Recommender Systems for Technology Enhanced Learning
Recommender Systems for Technology Enhanced Learning

Research Trends and Applications

Foreword by Joseph A. Konstan
It was an inauspicious beginning in Barcelona in 2010. I had agreed to give talk to a workshop I hadn’t heard of before on Recommender Systems for Technology Enhanced Learning. That morning was sunny and hot, and the city’s usually efficient transit was on strike. I was advised that the easiest way to get to the workshop would be a long walk, so I set off for the workshop reflecting on the theme of my talk—that recommender systems had great potential in education, but that we weren’t there yet. Arriving hot and tired, I re-told the story I’d been telling for almost 15 years—about how recommending products was relatively easy, and that it was a quick win for the technology. Product recommenders certainly have improved quality of life—making shopping and television watching easier. But for people seeking a deeper impact, they may fall short.

By contrast, education raised all sorts of challenges for recommender systems. But it also presented the potential for a deep win—for making a difference that would affect the quality of life for billions of people. The technical challenges are formidable. Education is fundamentally interdependent and sequential. A learning module or lesson that may be ideal for a student at one time may be completely useless too early or too late. So in a very real way, technology-enhanced learning should be a “grand challenge” for recommender systems researchers—but at that time, it mostly wasn’t happening.

There were many reasons why. Making progress on educational recommenders presented at least three formidable obstacles to the typical recommender systems researcher. First, the researcher needed to gain understanding of education and learning research—any successful effort in education would require such an understanding. Second, the researcher would need real datasets—part of the challenge at the time was the lack of large datasets in general and of cases where there are more than one or two alternatives for given content modules specifically. And third, the researcher would need to learn how to conduct meaningful evaluation—this is no longer simply a question of which learning modules a student “prefers” but of what leads to actual learning, competence, and performance, not just on an immediate
post-test basis, but later as the knowledge gets integrated. So while I was happy to lead the cheers for the whole area of RecSysTEL, and enjoyed seeing the work being done at the time, I left that day somewhat discouraged that this field would remain in the margins.

Three years later, how things have changed! Who knew that we’d have online courses with tens and hundreds of thousands of students? And who would have expected entire campuses (physical and virtual) committed to the idea of scientific exploration of personalised education? We are surely entering an era of new interest and new possibilities.

But what’s most exciting is that we are entering that area through strength. As I look through the collection of articles in this book, I see a variety of advances that bring together the best ideas in recommender systems with important TEL applications. It is gratifying to see the expansion of available datasets that can allow researchers to explore ideas offline first, and even more gratifying to see the increased diversity of research approaches and questions—with issues ranging from trust to affect, and methods ranging from data analysis to field and experimental research.

So we are entering what may well become the golden age of RecSysTEL research, and this is a well-timed volume to help bring those new to the field up to speed.

Minneapolis, MN

Joseph A. Konstan
Preface

Technology-enhanced learning (TEL) aims to design, develop, and test socio-technical innovations that will support and enhance learning practices of both individuals and organisations. It is an application domain that generally addresses all types of technology research and development aiming to support teaching and learning activities, and considers meta-cognitive and reflective skills such as self-management, self-motivation, and effective informal and self-regulated learning. It was in 2007 when our first efforts to create opportunities for researchers working on topics related to recommender systems for TEL found their way in workshops like the Workshop on Social Information Retrieval for Technology Enhanced Learning (SIRTEL), the Workshop on Context-Aware Recommendation for Learning, and the Workshop Towards User Modelling and Adaptive Systems for All (TUMAS-A).

Still, it was only in 2010 when a really rare opportunity rose: during the same week of September and at the same location (Barcelona, Spain), two very prestigious and very relevant events (the fourth ACM Conference on Recommender Systems and the fifth European Conference on Technology Enhanced Learning) took place, giving us the chance to bring the two communities together. And so we did, by organising a joint event called the 1st Workshop on Recommender Systems for Technology Enhanced Learning (RecSysTEL).

Since then, lots of things have happened to mainstream educational applications in recommender systems’ research. The most important achievement is an initial pool of datasets that have been collected and can be used to compare the outcomes of different TEL Recommender Systems to create a body of knowledge about the effects of different algorithms on learners. Furthermore, running research projects like Open Discovery Space\(^1\) and LinkedUp\(^2\) aim to create a publicly accessible Linked Data cloud\(^3\) that can be used as a reference dataset for RecSysTEL research. Along these infrastructure improvements various scientific events and publications

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1. www.opendiscoveryspace.eu/
2. www.linkedup-project.eu/
have been realised. The most relevant are the organisation of subsequent editions of the RecSysTEL workshop with bi-annual periodicity; authoring a review article for the Recommender Systems Handbook; expanding it to an introductory handbook on Recommender Systems for Learning; and contributing (as co-editors or as authors) to several relevant Special Issues in scientific journals and specialised books.

We thought that this is a good time to build upon this previous experience and to collect some state-of-the-art contributions to a volume that will give a fresh view of the status of this area. Our interest was to collect a representative sample of high-quality manuscripts that will illustrate some important research trends, identify key challenges and demonstrate some innovative applications. This volume is the result of an open call that helped us collect, peer-review, select and propose for publication 14 articles (out of 49 proposed works; 29 % acceptance rate) that give a very good picture of the current status of research in recommender systems for TEL. The first four chapters (Karampiperis et al.; Cenichel et al.; Dietze et al.; Bienkowski and Klo) deal with user and item data that can be used to support recommendation systems and scenarios. The next four (Hulpus et al.; Santos et al.; Schwind and Buder; Tang et al.) focus on innovative methods and techniques for recommendation purposes. And the last six (Fazeli et al.; Bielikova et al.; Nowakowski et al.; Fernandez et al.; Sie et al.; Petertonkoker et al.) present examples of educational platforms and tools where recommendations are incorporated.

The bibliography covered by this book is available in an open group created at the Mendeley research platform and will continue to be enriched with additional references. We would like to encourage the reader to sign up for this group and to connect to the community of people working on these topics, gaining access to the collected bibliography but also contributing pointers to new relevant publications within this very fast developing domain.

We hope that you will enjoy reading this volume as much as we enjoyed editing it.

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4http://www.mendeley.com/groups/1969281/recommender-systems-for-learning/
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