Editorial: Recommender systems and virtual learning communities

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Biographical notes: Olga C. Santos is the R&D Technical Manager of aDeNu Research Group at UNED and coordinates the technical developments of the group. Her current research interest focuses on taking into account recommendation strategies to provide open source educational accessible user-centred e-learning services for learners, where she applies her experience on previous research works on adaptation, collaboration and personalisation based on combining user modelling and machine learning techniques in multi-agent architectures and making a pervasive use of educational and technological standards and open architectures and technologies. She has published more than 110 papers in various international conferences and journals and co-chaired workshops and conferences related to topics from her research.

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This issue of the *IJWBC* is guest edited by Olga C. Santos and Jesus G. Boticario and presents the theme 'Recommender systems to support the dynamics of virtual learning communities'. We are delighted to offer five articles written by 19 experts in the diverse areas from this multidisciplinary field, including researchers in recommender systems, educators and usability practitioners. In spite of the specificities of the call for this issue, 16 proposals were received from all over the world, giving an acceptance rate of 31%. A double-blind reviewing process involving 13 experts from the field has been established to select the papers for the special issue, following the quality guidelines given by *IJWBC*. Accepted papers come from three different continents (Europe, Asia and USA) and four different countries (Spain, Finland, Jordan and Brazil).

This special issue is motivated by the current research on recommender systems applied to virtual learning communities to dynamically support their members in their interaction within these learning environments. This support is offered through recommendations derived from those contributions shared by the diversity of the community members that are the more interesting for each member (taking into account his/her profile). Virtual learning communities that emerge nowadays store contextual and semantic information from the contributions provided by the users through the services offered, such as discussions on forums, shared links, entries in blogs, ratings to learning objects, comments to contributions, etc. This information contributed to the virtual community could become relevant to their mates. However, these contributions increase continually and the community members are unable to take advantage of them. Thus, recommenders provide a valuable dynamic functionality to the members of virtual learning communities by recommending the appropriate shared contributions to each member.

Traditionally, much of the published research on recommenders has focused on the algorithms that power the recommendation process. However, many research challenges remain, especially when it comes to applications in specific domains, the design of the interfaces and the social implications of recommenders. Further research is needed to analyse needs and expectations from the users to which recommendations are offered. In particular when recommenders are applied in domains different from the traditionally ones (e.g., e-commerce), a domain oriented study of the user needs should be carried out and richer scenarios in terms of their domain features are to be considered, including alternative ways of dealing with the required feedback from users' interactions.

Moreover, there is a need to take into account user-centred design methods in order to direct the technical design as well as the graphical user interface. In this sense, this special issue gathers papers that analyse needs related to these issues and propose solutions from a user-centred viewpoint that reflect the support that can be provided by recommender systems in virtual learning communities.

The authors discuss the characteristics of virtual learning communities and how recommender systems can be applied to dynamise them. Diverse perspectives are considered, including the involvement of users though user-centred design methods and the application of artificial intelligence techniques.

A bottom-up approach is used to present the contributions. First, a use case showing the impact of recommenders in virtual learning communities is presented. Leino discusses design issues related to using recommenders in learning environments and student perceptions of using rating and commenting to allow students to winnow down additional reading materials in a university course website. In his study, he found positive student perceptions that show that recommenders can enhance the virtual learning

community experience. Especially the rating feature was viewed positively and influenced selecting behaviour, while commenting, although perceived positively, was seen as underused and less influential. His work points out interesting issues on how users perceived comments and evaluations from other community members.

Next, Ruiz-Iniesta et al. describe the guidelines followed in the design of a framework for managing repositories of learning objects. The main features of the framework proposed are the engagement of the virtual learning community in authoring and maintenance tasks, along with the use of recommender system technology in order to provide personalised searching and retrieval features. The paper focuses on the recommendation tasks, which help to identify suitable resources for the students in the virtual learning community. The recommendation approach follows a cascade hybrid strategy that refines the decisions of a case-based recommender by using a collaborative one. It is of particular interest their approach to deal with the problem of judging the utility of items in a given context. They also focused on providing an interface that alleviates the overload of information that students suffer.

Another framework is introduced by Fraij et al. which employs a different technique. It utilises memory-based collaborative filtering algorithm combined with an imbedded web crawler to update learning material. Key to the system is finding the correlation between the new learner and previous learners. The goal is to provide personalised suggestions for learners taking introductory undergraduate courses and has been successfully tested on real learners taking an introductory mathematics course. The performance of the learners in both groups was tested and the results showed that the learners in the experimental group outperformed their counterparts in the control group.

The fourth paper by Holanda et al. proposes an information agent-based system for helping students in the process of knowledge building by providing them with recommendations of papers and blogs as an educational resource in the context of an adaptive and semantic virtual learning environment. From mining users' interactions, the recommender system retrieves relevant material to support dynamic interactions. The design and implementation of the proposed system are described as well as a performed case study and its preliminary empirical results are reported.

Finally, Santos et al. present the user centred design process followed to design the administration tool for educators to support them in the understanding, generation and usage of recommendations for virtual learning communities. The aim of this tool is to facilitate the involvement of educators when personalising the learning experience for their students in virtual learning environments.

Additional included are two articles. Jaldemark is introducing the next special issue: Participation in online learning communities. His article 'Theories of participation in online learning communities: an intersectional understanding' gives information that helps to understands important aspects of participation in online learning communities.

In the article 'Does beauty matter? The role of friends' attractiveness and gender on social attractiveness ratings of individuals on Facebook', Jaschinski and Kommers investigate how the attractiveness of Facebook friends affects the impression formation of the profile owner, thereby including gender effects of target and perceiver.

The guest editors would like to thank the reviewers listed at the end of the Volume 8 for their valuable contribution and advice, which has given this special issue the high quality we are aiming for. As editors of this special issue, we expect that this compilation of papers helps to advance the research in the dinamisation of virtual learning communities.