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Exploring the Collaborative Information Behaviour of Engineering Students: a Pilot Study Design

Abstract: The paper reports the results and findings of a pilot study undertaken as part of a research project to explore the interaction between learning tasks and students' collaborative information behaviour when working as a group in a project-based undergraduate engineering design course at a Canadian university.

Résumé : Cette communication présente les résultats d'une étude pilote entreprise dans le cadre d'un projet de recherche sur l'interaction entre les activités d'apprentissage et le comportement informationnel collaboratif des étudiants. L'étude s'est penchée sur un cours de génie de premier cycle offert dans une université canadienne et utilisant une méthode d'enseignement par projets de groupe.

1. Background

Information seeking is an important and integrated part of work domains and work practices, and has been the focus of much research in information science. While many different models of information seeking have been proposed, most assume that the information seeker is an individual interacting with complex information spaces. Recent research, however, has found that people frequently collaborate and communicate when they retrieve and use information, and researchers have begun to challenge the individualistic approach by exploring the social, contextual and collaborative dimensions of information behaviour and information seeking (e.g., Bruce et al., 2002; Ingwersen & Jarvelin, 2005; Karamuftuoglu, 1998; Sonnenwald, 1999; Talja, 2002).

Many of the early information-seeking studies that have provided empirical analyses of *involved collaboration* through longitudinal research have focused on engineers' information-seeking behaviour. For example, Prekop (2002) explored the information-seeking behaviour of a military working group established to review the Australian Defence Force's command and control capability, Bruce et al. (2003) analysed two design teams during the initial stage of a software-engineering project and an aviation-engineering project, and Sonnenwald and Pierce (2000) reported on a qualitative study exploring human information behaviour in a command and control military context. These studies showed how social and collaborative aspects as well as the work context affect information behaviour and the problem solving process.

2. Research Objectives

Earlier studies in engineering have focused on engineers as professionals working on real-world projects; this research, in contrast, investigates the collaborative information behaviour of undergraduate engineering students working on a course-based engineering project to investigate how students collaboratively identify their information needs and then seek and use information sources from different channels. Engineering students, especially in design engineering courses, are required to find answers from a wide variety of documentary print and electronic information sources as well as seeking information from other people who they consider to be experts in the domain.

In spite of the mounting evidence of how important collaboration is during information seeking, a conceptual understanding of how people find and use information together remains elusive. Consequently there is a lack of models of collaborative information behavior; such models can be the basis for designing supporting tools and/or services. This research addresses these gaps by examining collaborative information behaviour in a naturalistic educational setting to gain greater insights into and more understanding of how students collaboratively seek information in an academic course and how students' information behaviours are affected by the learning task and its perceived complexity.

3. Research Design

As the research area focuses on a complex phenomenon that has many inputs; the study plans to investigate the effect of the project as a learning task on learners' information behaviour by exploring learning as a process of construction that includes the process of information seeking and use as an integral part. The theoretical framework for the study focuses on both the learner dimension and the subjected learning task dimension.

As the context of information behaviour has been recognized as essential in studying information behaviour, many recent studies have expressed the need to include the role of context and its impact on information-seeking behaviour (e.g. (Dervin, 2003; Wilson, 1981)) and to describe the complex and holistic process of information search: the study of context in information behaviour needs now warrants further exploration (Kuhlthau, 1991). According to Ingwersen and Jarvelin (2005), the pure cognitive view of information seeking has been criticized for its lack of realism, lack of theory integration, and lack of a holistic perspective that takes into account the underlying context and problem definition. Vakkari (1997) points out that research on information behaviour should follow a shift in meta-theory from a person-centred approach to a person in context or situation oriented approach.

The meta-theoretical frame of this study is constituted by the Sense-Making theory (Dervin, 1999). In essence, this theory deals with how an individual makes sense of his/her environment in a given situation, and specifically how seeking information bridges "gaps" or "discontinuities" that the individual has perceived in reality. In this study, it is a question of how students make sense of their situation, their need for information, and their seeking and using of information to solve the problem set out in their project. Sense-Making as meta-theory is selected as it presupposes that information action is not a static state, but a dynamic process.

The study is also framed through Taylor's information use environment (Taylor, 19991) that focuses on information use. Information use has two major viewpoints: (a) information use as a process, and (b) the various outcomes of this process, and both viewpoints can be seen as gap-bridging in Dervin's Sense-Making model (Savolainen, 2006). As both these previous models describe the information user as an individual, I am also using the integrated person in situation approach (Allen, 1997) to reflect and understand the information behaviour of group members and to study the impact on the information process of contextual factors such as the work task and its complexity.

