

Needles, Haystacks, Filters and Me: The It Confidence Dilemma

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CITATION

Edwards, S.L. & Bruce, C.S. (2002) Needles, haystacks, filters and me: the IT confidence dilemma. Refereed Conference Paper presented at *Lifelong Learning Conference 2nd: Yeppoon, Central Queensland, Australia, 16-19 June 2002*. [Lifelong Learning Conference: refereed papers from the 2nd International Lifelong Learning Conference, Yeppoon, Qld.] pp. 165-171. ISBN: 187 6780 19 3

NEEDLES, HAYSTACKS, FILTERS AND ME: THE IT CONFIDENCE DILEMMA

ABSTRACT

As higher educators strengthen curricular attention to graduate capabilities, it becomes important to understand what students are experiencing as they engage with learning these capabilities. Using an Information Technology unit as a focus, we report preliminary findings from an investigation of the different ways in which students experience information searching.

INTRODUCTION

As the higher education sector focuses its attention on the graduate attributes or skills, efforts to understand what students are thinking and experiencing while learning would be an advantage in future curriculum design. Using one unit in the Faculty of IT as a focus for the study this paper will report on the preliminary findings from ongoing research aiming to determine variation in the ways students approach information searching, learning to search for information, and potential levels of sophistication in information searching behaviour¹. It is believed that this research should benefit both teaching and learning strategies and may indeed lead to suggestions for improvement in information retrieval tool design.

This paper will briefly outline the background to the current study, explaining the research objectives, and give a brief account of the preliminary findings from the data collected and analysed to date.

BACKGROUND

No matter who we are, whether we are involved in teaching and learning, simply trying to keep up-to date in our personal life, or in workplace environments, we each face a constantly changing technological environment. Each of us occasionally struggle with new tools and concepts that straddle our life path. The trick would appear to be able to accept and learn these new tools and concepts. If we couple this skill with the fact that we live in an information age, then we can see a major problem. We are bombarded with thousands of printed journals and texts, and immediate access to an abundance of electronic information. With all this resource and information variety, however, rather than relief at having this at the flick of a switch, the variety of resources and information can feel quite overwhelming and can create confusion. As teachers we need to know how students learn to search in order to help them deal with this context.

Previous research has focused on the characteristics and metrics of searching (Jansen & Pooch, 2000), showing that the majority of searchers use two terms in a query, little or no Boolean operators, typically view no more than the first ten results displayed, and stay online for 10-15 minutes maximum when performing a search. There have been few

¹ This papers reports on the preliminary research findings of the work introduced at the 1st Lifelong Learning Conference in Yeppoon in 2000: an attempt to embed generic skills within one unit of the IT curriculum.

studies to date attempting to identify how the searcher decides on their approach, or to discover the variations in experiences that are occurring (Fitzgerald & Galloway, 2001) The findings imply a different approach is used in some aspects of searching database compared to search engines, raising some questions and implications for teaching and learning, curriculum design, and IR tool design. The questions raised can be summated as needing to understand why students approach searching IR systems in their present manner, and what are the variations in the approaches used. As students are approaching all databases, regardless of tool with the same approach, some implications for T&L and tool design need noting.

THE RESEARCH PROJECT

The broader investigation, therefore, aims:

1. To determine variation in the ways IT students approach information searching when using the Internet and library databases.
2. To determine variation in IT students ways of learning to search for information when using the Internet and library databases.
3. To recommended teaching and learning strategies for curriculum design that are based on managing student's experiences.
4. To determine if there are levels of sophistication in information searching, or other differences in student information searching behaviour approaches.
5. If levels do exist, to identify any triggers to move from one level of searching sophistication to another level.

The Pilot Study reported in this paper reveals that the students interviewed show four different ways of experiencing information searching, and that they appear to be hierarchical in character. Ethical clearance was obtained.

DESIGN OF RESEARCH APPROACH

For research purposes it was important to make sense of the students' understanding of the information searching and retrieval concepts within their individual educational experience context. That coupled with a desire to understand and study student approaches to learning to search, means that this research naturally lent itself to phenomenography (Bowden & Walsh, 2000, p.1).

Phenomenography is a research method adapted for mapping the qualitatively different ways in which people experience, conceptualise, perceive, and understand various aspects of, and phenomena in, the world around them (Marton, 1986, p.31).

