



**3rd Workshop on
Social Information
Retrieval for Technology-
Enhanced Learning
'SIRTEL09'**

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Manouselis and Rob Koper

at the International Conference on
Web-based Learning (ICWL),
Aachen, Germany, August 21, 2009

Welcome to SIRTEL09

What we want to achieve:

- Influence the State-Of-the-Art on SIRTEL research with your development efforts.
- To give you feedback where you are located in SIRTEL and what might be interesting for you.

How we want to work:

- Collaborative Mindmapping 

Workshop Programm

Time

Programm

09.00

Welcome and introduction

09.15 - 09.45

H. Drachsler: State-Of-The-Art on Recommender Systems in TEL, 1st Handbook on Recommender Systems

09.45 - 10.15

Discussion on SIRTEL challenges for 2020

10.15 - 10.45

Break

10.45 - 11.00

F. Abel, I. Marenzi, W. Nejdl and S. Zerr: Learn Web2.0: Resource Sharing in Social Media

11.00 - 11.40

A. Carbonara: Collaborative and Semantic Information Retrieval for Technology-Enhanced Learning

11.40 - 12.20

R. Vuorikari and R. Koper: Self-organisation and social tagging in a multilingual educational context

12.20 - 13.00

B. Schmidt and W. Reinhardt: Task Patterns to support task-centric Social Software Engineering

13.00 - 14.00

Lunch together with the participants

14.00 - 14:45

Possible "Pecha Kucha" session

State-Of-The-Art on Recommender Systems in TEL

Based on:

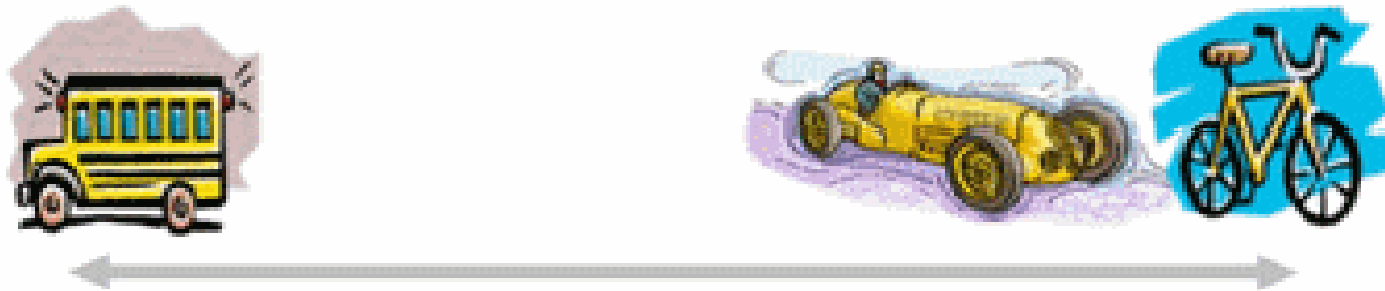
Manouselis, N., Drachsler, H., Vuorikari, R., Hummel, H.G.K., Koper, R.: Recommender Systems in Technology Enhanced Learning. In: Kantor, P.B., Ricci, F., Rokach, L., Shapira, B. (eds.): 1st Recommender Systems Handbook. Springer, Berlin (accepted).

Chapter Overview

1. Discuss the background of recommender systems in TEL, particularly in relation to the particularities of TEL context (*Formal and Informal Learning*).
2. Reflect on user tasks that are supported in TEL settings, and how they compare to typical user tasks in other recommender systems.
3. Review related work coming from **Adaptive Educational Hypermedia (AEH)** systems and the **Learning Networks (LN)** concept.
4. Assess the current status of development of TEL recommender systems.
5. Provide an outline of requirements related to the evaluation of TEL recommender systems that can provide a basis for their further application and research in educational applications.

TEL Context

Spectrum of Learning



Formal

You go where the bus goes.

Informal

You go where you choose.

Figure by : Cross, J. (2006). *Informal learning: Rediscovering the natural pathways that inspire innovation and performance*. San Francisco, CA: Pfeiffer.

Formal Learning Context

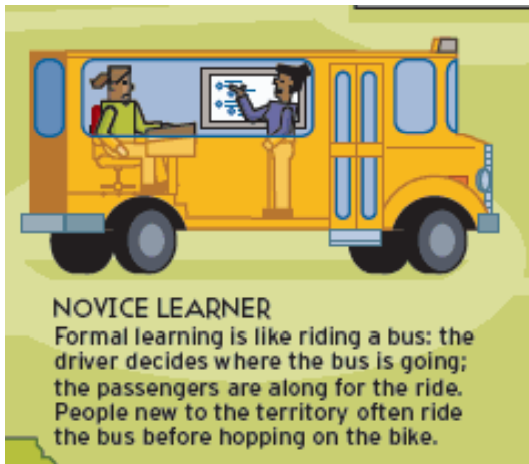


Figure by :
Cross, J. (2006). *Informal learning: Rediscovering the natural pathways that inspire innovation and performance.* San Francisco, CA: Pfeiffer.

- Formal learning includes learning offers from educational institutions (e.g. universities, schools) within a curriculum or syllabus framework, and is characterised as highly structured, leading to a specific accreditation and involving domain experts to guarantee quality.
- Most of the time addressed by Adaptive Educational Hypermedia approaches.

Informal Learning Context

- Informal learning takes place through daily life activities that are generally outside a formal educational setting (e.g. related to work, family or leisure activities), is less structured (in terms of learning objectives, learning time or learning support) and does not lead to a certain accreditation.
- Most of the time addressed by Learning Network approaches.

