need the information quickly	3.17	1.30
Want a wide range of sources to enhance the credibility of the project	2.33	1.46

Note: Participants were responding on a scale of 1-5, with 1 as the least important reason and 5 as the most important reason.

#### 4.2.1. Internal vs. external sources of information

The sources of information identified in Table 1 can be divided into: sources from within the organization; and sources of information external to the organization. Overall, external sources were ranked more highly. Interestingly, libraries featured prominently (7), indicating that, while the internet is clearly the most popular source of information, there is a recognition that it cannot supply *all* external information needs. It should be noted that these interns retained access to the University of Hong Kong Libraries, which host one of the world's most extensive online collections and could be accessed remotely by the interns. Within the organizations, apart from interrogating colleagues, internal databases (3) and files (4) were important sources of information.

#### 4.2.2. Document sources vs. human sources

There was a range of human sources, some from within the organisation and others from outside, e.g. friends, family members, information professionals, consultants and members of other organizations. While this latter group had low individual incidence, it may indicate that the interns were carefully matching the nature of the information need to a particular source. Another possible explanation is that information seekers work through a predetermined list, starting at the information source they consider most likely, and then, if the need is unsatisfied, moving to the next most likely source, and so on. From the KM point of view, the reliance on human information sources within the organization confirms the importance of tacit knowledge.

### 4.3 Evaluating the quality of retrieved information

Interns applied a range of methods to evaluating the quality of the information they retrieved. As indicated in Table 2 above, interns frequently selected sources that they considered reliable, i.e. their selection of the source was often linked to their evaluation of the quality of information they perceive it contains (14). Reliance on a supervisor or colleague's opinion (5) was also important. A relatively small number of interns used their own judgment (3) based on their assessment of the retrieved information itself, as opposed to the perceived quality of the source. This clearly reflects confidence in their ability to evaluate the information.



#### 4.4 *Information stopping*

The major reason for halting information seeking was time constraints (10). The amount of information retrieved was also an important factor, such as situations: where students could not find any additional relevant information (6); their perception that they had found everything that was relevant; and that they had found sufficient information to complete the task (4). One intern stopped seeking information when instructed to do so by his/her supervisor!

##### 4.4.1. *Returning to information seeking*

Sixteen interns returned to search for additional information after they had initially stopped. Mostly, this was due to the ongoing nature of the projects that they were working on. Length of time spent on the project required information retrieved earlier to be updated (2); key information was found to be missing at a later stage in the project so additional information was sought (4); some retrieved information needed clarification so further seeking was required (4); and editorial work on the project report required additional information (2). In summary additional information seeking was required due to inadequacy of the initial results in ten cases; while in two cases, updates on earlier retrieved information were required. This second point is of interest because it reflects information seeking behavior in longer projects, i.e. additional information may not be required, but due to the time lag between stopping information seeking and completing the project, some information loses currency and needs to be updated.

#### 4.5 *Percentage of information used*

Utilization of the information was reasonably high overall, indicating that students' information seeking had been effective in most cases, as indicated in Table 3.

*Table 3. Percentage of retrieved information used*

Information used(percentage)	Number
21-40	1
41-60	4
61-80	9
81-100	5

*Note:* Intervals with no activity have been omitted.

Further background on the reasons for the differing levels of information use, especially at the lower end of the continuum, could be insightful. As noted, by Feldman and March (1981), much of the information gathered for decision-making in organizations has little relevance to the decision or it is not used. Relatively low use of retrieved information in the current study may be due to a range of reasons, including: poor information seeking skills resulting in low-quality results; a difficult area in which to search, resulting in decreasing returns to scale, i.e. as higher recall is sought, precision

drops away dramatically; seeking security in more information after sufficient information has been retrieved, resulting in superfluous or duplicated information.

#### **4.6 Time devoted to information seeking**

Most of the interns spent considerable time seeking information as indicated in Table 4.

*Table 4. Time spent on information seeking for task*

Time (hours)	Number
Less than 11	1
11-30	4
51-60	3
81-100	8
150 or more	2

*Note:* Intervals with no activity have been omitted.

Similar to 4.1.4, additional background relating to the reasons for the differing amounts of time spent seeking information could be instructive. Relatively large or small amounts of time spent seeking information may be due to a range of reasons, including: the individuals' levels of information seeking skills resulting in efficient or inefficient (and time-consuming) searches; level of difficulty of areas in which to search, requiring simple or complex (and time-consuming) searching strategies; continuing to seek more information, even after sufficient information has been retrieved.

