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Paper: Collaborative Information Behaviour of Engineering Students

Abstract: Collaborative information behaviour is an emerging area in information science that studies when two or more actors identify, seek, search, and use information to accomplish a task. This paper reports on a recent research investigating the collaborative information behaviour of undergraduate engineering students in the context of engineering design group projects.
Résumé: Le comportement informationnel collaboratif est un sujet émergent en sciences de l'information qui s'intéresse aux moments où deux acteurs ou plus cherchent, repèrent, sélectionnent et utilisent l'information pour accomplir une tâche. Cette communication présente une étude récente sur le comportement informationnel informatif des étudiants en génie dans le contexte de projets de groupe en conception technique.

Over the last years, a tremendous amount of research has focused on the ways that engineers as a group of professionals seek and use information in their work tasks (Allen 1977; Taylor 1991; Nelson and Pollock 1970; Gralewska-Vickery 1976; Pinelli et al. 1993; King, Casto, and Jones 1994). Leckie, Pettigrew, and Sylvain (1996, 164) reported that engineers were the first professionals whose information behaviour was studied. Further studies focused on identifying the factors that affect their information behaviour, including parameters such as accessibility (Bruce et al., 2003; Fidel & Green, 2004) , quality (Sonnenwald 1995) , types of information sources (Carstensen 1997) , levels of education and the nature of the work itself (Kwasitsu 2003), cost (Gerstberger and Allen 1968), and the preference of engineers to approach people as information channels over the use of documentary sources (Hertzum and Pejtersen 2000). Studies of engineers showed that their information behaviour is a result of a complex interaction among different variables (Leckie, Pettigrew, and Sylvain 1996, 167).

Studies of engineers' information behaviour have been extended to investigate the collaborative nature of information seeking and use in engineering work tasks (Potts and Catledge 1996; Button and Sharrock 1996; Prekop 2002; Bruce et al. 2003; Fidel et al. 2004; Hansen and Järvelin 2005). These studies showed that engineering tasks, and particularly in design and product development, require a high level of collaboration that includes collaborative information seeking and use.

The collaborative aspect of information behaviour is an evolving subject in information science and it is a rather new concern still under development in information studies (Talja, 2002, p.134). In his review of the literature, Foster (2006) notes that most of the research on collaborative information behaviour did not focus on collaboration itself. Many definitions of collaborative information behaviour have been developed to describe this phenomenon through its purpose (Talja 2002), types of resources (Hansen and Järvelin 2005), activities (Hertzum and Pejtersen 2000), levels of collaboration (Sonnenwald and Pierce 2000), and roles (Prekop 2002). Hansen and Järvelin (2005, 1102) define collaborative information behaviour as "an information access activity related to a specific problem solving activity that, implicitly or explicitly, involves human

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beings interacting with other human(s) directly and/or through texts (e.g., documents, notes, figures) as information sources in an work task related information seeking and retrieval process either in a specific workplace setting or in a more open community or environment". In the same study, the authors explained that this definition should be seen as a preliminarily definition which needs more refining through further studies, observations and investigations.

Guided by previous research on engineers' information behaviour, the study being presented here is investigating the collaborative information behaviour of engineering students in assigned design projects in order to explore the interaction between the project as the learning task and students' experience in seeking and using information while they work as groups in a senior year project-based undergraduate engineering design course. The aim of the study is twofold: to analyze the characteristics of the project as a learning task that affects the information behaviour of engineering students, and then to understand the collaborative information behaviour of these students in the context of their projects.

The research has been designed as a qualitative longitudinal study following a constructivist approach through two related studies undertaken in two successive academic years in a natural setting. The research design has been described in previous papers (Saleh and Large 2010; Saleh 2011). Data in the first case study constituted a web-based survey at the end of the course plus an analysis of the students' deliverables during the project: weekly progress reports that described the activities of the project, team memos reporting on the roles and activities of group members, and interim and final project reports. Preliminary results of the first study have been discussed in a previous published paper (Saleh and Large 2011).

The data in the second study has been collected through four interviews with eight students during the lifespan of the project that lasted for eight months. Interviews were conducted with individual students who were participating in design projects in order to get more understanding of learners' ways of approaching and then understanding information in an information-intensive engineering project that has been designed with real-world industry or community partners through predefined learning outcomes.

Qualitative data analysis was based on a grounded-theory approach as originally described by Glaser and Strauss (1967) through inductive method based on the constant comparative method (Strauss and Corbin 1994) to analyze and to categorize research data. One of the main characteristics of this inductive approach is that the categories emerge from the data through inductive analysis rather than coding the data according to prearranged categories (Charmaz 2006).

Data analysis showed that collaborative information behaviours dynamically occur in different stages of the project through different levels depending on the corresponding project tasks that trigger different collaborative information related activities. Students have spanned several roles in the design process regarding information seeking and use and these roles varied among different projects in the same course in the first study and also for students who were participating in more than one design project in different courses in the second study. The findings also showed the similarity of engineering students' information behaviour to those of professional engineers regarding accessibility and cost of information sources, timeliness, and their preference to approach people as information channels rather than use documentary information sources.

Perceived task complexity was found to be a factor that triggered collaborative information seeking activities of students to use different types of information sources with preferences for easily accessible resources. This perceived complexity was affected by students' prior knowledge and the ambiguity of information, making their preferred approach people who they consider as experts with better domain procedural knowledge and who can help them to understand the meaning of an information source or to guide them to alternative types of information sources that are useful for the project.

Another important finding is that the collaborative information behaviours of students were found to be centrally triggered by both the collaborative synthesis of the project information and the collaborative awareness of the tasks to be performed in order to create a collaborative meaning of the needed and acquired information through electronic media, meetings and group discussions; these activities shifted the balance from individual to group understanding. These findings are in agreement with Karamuftuoglu (1998) and Hertzum (2008) who emphasized that a central factor in collaborative information seeking is the construction of a shared understanding that integrates individual information behaviours. As this research is a part of a recent PhD thesis, the findings and conclusions of the study will be presented at the conference and will be published soon in a full paper.

Acknowledgement

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