Special Issue on

Advances of Semantic Web for E-learning: Expanding learning frontiers.

British Journal of Educational Technology
Edited by: Nick Rushby, Print ISSN: 0007-1013, Online ISSN: 1467-8535
URL: http://www.blackwellpublishing.com/journal.asp?ref=0007-1013

Special Issue Editors

Ambjorn Naeve, Head of the Knowledge Management Research group, Computer Science and Communication (NADA), Royal Institute of Technology (KTH), Sweden, amb@nada.kth.se

Miltiadis Lytras, Research Academic Computer Technology Institute and Computers Engineering and Informatics Department, University of Patras, Hellas, Lytras@ceid.upatras.gr

Wolfgang Nejdl, Director of the L3S Research Center, University of Hannover, Germany, and Coordinator of the PROLEARN network of excellence within technology enhanced learning, nejdl@kbs.uni-hannover.de

Nicolas Balacheff, Director of the Leibniz laboratory (CNRS-INPG-UJ F), Grenoble, France, and Coordinator of the KALEIDOSCOPE network of excellence within technology enhanced learning, Nicolas.Balacheff@imag.fr

Joseph Hardin, Director of the Collaborative Technologies Laboratory in the Duderstadt Center, University of Michigan, USA, and Project Chair of the Sakai project, hardin@umich.edu

Call for Papers

Focus

The advent of Semantic Web and its relevant technologies, tools and applications provide a new context for exploitation. The “expression of meaning” relates directly to numerous open issues in e-learning. In this special issue the focus is two-fold: On the one hand to stress the importance of applying Semantic Web techniques towards constructing systems that provide value to learners, and - on the other hand - to reveal research opportunities that can initiate interesting projects over the forthcoming years.

In the W3C Semantic Web activity a list of priorities has set the challenging landscape for the realization of the next generation web: The creation of a Policy Aware Infrastructure, the Ontological Evolution, the promotion of a Web of Trust, and the facilitation of Information Flow and Collaborative Life.
The huge work that has been carried out during the last years in the context of Semantic Web by several official bodies and research groups has led the research community to a mature level concerning strategies, technologies, frameworks and implementations. According to Eric Miller, head of the W3C SW activity “The WWW2004 Web conference had a huge Semantic Web focus and reminded me of the second web conference in Chicago. Chicago, it seems to me, was a turning point as everyone who attended realized the Web was not a fad, but rather something that was going to revolutionize how we communicate. The WWW2004 conference had a similar impact on me with regards to the Semantic Web. The technologies and toolkits are maturing. Semantic Web applications are becoming far more prevalent”.

Similarly, Amit Sheth stresses that “Semantic Web technology is here to stay” but the most critical aspect is to focus on Semantics rather than on Web, since “If SW is narrowly defined, ruling out anything that does not involve formal representation and inferencing, then it may not be in vogue for too long”.

In this context this Special issue of the BJET Journal intends to be a reference point for all researchers interested in the challenges that Semantic Web poses to E-learning in particular and to Learning and Knowledge Technologies in general.

The ultimate objective is obvious. Semantic Web Research “targets the improvement of the human experience and the enrichment of the living, through a major shift of focus - from computing to improving human experience - not only with better ability to use heterogeneous content and apply knowledge, but also to incorporate perception and pervasive computing” (Sheth 2004). The exploitation of Semantic Web in the context of e-learning requires a deeper understanding of the relevant issues. In figure 1 we have tried to summarize some key research themes in the convergence of Semantic Web and E-learning. More specifically we have used a matching of key issues that have significant roles in Semantic Web and E-learning Research respectively, and we have developed a set of research priorities.

In figure 1, three cyclical areas summarize the current research in semantic e-learning. We use for their discussion a pair where the first part relates to the Semantic Web key issue and the second one to the E-learning Key Issue:

**Expression of Meaning - Content authoring:** The obvious direct relation of Semantic Web and E-learning combines the traditional content authoring process with the critical objective of expression of meaning. Issues like semantic mark-up, semantic retrieval, personalized, (semi)-structured annotation and content conversion are leading a big research stream, in which the main concern is the development of semantic e-learning content.

