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A relevance model for middle school students seeking information for an inquiry-based class history project

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ABSTRACT

The article reports a field study of 60 grade-eight students seeking information for their 4-month long, thesis-based class history project. The study asked: What is relevance for the group studied, and how does relevance evolve over the course of the students' 4-month history project? Instead of investigating a unitary concept of relevance, our conceptual framework considers both topical and psychological relevance as defined by Harter (1992). The 60 student participants were divided into three groups based on their instructors' marks. We then utilized the constant comparative method of Glaser and Strauss's grounded theory approach to code 2 class assignments that formed part of the history project. Study findings indicate that psychological relevance is constructed by the students in Associating, Translating and Verticalizing phases. Topical relevance only occurs in the Verticalizing third phase. Students in the High Mark Group indicated significantly higher instances of the Verticalizing phase than the Low and Middle Mark Groups who were stuck in the Associating and Translating phases. Students can be aided in this difficult process of constructing an effective relevance criteria framework via the design of personalized information systems that facilitate students' involvement of their prior knowledge and belief systems in the relevance assessment process.

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1. Introduction

Middle school students researching a thesis-focused history project are confronted with performing a neat meta-cognitive manoeuvre, a skill that, if learned, will serve them well for the rest of their lives. In a weeks-long process where they select and research a history topic they know very little about, the students must learn the meta-cognitive skill of constructing an ad hoc cognitive framework for organizing their thoughts on the topic, then combining these thoughts with information they find on the Internet and from other information sources to produce or construct new knowledge. Acquiring this knowledge construction skill is essential in our knowledge economy, so necessary that its acquisition, usually started in late high school or first year university, has now, among schools with a university-preparation mandate, been pushed down to middle school. An important part of this skill is knowing how to evaluate information for the purpose of knowledge construction? We assume topic information is the fuel for this new knowledge construction, and the construction and support of a thesis on their selected history topic is the spark plug, but what in information interaction sets off the spark?

Kuhlthau (1993) modeled an overview of this thesis-based school assignment process in her 6-stage Information Search Process (ISP) Model. In ISP Stage 1, the student initiates thinking on the assignment and recognizes a need for information. In

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Stage 2 the student selects the assignment topic. The student explores information on the topic in Stage 3, then formulates a focus on the topic in Stage 4. The Stage 4 focus is defined as a critical or personal perspective on the assignment topic, according to Kuhlthau. The student then collects information in support of the focus in Stage 5; and finally, in Stage 6, prepares and presents the finished assignment.

Over the four years of our research project(2010–2014), we specifically investigated the shift of information behavior associated with middle school students' ISP. We found that the students' required shift from ISP Stages 1–3, where they select their topic then explore information on the topic, to ISP Stage 4, where the students formulate their thesis, constitutes a hurdle for many students and that they need help to overcome the hurdle. What exactly are students doing in ISP Stages 1–3? They haven't formulated their focus-thesis yet—this happens in ISP Stage 4—so what, in terms of fuel, spark plug and spark, drives their information behavior in these difficult ISP Stages 1–3? If we look at Stages 5–6 more carefully, which maybe only successful, perhaps a minority of students actually reach, can this more careful look shed light on what the students are striving for in the shift from Stages 1–3 to Stage 4?

Bates' (1989) berrypicking model of information seeking describes the student's gradual bit by bit uncovering of their information need through iterative interaction with information, via both formal and informal (conversations with colleagues, family, friends) information systems. According to this berrypicking model, students define their topic feature by feature via interaction with topic information, but they also get "new ideas" from the information (Bates, 1989, p. 410). So it is not only a horizontal, quantitative, bit by bit accumulation of new information on the topic that's occurring (Liu, Liu, & Belkin, 2016); there is also a vertical adjustment in the student's understanding of the topic, and her own critical or personal perspective on the topic in terms of her thesis-based information need, which will precipitate Stage 4′s focus or thesis formulation. Taylor (1968) 4-level model is a classic vertical model of information need.

Taylor's model assumes the student user's real information need, which he calls the Q1-level of the need, is visceral and unknowable to the searcher. The Q2-level is the searcher's within brain, barely conscious form of the information need, while the Q3-level is a problem statement form of the need the searcher could produce if asked to sit down and write it out. Very few students do this. Instead, the student formulates a query to an information system based on the Q4-level, compromised form of the need. It is the form of the information need the searcher believes the information system requires in order to function. In Taylor's day as is the case today, the search query is overly short and overly general/non-specific. The resulting gap between the Q1-real information need and the Q4-compromised need "creat[es] an intention gap between users and queries" (Kim & Lee, 2015, p. 773). To close the gap in today's online Internet search environment–compared to the more drawn-out, horizontal search environment at the time of Bates' (1989) berrypicking model–the student searcher is forced to make the **vertical adjustment** from the Q4-level compromised form of the need into the Q1-Q3 levels of her information need when looking over and interacting with topic information accessed via the information system results list (for a cognitive model, see Sharit, Hernandez, Czaja, & Pirolli, 2008; see also, Monchaux, Amadieu, Chevalier, & Mariné, 2015).

We have always looked at this gap in terms of the disconnect between the searcher's query and the searcher's real information need. But what if we looked at the gap in another way? Not from the viewpoint of an inadequate or compromised query due to the searcher's inadequate identification of her information need; but rather from the perspective of the disconnect between the information accessed via the results list and the searcher's relevance criteria during her evaluation of the match between her information need and system output in the results list? So instead of not knowing adequately her information need, we examine the inadequacy of relevance criteria for this searcher to evaluate the relevance to her information need of the information found in or accessed via the results list.

If we focus in on relevance evaluation criteria, we see that it's different, a different process than assessing system output to the degree it matches with the searcher's information need. This is because the searcher creates an Expectation Set based on her information need, for what she expects to find in the results list; but in early ISP the topic information the searcher finds in the results list is different and creates its own and different set. In effect, the topic information the searcher finds in the results list, and the process of evaluating its relevance, changes the information need-based Expectation Set. In Fig. 1, we call it the searcher's Evaluation Set. Depending on the ISP stage the student searcher is in at the time of the search, the Evaluation Set must be to some extent connected to the information need-based Expectation Set. It may reinforce some aspect of the Expectation Set as shown in Fig. 1. Or it may, as Bates' berrypicking model suggests, shift the student's thinking, causing her to follow up new ideas. We set this 2-set vision of relevance evaluation as a study assumption:

> Relevance assessment is a 2-set process. The searcher's Expectation Set is produced based on the searcher's information need while the Evaluation Set is a separate set that comes to the searcher's mind in reaction to the topic information found in and accessed via the results list. The Expectation Set is more inward motivated while the Evaluation Set resulting from the searcher's interaction with information found in the system output is more outward, topic information oriented.

The general problem we investigate in the current study is the difference in the relevance assessment process of successful versus unsuccessful student participants in the study. In a thesis-based history project, we make the assumption that success has something to do with using newly found topic information (the fuel) to verticalize the information into the student's Q1-Q3 levels, the so-called "question levels of Taylor's information need model. But what sets off the spark when interacting with topic information found in the results list during the relevance evaluation process?

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