

Recommender Systems in e-learning: axiological, epistemic, and practical implications of the design choices.

Abstract

Recommender systems are increasingly used in e-learning in order to provide the users with personalized services and advice: task difficulty ranking (e.g. [1]), learning material or path recommendation (e.g. [2,3,4]), friend recommendation (e.g. [5]), learning object recommendation (e.g. [6,7]), performance evaluation (e.g. [8,9]), etc. The objectives and proposed items, the chosen recommendation techniques, the features that are taken into account, the way the recommendations are presented to the users are closely related to the designers' perception of learners and knowledge. Is the recommender system designed to team with humans or act alone? Are the recommendations explained to the user? What are the purposes of the system? On which criteria are based the recommendations? For example, making recommendations based on the user's learning style could have the effect of freezing them in one way of learning, when they are multisensory learners. This trend stems from the will of personalizing teaching and adapting it to the student's preferred way of learning and is part of the idea that learning should be made easy. But it results in propagating categorization and labelling of learners, thus encouraging them to develop fixed mindsets and to perform from them. Thus, promoting the value of adaptability, it spreads compartmentalization, cognitive sealing, and pedagogical experiences limiting.[10] On the contrary, some hybrid recommender systems are designed in order to adjust their propositions to the current context, such as the user's learning environment or their potential change of interest, and provide them with evolving recommendations (e.g. context-aware recommendations, sequential pattern mining [11,12]). These various approaches reflect different epistemic and ethical viewpoints, since representing people using fixed models is easier to process, diagnose, predict and explain, but presents a partial view of reality and overshadows that they are complex and evolving individuals.

Similarly, choosing content-based recommendation techniques instead of collaborative filtering ones have crucial stakes, both ideological and practical, that have to be seriously examined: when the former may meet the user's expectations more directly, the last allows more serendipity. Just as the systems that recommend friends, pages, articles, etc. based on the user's interests and ideas may confine them to exclusive communities of ideas and promote socio-economic and cultural exclusive grouping, some recommender systems in e-learning can restrict the view of available courses to items considered similar to those that the

learner has already followed, thus promoting specialization rather than diversification and openness. This aspect is closely related to fundamental issues involved in theory of knowledge: against an increasingly compartmentalized scientific knowledge, the will of transcending disciplinary dividing lines crystallized around the concepts of “interdisciplinarity” in the 1970’s then “transdisciplinarity” in the 1990’s. This is a key subject for the evolution of University and, more fundamentally, modern societies. Indeed, these issues should be seen in a broader context of reflection about the economic changes and ideological transformations of a society marked by the neoliberal capitalism. On the one hand, in late 19th century, the accelerated development of scientific disciplines in both the empiric and the human sciences sectors made the scientific knowledge more efficient by multiplying the specialized looks – trend coeval to the industrial organization that led to the labor division and the task specialization. On the other hand, the research of a holistic knowledge in order to constitute a network of meanings is often regarded as an ideal to be achieved. But, beyond the issues of specialization or diversification, the values and the purposes of knowledge should be addressed: alongside an idealist perception of transdisciplinarity that aims to build a collective knowledge that rejects oversimplifying and totalizing solutions, respecting the elusive interplay between the whole and the parts, an utilitarian vision has emerged, resulting in a shift in the conception of science, less worried about the epistemological considerations than about the economic imperatives: the aim of science is now to find concrete solutions to multidimensional existing matters, often both technical and socio-economic, instead of theoretical reasoning in order to better comprehend the world. Thus, these issues have to be examined when designing a recommender system for e-learning: should we promote an utilitarian vision of science, in order to provide the users with tools directly relevant to the current job market? Or should we encourage and support the idealist perception of a holistic knowledge by proposing more theoretical courses, maybe dealing with rarely studied subjects? Such reflection is essential before the system is designed, because the decisions can heavily influence both the chosen techniques (i.e. for the most, collaborative filtering, content-based, knowledge-based, or hybrid approach) and the user and item characteristics that are taken into account in the algorithm.

The main goal of this study is to explain how the design of recommender systems in e-learning has both ideological and practical implications, since it reflects an ideological vision of science and techniques, thus requires a previous examination of these issues in order to define the theoretical model of theory of knowledge in which it takes place. For that purpose, since these tools raise questions about the concepts of knowledge and science, we study them

briefly tracing their historical evolution and resituating them in the context of our modern societies, with a particular focus on the epistemic and ethical issues it brings. We will define the scientific and political implications of the choices that can be made, while we examine methods used by existing recommender systems and their axiological stakes.

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