**Ontological Evolution - Adaptive Hypermedia:** The traditional Adaptive Hypermedia considerations in E-learning are combined with Ontological engineering and a lot of flexible systems and accompanied methodologies have emerged. Issues like ontology-building, ontology-integration, conceptual modelling and semantic conceptualisation reveal a new research agenda, in
which the specifications of conceptualisations (ontologies) promote the performance of learning systems.
**Information flow and collaborative Life / Learning Context:** As mentioned above, the instrumenting of knowledge flows has been set as one of the priorities of the SW W3C activity. According to Eric Miller “One of the challenges we will meet is to strike a balance between requiring authors to do more at the outset to make information machine processable, insisting that everything the machine could use to answer a question be recognized and identified by the (human) questioner, and leaving large quantities of information inaccessible to the machine”. In this area Semantic Services, (Semi) Automated Reasoning and Argumentation are critical themes on the semantic e-learning agenda.

**Policy Aware Infrastructure - Interoperability/Standards:** The E-learning industry has many achievements in the area of interoperability and standards and from this perspective it recognizes the need to secure a policy-aware infrastructure. The Semantic Web will only achieve its potential as an information space for the free flow of scientific and cultural information if its infrastructure supports a full range of fine-grained policy controls over its content. The research on types of control over content, the compliance to semantic and metadata models as well as the issues of versioning and provenance require extensive research.

**Web of Trust - Communities/Social Dimensions:** According to Eric Miller “Trust in the human social context is based on constantly evolving and adapting information.” Two parties may trust each other based on a history of mutual interaction, based on formal contracts that in turn rely on other established systems (e.g. legal and legislative), and based on risk analysis of a failure of any
party to perform as agreed. In the E-learning Industry this issue is of critical importance. The Learning Objects Marketplaces and Farms, the Unique Identifications of Resources and the Development of Intelligent Assistants will require a Semantic Web language of describing trust. A lot of work remains to be done within this area.

**Intended Topics**

Within the forthcoming years, Semantic Web will provide a challenging research context for the e-learning research community. The inevitable role of knowledge and learning in the knowledge society will drive the development of several semantic web-enabled services, tools, and applications for citizens and learners.

The e-learning research community has a critical role in creating synergies and providing value systems for learning - by exploiting the Semantic Web capacity, building on the maturity of the previous research in e-learning: Research areas such as standards and metadata, adaptive hypermedia, learning communities, knowledge management, personalized delivery of content, and learning content annotation show a significant level of readiness to exploit Semantic Web. A number of research issues in e-learning revealed during the past years can be approached through semantic web practices, tools, methods and technologies.

We invite submissions that fall in to the following three areas:

**A. Preparation for Semantic E-learning / Semantic e-learning readiness**

In this area the main emphasis is placed on the conversion and the compliance of learning content to semantic web standards. In the current stage of Semantic Web evolution, this is basically pursued through the specification of ontologies and their use for e-learning. Typical themes in this area are:

- Semantic Annotation of Learning content: Content/Learner/Context orientations.
- Methodologies for (semi) automated conversion to Semantic content.
- Semantic Mining according to multi-criteria for learning performance.
- Development of Learner Model Ontologies.

**B. Semantic E-learning**

The Realization of Semantic E-learning requires a multifold approach to a number of vertical and horizontal themes. The international collaboration can promote such a goal, and obviously the success of the previous area (Semantic E-learning Readiness) will influence the possibilities for successful and wide adoption of Semantic E-learning. Some interesting research themes in this area include:
Semantic E-learning Services: exploring resource identities for (semi)-automated value provision.
Semantic Content Repositories and Intelligent Assistants.

C. Next Generation E-learning
Undoubtedly, Semantic Web is present on many milestones towards our goal for effective learning. In the next years we think that the key challenge for Semantic Web as well as for e-learning will be to develop infrastructures capable of exploring learning content in every format in an integrative way. This means that we will see a shift of focus from formalizing/codifying learning content to managing content in multimedia forms through automated reasoning and exploitation of mobile, wireless networks as well as new vehicles through digital TV channels.

Some interesting research themes in this area include:
- Semantic Multimedia Content Management: methodologies/frameworks/engineering.
- Bridging Semantic E-learning to Ubiquitous and Pervasive Networks.

Important Dates
Send manuscripts to Lytras@ceid.upatras.gr and cc: amb@nada.kth.se

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>15th June 2005</td>
<td>Submission of manuscripts</td>
</tr>
<tr>
<td>15th July 2005</td>
<td>Notification to authors</td>
</tr>
<tr>
<td>30th September 2005</td>
<td>Final versions due</td>
</tr>
<tr>
<td>Early 2006</td>
<td>Publication</td>
</tr>
</tbody>
</table>

Style and Author Guidelines
Author guidelines are available at:

Special Issue Sponsors
http://www.sigsemis.org
Join AIS SIGSEMIS:
http://www.aisnet.org/sigs.shtml