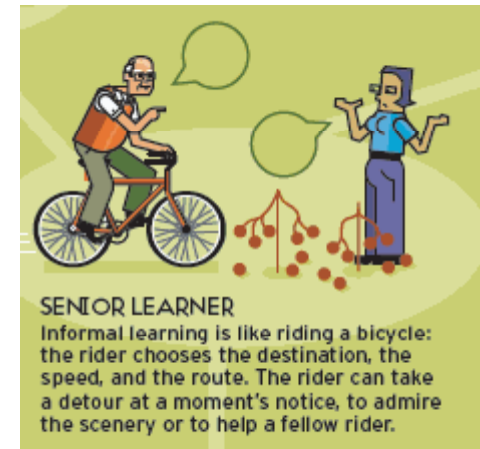


Figure by :
Cross, J. (2006). *Informal learning: Rediscovering the natural pathways that inspire innovation and performance.* San Francisco, CA: Pfeiffer.

Recommendation Goals

- **Annotation in Context.**

Web recommenders that provide predictions about existing links in the user's typical browsing environment.

- **Find Good Items.**

The core recommendation task, recommending users with a number of suggested items.

- **Find All Good Items.**

Providing recommendations in domains where information completeness is a critical factor (e.g. health or legal cases).

- **Recommend Sequence.**

Very relevant in systems where users are "consuming" items in a sequence (i.e. one after the other), such as personalised radio and TV applications.

- **Just Browsing.**

Relevant in cases where recommendation is not supporting relevant or "equally good" items, but is trying to expand a bit the search coverage with novel or serendipitous suggestions.

- **Find Credible Recommender.**

Relevant in the early stages of getting familiarised with a recommender system, when users want to explore and validate the credibility of the system.

(Herlocker et al. ,2004)

Recommendation Goals for Informal Learning

- Learning a new concept or reinforce existing knowledge may require different type of learning resources.
- Relevant pedagogical rules like Vygotsky's "zone of proximal development" are important for learning.
- Learning is an effort that often takes more time and interactions compared to a commercial transaction.
- Learners rarely achieve a final end state after a fixed time.
- Instead of buying a product and then owning it, learners achieve different levels of competences that have various levels in different domains.

Recommendation Goals for Formal Learning

- Finding content to motivate the learners.
- To recall existing knowledge, to illustrate, visualise and represent new concepts and information.
- Applying different pedagogical methods.
- To map current activities to underlying curriculum goals.

Two Research domains

- **Adaptive Educational Hypermedia (AEH)**

“A user-adaptive system is an interactive system which adapts its behaviour to each individual user on the basis of nontrivial inferences from information about that user”.

Jameson (2001)

- **Learning Networks (LN)**

The design and development of learning networks is highly flexible, learner-centric and evolving from the bottom upwards, going beyond formal course and programme-centric models that are imposed from the top downwards. A Learning Network is populated with many users and learning activities provided by different stakeholders. Each user is allowed to add, edit, delete or evaluate learning resources at any time. The context variables are extracted from the contributions of the learners.

Koper & Tattersall (2004)

Differences between AEH and LN

Adaptive Educational Hypermedia

1. Top-down approach (Expert)
2. Closed- Corpus*
(Formal learning)
3. Virtual Learning Environments
4. Rich data sets
5. Well defined metadata structures
6. Ontology's, Knowledge Domains

Learning Network Concept

1. Bottom-up approach (Community)
2. OpenCorpus*
(Informal learning)
3. Personalized Learning Environments
4. Sparse data sets
5. Tags and ratings
6. Data mining techniques

* *Brusilovsky & Henze (2007)*

Survey on TEL Recommenders

System	Status	Evaluator focus	Evaluation roles
Altered Vista (Recker & Walker, 2000, Recker & Wiley, 2000)	Full system	Interface, Algorithm, System usage	Human users
RACOFI (Anderson et al., 2003; Lemire et al., 2005)	Prototype	Algorithm	System designers
QSAI (Rafaeli et al., 2004; Rafaeli et al., 2005)	Full system	-	-
CYCLADES (Avancini & Straccia, 2005)	Full system	Algorithm	System designers

Table 1. Extract of Implemented TEL recommender systems from the chapter.

Evaluation Approach for TEL Recommender Systems

- A detailed analysis of the evaluation methods and tools that can be employed for evaluating TEL recommendation techniques against a set of criteria that will be proposed for each of the selected components (user model, domain model, recommendation strategy and algorithm, etc.).
- The specification of evaluation metrics/indicators to measure the success of each component (e.g. evaluating accuracy of the recommendation algorithm, evaluating coverage of the domain model, etc.).
- The elaboration of a number of methods and instruments that can be engaged during TEL settings, in order to collect evaluation data from engaged stakeholders, explicitly or implicitly (e.g. measuring user satisfaction, assessing impact of engaging the TEL recommender from improvements in their working tasks, etc.).

Future Research

- Systematic development and evaluation of such recommender systems for TEL.
- Regarding the recommendation support for learners in formal and informal learning, taking advantage of contextualized recommender systems become important.
- The use of multi-criteria input for recommender system in TEL is becoming more important. Users (learners and teachers) can rate learning resource based on the level of complexity, curriculum alignment or study time.
- The lack of TEL specific rated data sets for informal and formal learning.
- New recommendation approaches that are based on both research domains AEH and LN concept.
- And still: ‘the Holy Grail’ most suitable recommendation algorithm for certain tasks.

Many thanks for your interest!

This slide is available here:

<http://www.slideshare.com/Drachsler>

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Twittering at: <http://twitter.com/HDrachsler>

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Discussion on SIRTEL challenges for 2020



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Lets see how your contribution will extend the current research

- 10.45 - 11.00** F. Abel, I. Marenzi, W. Nejdl and S. Zerr: Learn Web2.0: Resource Sharing in Social Media
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