#### **4.7 Problems encountered in seeking information**

There were no dominant problems that interns encountered when seeking information. Despite the relatively high precision rates for the retrieved information, some interns had difficulty in the information seeking process (3); while others complained of too many irrelevant results (4); technical problems (2); and working against time (1). Evaluation of the results was problematic due to a lack of experience in the subject area (3).

#### **4.8 Locus of Control**

Due to the small sample size, inferential statistics were not undertaken. Descriptive analysis of the data, however, revealed interesting findings with regard to locus of control and learning strategies. Rather than representing the participants on a continuous scale, median split was used to divide the participants into two distinct groups: those with external locus of control, and those with internal locus of control. This follows the approach of earlier studies involving locus of control as a variable (e.g. Gidron, Gal, & Syna Desevilya, 2003; Hahn, 2000). Similarly, participants were divided into those who were either deep or surface learners. Results indicate that individuals with an internal locus of control and those with an external locus of control perceive the information seeking and information stopping process differently.

Respondents with an internal locus of control were more satisfied with the *types* of information ( $M = 4.3$ ,  $SD=0.48$ ; scale of 1-5, where 1 represented “not satisfied” and 5 represented “very satisfied”) and with the *amount* of information ( $M=3.8$ ,  $SD =0.63$ ; scale of 1-5, where 1 represented “not satisfied” and 5 represented “very satisfied”) retrieved, compared to those with an external locus of control (satisfaction with the type of information:  $M=3.83$ ,  $SD=0.64$ ; satisfaction with the amount of information:  $M=3.62$ ,  $SD=0.74$ ). Individuals with an internal locus of control likewise perceived the information search process as less difficult ( $M=3.00$ ,  $SD =0.76$ ; scale of 1-5, where 1 represented “not difficult” and 5 represented “very difficult”) compared to those with an external locus of control ( $M=3.43$ ,  $SD=0.53$ ).

#### **4.9 Study approach and information seeking/stopping**

Median split was used to divide students into deep learners and surface learners. Deep learners were found to be more satisfied with both the *type* ( $M=4.3$ ,  $SD=0.48$ ) and *amount* of information ( $M=3.90$ ,  $SD=0.74$ ) they had when they stopped compared to surface learners (satisfaction with the *type* of information:  $M=3.88$ ,  $SD=0.64$ ; satisfaction with the *amount* of information:  $M=3.5$ ,  $SD=0.53$ ). With regard to confidence, the deep learners were more confident of the information they had when they stopped looking ( $M=4.4$ ,  $SD=0.70$ ; scale of 1-5, where 1 represented “not confident” and 5 represented “very confident”) compared to surface learners ( $M=4$ ,  $SD=0.53$ ). Surface learners experienced more difficulties when searching for the needed information ( $M=3.5$ ,  $SD=0.71$ ) compared to the deep learners ( $M=3.0$ ,  $SD=0.71$ ). Deep learners felt that they were able to use more of the information they retrieved ( $M=75.5$ ,  $SD=13.63$ ; where subjects estimated the *percentage* of retrieved information that they used) as opposed to the surface learners ( $M=69.28$ ,  $SD=21.68$ ).

## **5. Discussion**

Results showed that the internet was the most widely consulted information source by the student interns, followed by asking a colleague in the receiving organization. This heavy reliance of the student interns on oral communication with others to gain access to information is supported by previous research undertaken on people working on different fields such as engineering (Hertzum & Pejtersen, 2000; King, Casto, & Jones, 1994). However, individuals external to the organization such as: friends ( $M=2.37$ ), members of another organization ( $M=1.47$ ) and members ( $M=1.37$ ) were individually *not* as significant, but when grouped together as organisational outsiders become important sources of information. This use of outsiders as information sources may be exaggerated in the present study due to the relative unfamiliarity of the subjects, as student interns, to the organization, its personnel and its information channels.

An interesting finding was that relying on personal knowledge was only ranked as the sixth most commonly used information source by the student interns. This is in sharp

contrast to the information seeking patterns of professionals who tend to rely on their own personal knowledge and experience first, when faced with a work-related decision or problems (Leckie, Pettigrew, & Sylvain, 1996). It suggests that the information seeking behavior of professionals are different from those of student interns. Professionals who have more domain knowledge, experience, and expertise can rely on their own personal knowledge and experience; while student-interns, who are novices in the field, do not have access to such knowledge, so they tend to rely on external sources more. There is a clear need for more research on the information seeking behavior of novices like student interns because most studies have concentrated on the information seeking behavior of professionals (e.g. Anderson, et al., 2001; Hertzum, 2000; Hertzum & Pejtersen, 2000; Jackson, et al., 2007). This study illustrates that there are salient differences between novices and experts in their information seeking behavior.