Phenomenography is an interpretive research approach that looks at the different ways people experience or conceive a range of phenomenon (Marton, 1988). It has been used within the IT domain to explore conceptions of programming (Booth, 1990), information systems (Cope, 2000), and information literacy (Bruce, 1997).

As there is no prescriptive format to conduct the phenomenographic research, when phenomenography is used it requires that the procedure adopted is documented and the individual variations in the method used explained (Bowden & Walsh, 2000).

GATHERING AND ANALYSING THE DATA

The 10 participants were QUT students, from the IT and other faculties, at both the undergraduate and post-graduate levels, who largely had a few years experience of information searching, without having had formal training in the task.

To start the dialogue with participants, entry level questions were made concrete, asking them to describe a search they had recently done and then asking them to explain further about what they actually did in that searching process, and why. Respondents were invited to explain their experiences in both graphical or written form, and were also video recorded during an information searching task.

Transcripts of the interview were the primarily tool for the analysis of the data. From the analysis of the transcripts the researcher developed the categories of description of the phenomenon. Put simply these categories are our interpretation, based on their analysis of the data, of the variation in an individual, or a groups, account of the way they experience information searching (Cope, 2000, p.78). Each category represents one way in which the phenomenon is experienced. The purpose is to clearly define both the meaning and the focus of each group's way of looking at the world.

Using the categories, we have developed an outcome space. This is, in its simplest form, a map showing what critically different categories have been found by the research, and the relation between them.

WAYS OF EXPERIENCING INFORMATION SEARCHING

Analysis of the data gathered to date suggests an initial framework of four categories that capture student's different ways of searching and learning to search for information. It should be emphasised that these categories may still be fluid, as analysis is ongoing.

1. Information searching is seen as looking for a needle in a haystack.
2. Information searching is seen as the process (or Planning).
3. Information searching is seen as using the tools as a filter.
4. Information searching is seen as using the tools as a filter to limit results to high quality information.

Each of these categories is associated with different meanings being assigned to the search experience. They are also associated with different awareness structures, different approaches to learning and different search outcomes. The awareness structures are differentiated in terms of different foci, and also in different ways of seeing the information environment, the information tool structure, and the awareness of the quality of information. The following sections briefly outline each of the four categories according to their meaning, the structure of awareness, the approach to leaning evident, and the likely search outcomes.

Category 1: Information searching is seen as looking for a needle in a haystack.

Meaning:

In this category students see information searching as similar to looking for a needle in a haystack. A significant amount of attention is directed towards the topic. They appear to see it as imperative to understand the topic or they will "never find it out there."

Structure of Awareness:

The structure of awareness associated with this experience suggests that the student's focus is on the topic. Although they are aware of the information environment they have no appreciation of the importance of the structure of that environment, nor the structure of the tools that they use to find information. In this category there is often confusion between different tools evident, and confusion over tool options.

(Please Note: Int 1:5(p.6) = Interview 1: Participant 5 (p. 6 of transcript))

Int 1:5(p.6) truncation is more like, let's say you have the 'or' 'not' 'and' and you try to use these words. Lets say you want both (topic 1) and (topic 2), you put the 'and' in it so you come up with both of them. That means it has to have both of these terms in it. And 'or' will be either this or either this, so any of them will do.

Approach to Learning:

In this category, and the other categories, the approach to learning is characterised by three dimensions. Firstly, their IT confidence is at a medium level in this stage. They are comfortable with IT, but not confident. They are comfortable enough to start searching for online resources, but their lack of confidence also probably interferes with their appreciation of the structure of the information environment. They have little understanding of the structure, and not enough confidence to push further into the environment to understand it better.

Int 1:5(p.9) Firstly ...I'm not familiar with the topic. Alright. I'm just over the head with (the topic). Secondly, I think it is also because I can't really do my search that well, with all these.

Secondly their planning is poor, or possibly non-existent, in this stage. There is no apparent understanding of any necessity to plan, and therefore there is little reflection occurring either. This reflection is the third dimension in their approach to learning. The likelihood is that the searcher will switch tools, and switch terms at the same time. Showing little evidence of approaching the search process in a reasoned manner.

Search Outcomes:

Finally there appears to be a correlation between quality and character of search outcomes, and the way of experiencing searching. This correlation may link back to the reflection process, in that as there is little or no planning or reflection taking place, it is likely that the search process will be abandoned. There is usually an assumption that the information required is not available at this source, or the tool in use is of poor quality and does not index the required information.