The concept map of this study is shown in Figure 1. It represents a holistic view of the proposed research. It shall be noted that there is feedback from one action to any one of its predecessors if there is no satisfaction or accomplishment of the learning task

outcomes. This model represents the project as a learning task that includes many different subtasks during the lifetime of the project.

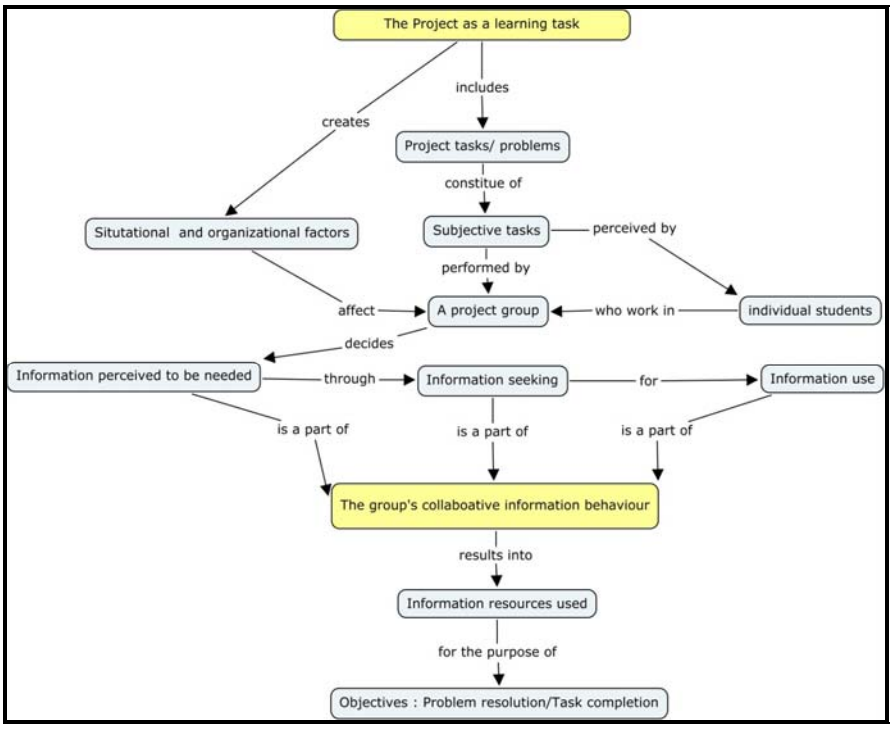

Figure 1: The general concepts of the research

4. Research Methodology

In order to explore and gain insight into the interaction between the learning task and the collaborative information behaviour of students, two case studies will be carried out in a group-based setting of students, and both of the case studies will be performed for the same course but in two consecutive academic years.

The design of both cases study will be based on a qualitative and longitudinal research approach that is concerned with an understanding of the group members' experience during the project. The research method will be a multi-method approach to collect data on complex phenomena, as each individual method would deliver only partial evidence on the phenomena while multiple methods will cover multiple aspects of students' experience.

5. Pilot Study

The pilot study was conducted in March 2010 near the end of the students' projects that had extended over 8 months. The purpose of the pilot study was to collect data about students' experience in the course and how the project task interacted with the group's collaborative information needs, seeking, and use. The pilot study did not aim to ask students about the information-seeking process in detail but it did try to capture the relationship between project task and students' collaborative information behaviour. Data was collected through a web-based questionnaire

The use of the questionnaire at the end of the year is based on the critical incident method, and is intended to focus on a recent concrete incident to collect data on a phenomenon that users have just experienced. Martyn and Lancaster (1981) describe the application of the critical incident method in information- seeking research as it relates to the use of information in the problem solving process. As it is easier and more reliable to report on a recent concrete incident than answering many broad and general questions, the questionnaire is designed to begin with more general questions about the project task and its complexity, and then focuses on the critical incidents within the collaborative information behaviour.

A web- based questionnaire was sent to all students near the end of their project to get feedback about their experience of collaborative information behaviour in the project. The selected class in 2009/10 comprised 63 students who were divided into 20 project groups. The questionnaire is divided into two major parts that measure the perceived learning task complexity and the collaborative information use from the students' point of view. The questions are both open ended to allow students to think aloud about their experience in addition to questions that indicate their level of agreement on a 1 to 5 rating scale concerning a number of statements about the project topic and their information behaviour. The questionnaire was to be completed individually by the students but the replies were grouped together by project group for intra-group analysis. Responses were received from 42 students (a response rate of 66%). This paper will present the analysis of the pilot study results and draw conclusions from them.

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