

Using semantic web tools in higher education

The widespread use of web-based technology in education offers new opportunities for teachers and students. In particular, the availability of large datasets and real-life cases has the potential to enhance higher education teaching.

The Ensemble project, part of the joint ESRC/EPSRC-funded Technology Enhanced Learning (TEL) programme, explored the role of 'semantic web' technologies to support undergraduate and postgraduate teaching in complex and rapidly-evolving fields where case-based learning is common.

The 'semantic web' refers to a set of international standards which are used to structure online data in terms of content, creating a vast resource of structured and linked data. These digital archives can support teaching and learning in subjects dealing with complex qualitative and quantitative data.

Ensemble looked at how semantic web technologies can support teachers and learners across a range of disciplines - plant sciences, education, environmental education, dance and maritime operations. The project focused on complex, fast-moving subject areas where traditional curricula quickly become outdated.

In such settings case studies are often used to help students get to grips with complex issues. For example, in plant sciences teachers and students explored plant epidemiology, plant evolution and issues in plant conservation by using datasets which were presented through various visualisation tools.

The Ensemble project developed progressively more complex and useful web applications by building prototypes with students and teachers. These bespoke tools improved the ability to store, share, combine, present and annotate digital resources - enabling students and teachers to experiment with different ways of representing data and the relationships between them, in order to construct and interact with cases.

Key findings

- The ability of teachers and students to draw on authentic and even 'real time' data from across the world offers significant opportunities for learning - not just in working with 'big data', but in supporting problem-based learning environments, encouraging case-based learning, and allowing new forms of collaboration at individual, institutional and global levels.
- However this requires a new range of digital skills for teachers, and space for new teaching practice to be developed. Teachers who have previously taught using 'textbook examples' need to be supported to develop expertise for engaging with rapidly changing, contested and 'messy' data from multiple sources.
- Engaging students themselves as researchers and designers allows the development of technologies where the curriculum becomes a 'first-hand experience', rather than mediated solely by teachers.
- The effective use of semantic web technologies is dependent on easy-to-use software for authoring, archiving and publishing. Tools developed through the Ensemble project improved the ability to store, combine and share digital resources.
- These tools also enabled students and teachers to acquire a more sophisticated understanding of key issues in their subjects, of how problems could be answered in different ways - in turn suggesting further directions for enquiry.

HEIs should be encouraged to support local experimentation with subject-specific teaching technologies and practices



Policy relevance and implications

Semantic web technologies can provide potentially powerful tools for enhancing higher education teaching in complex, fast-moving subject areas. However, support is needed in terms of educational policies, skills development, teaching models, and data management centrally and at Higher Education Institution (HEI) level.

- Government policies should support HEIs in the use of new teaching models such as case-based learning, case study and project work, as well as supporting teachers and students to experiment with semantic web technologies and related practices.
- HEIs should be encouraged to support local experimentation with subject-specific teaching technologies and practices, and develop overall strategies for implementing learning technologies. This could be achieved through benchmarking exercises or institution-wide systems such as quality assurance, staff training and managed learning environments.
- The Government and HEIs need to establish a 'culture of inquiry' where management supports and encourages experimentation and dialogue across conventional boundaries.
- Providers of data such as the Government and other public sector bodies should continue to move towards linked data, as exemplified by initiatives such as data.gov.uk and the UK Administrative Data Research Network proposed by the ESRC-supported Administrative Data Taskforce. This will offer new opportunities for education and training. Public bodies and publicly-funded projects should publish the data that support and contribute to their reports, summaries and findings.
- HEIs should be encouraged to explore ways of supporting teachers and students in becoming knowledge producers as well as consumers - for example, by extending the

role of institutional archives and data repositories, offering students ways to make parts of their portfolios public and producing open educational resources.

BRIEF DESCRIPTION OF THE RESEARCH

The Ensemble research project has explored the potential of using semantic web and linked data technologies to support higher education teaching in complex fields with the use of real-life cases. Working with teachers and students in undergraduate and postgraduate courses, the researchers developed tools improving the ability to store, combine and share digital resources.

Ensemble: Semantic technologies for the Enhancement of Case Based Learning

Web: <http://www.ensemble.ac.uk/wp/>

FURTHER INFORMATION

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