Category 2: Information searching is seen as the process (or Planning).

Meaning:

In this category students see information searching as the process, or the planning, of a search. While they still focus on the topic, there is a strong emphasis appearing on the choice of terms and synonyms, databases, and retrieving results into a useable format for later work. The process or the planning of the search has become more important.

Structure of Awareness:

With both the topic and the search process in focus, an interest and awareness of the structure of the information environment begins to appear. Along with this growing awareness, there is also an awareness of what the tool will allow them to do.

Int 1:3 (p.4) ...I try and find a search engine that has an advanced search option and do it that way and specify whereabouts I want the web site to be.

In this category the students begin to use advanced search features, and talk about some aspects of the quality of the information found. This information quality does not appear to be a major focus yet in their searching technique, but they are aware of its importance.

Int 1:5 (p.1) Because (Yahoo) is just one of those sites that actually gives you a lot of information. I tried a few like Askjeeves and all that. Askjeeves is more theoretical. That's what I've realised. It is more theoretical. It gives you more stuff on what is global positioning system and something, but not really much on distributors. Yahoo is very distributor oriented.

In general students in this category are more attuned with the different tools available but still talk about them interchangeably.

Approach to Learning:

Again the IT confidence is at a medium level in this stage. They are comfortable with IT, but not overly confident. They are comfortable enough searching for online resources, and, with a growing awareness of the structure of the information environment, they have begun to plan their searches and show some signs of reflection, changing terms searched on the basis of previous results. In this stage there is often talk of an early “quick and dirty” search used to enlighten them about the topic terms, and then refine their search based on a preliminary result.

Search Outcomes:

In this category they are more likely to persist, consider alternatives, and persevere to find results. However, again there is still a tendency to blame the tool rather than question their own abilities.

Category 3: Information searching is seen as using the tools as a filter.

Meaning:

In this category students see information searching as using the tools to filter to find information. They can undertake a search whether or not they understand the search topic. In fact they tend to use the tools to help them understand the topic as well as to find the

required information. The tools can, therefore, be used to further enhance their understanding of the topic.

Structure of Awareness:

The structure of awareness associated with this experience means that the student's focus is, primarily on the tools, and the topic is of secondary importance.

Int 1:1 (p.4) I always use a broad search first. Just with one, or two or three terms first. And then I get just an overview on the issue and I try to narrow it down. Because I always gets more articles than I can handle. I can't read them all, so. And I often use the abstract, especially on the QUT library, I also use, I just read about the abstract, and just look at articles I want to use.

There is a strong awareness in this category of the structure of the information environment, and little, or no, confusion between the different tools available. They are much more aware of the structure of each of these tools and show an ability to adapt their searching based on the tool they are currently using. In this category, while aware of the quality of information, it does not factor into their searching strategy. Primarily the tools are used to help refine the topic, and filter the results to a usable sized group.

Int 1:6 (p.1) ... *I had to search Internet definitely, but I also had to search some library to get a general information about (topic), and I also had to find the recent updates because the issue had to be current. So I had to search many many many fields, so I went to Internet first because it is the easiest way to get information that is Internet connected. ...I prefer to go to Metacrawler because it is a metasearch engine. ... Then I would probably go to the library and find books about (topic) and (sub-topic), because it is needed for general definitions.*

Approach to Learning:

IT confidence in this category is much more obvious, but also less likely to interfere with the search outcomes. Students are more aware of their possible mistakes, and take the necessary steps to correct them as required. Although the students did not notice all mistakes, the majority of them were both noticed and corrected. Planning is evident, and may even be written down before searching, and referred to during the process. This planning often includes an analysis of the terms and a more pronounced attempt to identify synonyms before proceeding.

Reflection is also evident. While the reflection process is not necessarily written down, nor changes in search strategy noted, there is attempts throughout the search process to identify any alternative synonyms and change strategies based on the results of the first attempts.

Search Outcomes:

As reflection is starting to be more refined, students experiencing searching in this way tend to be successful in searching. Most items missed in searching would be due to the unplanned stages of reflection. Given the search process tends to work, however, and they are aware of the structure of the information environment and the tools, it is unlikely the greater attention will be given to more through planning and reflection.

Category 4: Information searching is seen as using the tools as a filter to limit results to high quality information.