### 5.1 Convenience/Quality Tradeoff

Convenience of the information source emerged as the most important factor influencing the interns' decision in choosing an information source; confidence in the quality of the source ranked only second. This is consistent with the principle of least effort, which states that people strive to resolve their problems in a way that minimizes the work they need to do. This principle, proposed by Zipf (1949) in the pre-digital era has been supported by many subsequent studies in a range of different areas up to the present and echoes Zach's (2005) description of information seekers in her study as satisficers. For example: Von Seggern (1995) found that scientists relied heavily on personal collections, informal communications, and accessible resources. They exhibited less usage of library sources and formal literature review processes. Other previous research on information seeking behavior that supports the principle of least effort includes: Badawy (1988), Blandin and Brown (1977), Hardy (1982), O'Reilly (1982), Rosenberg (1967), Swanson (1987), and Liu & Yang (2004).

The high ratings for convenience of source, and confidence in the quality of the source, require further investigation. From the searcher's perspective, an ideal information source is both reliable *and* convenient to access. The cognitive process by which searchers distil these elements may indicate that *both* are factored into the decision of where to search for information. Sources perceived as being of poor quality may be *a priori* excluded from the process of selecting information sources, i.e. the convenience factor may be limited to a group of information sources that are already perceived as being reliable. This decision is also limited by the time frame for completion of the project, of which information seeking is just one part. That is, the imperative for timely completion may skew searchers' behavior towards the satisficing model, where perceived quality may be compromised in the interests of urgency. This is consistent with the low ranking for validation of the interns' projects, i.e. increasing the credibility of the project by providing supporting information from a range of sources.

## 5.2 *Psychological Variables*

This study illustrates the importance of taking into account psychological variables like locus of control and study approach when investigating information seeking and stopping behavior. Previous research has shown the importance of addressing the characteristics of the users in exploring their information seeking behavior. Most of these studies have focused only on demographic variables like experience and education (Johnson, Donohue, Atkin, & Johnson, 1995; Keller & Holland, 1978; O'Reilly, 1982). However there are some that look at the psychological dimensions. Kuhthau's (2004, etc.) Information Search Process (ISP) model explicitly addresses the affective impacts on the searcher at different stages of the information seeking process. Bellardo (1985) concluded that the influence of personality, shyness and weak self-esteem may initially have a negative impact on search outcome, but can be reduced by experience in database searching. Borgman (1989) investigated personality characteristics and abilities related to academic orientation variables previously found to predict information retrieval performance. She concluded that individual characteristics should be taken into account for information retrieval training. Heinstrom (2003) demonstrated that personality dimensions affect information behavior. These inner traits interact with contextual factors during information behaviour.

The present study highlights the differential experiences in information seeking and stopping by individuals with different learning strategies and loci of control. Those with higher internal loci of control expressed more confidence in their ability to make decisions about: identifying information sources; evaluating the quality of information; and knowing when to stop seeking information. Parallel to this, deep learners, compared to surface learners: were more confident of the information they had when they stopped; perceived fewer difficulties when searching for the needed information; and felt that they were able to use more of the information they retrieved.

The implications for this are difficult to extrapolate and raise further questions, e.g.:

- Does technical expertise in information seeking compensate for external locus of control?
- Should building the confidence of information seekers be integrated into information literacy instruction?
- Where internal locus of control is *not* matched by information seeking skills, will poor technical decisions be made at different levels of the information seeking process due to overconfidence; etc.

## 6. **Conclusion**

Student interns in this study provided evidence of being satisficers, in terms of their information seeking. They relied heavily on the internet and colleagues as sources of information, and ranked familiarity of the source and convenience of use highly.

Broadening the range of sources to enhance the validity of a project was *not* ranked highly, reflecting satisficing, pragmatism, and time constraints. Balancing this, the interns also gave high ranking to confidence in the source.

There was evidence that psychological variables, such as locus and control and learning style, may have an impact on the student interns' information behavior in the workplace. Students with internal loci of control expressed more confidence in a number of information seeking components. This was mirrored by subjects with a deeper learning approach.

## 7. Limitations and Further Study

The major limitation of the study is the small number of subjects. This reduces the potential generalizability of the study. The study could be expanded to include a larger number of subjects, which would enable the application of multivariate statistics to better analyze the relationships among the different variables.

Additionally, the study could be expanded to include interns who do *not* come from an information management/library and information science background. The subjects of the present study have had deep interaction with information resources and methods as part of their prescribed course of study. In contrast, most student interns have, at most, been exposed to optional general library courses. This may mean that the psychological dimensions of interns' information behavior may be amplified in the general student population.

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