

Using Recommendations for Learning: Theoretical and Empirical Contextualisations

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Introduction

Learners can easily be overwhelmed by the amount of available information in the World Wide Web. Thus, the use of filtering mechanisms like social navigation and recommendations is indicated. These tools facilitate users in finding relevant material in large informational environments (Dieberger, 2004). Besides the development of workable, scalable architectures for recommender systems, it is relevant to address the social science perspective of recommendations. For this purpose, this paper considers theoretical and empirical contextualisations and outlines their implications.

Theoretical Contextualisation

At first sight, the research of recommendations is a pure technical domain. However, if we have a look in classical psychological literature, the association of theoretical conceptions on the one hand and main functional principles of recommender systems on the other hand becomes apparent:

First, the principle that recommendations are derived from a community of learners rather than from experts goes hand in hand with the emphasis on constructivist, learner-centered accounts of education. On a larger scale, research on collaborative filters resonates with ideas that are manifest in theoretical constructs such as common ground (Clark, 1996), “wisdom of the crowds” (Surowiecki, 2005), group awareness (Gutwin & Greenberg, 1995), and group cognition (Stahl, 2007). Second, the principle of personalisation has become an important issue since Cronbach and Snow (1977) demonstrated the importance of aptitude-treatment interactions. Computer technologies are perfectly designed to address this issue, as could be shown in various areas of the learning sciences (e.g. adaptive multimedia systems). Third, the principle of giving guidance to learners is related to theories about help-seeking behaviour (Aleven et al., 2003). This means that recommendations can be classified as a social activity, where the individual can benefit and seek advice from the corresponding community.

The interplay of both disciplines leads to the main factors which determine the functionality of recommendations for learning: the technical perspective focuses on the context of recommendations (including tool characteristics), whereas the psychological perspective concentrates on the learners themselves. Humans employ quite different strategies of information processing, depending on personal and situational variables. Consequently, their use of recommendations will differ as well. Moreover, social psychology has made us aware that humans exhibit certain biases when they search for information (e.g. confirmation bias). These biases may run counter to some instructional objectives. Finally, and most strikingly, designers should be aware that recommender systems are probably more subject to anthropomorphisms than most other tools. As users are likely to ascribe a personality to recommender systems (McNee et al., 2006), issues like impression management come into play. Being aware of these peculiarities is likely to influence the design of recommender systems.

Empirical Contextualisation

One common goal of research on recommendations for learning should be the enhancement of the matching between the underlying contextual factors with the specific learning situation. Empirical considerations can help to derive testable hypotheses about the boundary conditions that make recommender systems work. Therefore, we identified three variables as a starting point of our research: learning goal, searching goal and depth of processing.

- **Learning goal:** Knowledge resources can be consistent or inconsistent to prior knowledge structures, to interests, to attitudes and to majority opinions. Our assumption is that the learning goal influences which kind of recommendation is necessary. Consistent recommendations are hypothesized to be useful when prior knowledge is rather low and the learning goal is to reach a deeper understanding of the content. In contrast, inconsistent recommendations particularly make sense when prior knowledge is rather high and the learning goal is to receive an overview of the content.
- **Searching goal:** Two processes of information seeking can be differentiated: searching and browsing. 'Searching' indicates a more goal-orientated, directive search, whereas 'browsing' refers to rather superficial scan and select operations (Marchionini, 1995). We expect that recommender systems lead to better results (higher acceptance rates, higher satisfaction) when learners are involved in browsing activities rather than searching activities.
- **Depth of processing:** The availability of cognitive resources plays an important role in the search for information. Dual-process theories postulate two different types of information processing. Selection of information can be accomplished in a systematic, reflected mode of processing or in an automated mode of processing (Chaiken & Maheswaran, 1994; Petty & Cacioppo, 1986). It is hypothesized that under conditions of heuristic information processing, learners will exhibit higher acceptance rates for recommendations than under systematic processing. However, this effect can be levelled out by providing additional source information.

Implications

The contextualising research and development of recommender systems results in a more complete picture of what makes these systems work. Careful analysis of functional properties can help to avoid pitfalls in the design. Knowledge about the idiosyncrasies of human information processing can make us aware that the perceived usefulness of recommender systems will rest on sometimes unexpected variables (like the ascribed personality of these systems). And empirical work on the underlying mechanisms will help not only to unravel principles of group cognition, but also can inform the design of future developments in this promising field.

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