Meaning:

In this category students see information searching as using the tools as a filter and attempt to limit to higher quality resources during the search process. Again an understanding of the topic is not required, as they use the tools to help them understand the topic, as well as to find the required information. Furthermore, they use the appropriate tools to find the primary resource for information.

Structure of Awareness:

The focus of this category is primarily on the structure of the tool, followed by the topic, and includes for the first time a focus on the character or quality of the information resource. This character/quality awareness is the major difference from the previous category. As the awareness of primary and secondary information is heightened, the tools and their structure are used to both refine the topic and refine the search, to help filter out poor quality items (ie: domain name searching, etc.).

Int 1:4 (p.5)... *but if you do a search on say (topic) or something, and you'll end up with thousands of pages. But if you put lecture notes or tutorial on the end of it, it narrows it down quite a bit.*

Approach to Learning:

IT confidence is at its peak levels, but this confidence is not likely to interfere as they are aware of possible mistakes, and more likely to correct themselves. While it remains possible that screen and typing errors will be missed, they are more inclined to ask for help from peers.

Strong planning and reflection are evident and include the preceding analysis of the term and an identification of potential synonyms before searching, occasionally writing down changes in search strategy, and changing their strategy based on results of first attempts.

The major difference here again is that the process also includes reflection on information character/quality, which is not evident in other levels. They are also more inclined to stop a search, reflect upon improvement, then reattempt later a previously failed search. This reattempt may be minutes, days, or even weeks afterwards.

Search Outcomes:

As reflection is more refined, and across a series of the information tools, their structure, and the quality of information required, this group is usually successful in searching.

Discussion of Findings and Further Directions

Despite each respondent having a similar information literacy baseline, they each displayed differences in the way they approached and experienced information searching. To summarise, some have approached information searching similar to the idea of looking for a needle in a haystack, while others see the tools as offering filters to find information more readily. It is early days in the analysis to date, but the data at this stage suggests that the confidence with IT, in some cases, may be a hindrance to a student's ability to learn to search more effectively. This will be investigated in a later phase of the study.

The four categories discovered by this research can be mapped into an outcome space (refer figure 1). The outcome space reflects the hierarchical relationship between the categories found to date, and also presents the possibility of further categories that are yet to be identified. Further data is being gathered to ensure that the categories found to date can be confirmed.

At this stage it is suspected that there are two further categories yet to be found. The reason for this suspicion is that the study has only included IT students to date. It is expected that lower levels of IT confidence and neophyte searchers may indeed have a different experience to any of those listed, and less awareness of the information environment and its structure. It is further suspected that there is a further category 5, who would be information professionals with a number of years experience at information searching. The years of experience and the different ways of approaching searching may be another variation and level of sophistication above that of the present Category 4.

When the data gathering and analysis are completed, it is expected that the research outcomes will help in the future curriculum development to enable future students a more powerful development and a better understanding of the information searching phenomenon. It is hoped this will enable the identification of any triggers to move from one level to the next, and the development of ways to encourage this move, by enabling the students to perceive changes in their worldview. At this stage of the research the final aim is yet to be achieved.

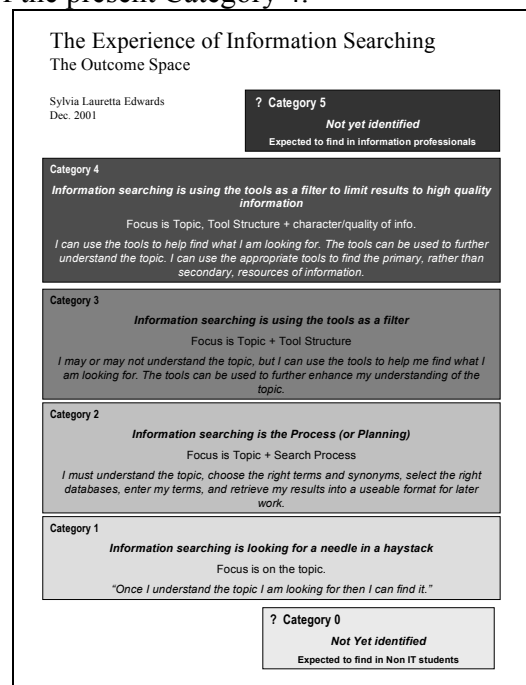


Figure 1: The Experience of Information Searching

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