EDUCATION AND SEMANTIC WEB

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Annotation

Twenty years ago the student learnt mainly from written material in the form of journal material or textbooks, accessed as photocopies or by visiting a library. Now, much of the journal material, books, and especially expensive monographs are available on the Web. Apart from these digitized versions of previously available sources, the learner is now faced with a huge amount of information. The Web has replaced the encyclopedia as the entry point into arbitrary topics of inquiry. The Semantic Web as an extended World Wide Web becomes a primary medium of academic and pedagogic interaction [1]. There exists skepticism about the utility of the semantic Web vision. This suspicion is especially pronounced in educational contexts where for many the educational transaction is an intensely human experience. Education is more accurately described as an artistic social interchange than one waiting for enhancement and possible substitution by a human-machine interaction. The capacity to create powerful learning opportunities, accessible anywhere and anytime that maximize the use to content, social interaction and machine support is very important to educators. The aim of the paper is to describe the main tendencies in this direction.

The policy and practice of education

International cooperation in linking knowledge to policy and practice on education and training has developed considerably in recent years. The Lisbon European Council in 2000 [2] identified knowledge as the key to future growth, jobs and social cohesion and acclaimed: "We need policies that reinforce this knowledge base". Education and training are a prerequisite for a fully functioning education, research, and innovation, which compose so called the "knowledge triangle". Education and training have a critical impact on economics and social life. Improving the use and impact of knowledge for developing policy and practice would improve the quality and governance of education systems.

Education and training are the part of the different cultural traditions and identities of countries and regions. The "knowledge continuum" cycle involves a way of looking at the interaction between the researchers, policy-makers, practitioners and three dimensions of knowledge-based policy and practice: knowledge creation, knowledge application, and knowledge mediation. Knowledge creation – the production of research-based knowledge relating to education and training. Knowledge application – the utilization of research and evidence by educational decisionmakers, practitioners and other end-users. Knowledge mediation – the brokerage of such knowledge in terms of making it accessible and facilitating its spread. Knowledge mediation is the bridge between creation and application, without which successful knowledge management and use is impossible. Mediation involves translating and disseminating knowledge and the outcomes of educational research through networks, platforms, websites and the media that influence policy and practice. According to [2] mediation is the weakest link in the knowledge continuum, and yet mediation is the bridge between creation and application, without which successful knowledge management is impossible. The Internet is widespread, and the possibility of access to vast amounts of information but with less quality control increases the risk that irrelevant or questionable material may be taken up into the policy-making process, and valuable evidence may be lost in the "noise".

The role of Semantic Web in education

The Semantic Web bears its own description so that applications as well as humans can make sense and use of it. The Semantic Web means changing the Web's infrastructure such that information exchanges between computers alone become as ubiquitous, cheap, and easy as exchanges between humans, mediated by the Web, are already. The Semantic Web provides a range of additional educational semantic web services such as summarization, interpretation or sense-making, structure-visualization, and support for argumentation.

The Educational Semantic Web is based on three fundamental affordances. The term affordance was appropriated by D. Norman [3] in the context of human–machine interaction. An affordance is a property of an object that determines or indicates how that object can be used. Affordances may be actual physical properties, or perceived properties.

The first affordance of the Educational Semantic Web [4] is the capacity for effective information storage and retrieval. The second affordance is the capacity for nonhuman autonomous agents to augment the learning and information retrieval and processing power of human beings. The third affordance is the capacity of the Internet to support, extend and expand communications capabilities of humans in multiple formats across the bounds of time and space.

The capacity of the Semantic Web to add meaning to information, stored such that it can be searched and processed, provides greatly expanded opportunities for education. A software agent is a piece of software that acts for a user or other program in a relationship of agency. The teacher agents operating on the Semantic Web

might undertake many of the routine administrative tasks. The teacher agents communicate with individual student agents, tracking student progress, promoted lists of resources such as tutorials, remedial help, and assisting scheduling and time allocation tasks. The agents schedule personal time between teachers and students to maximize the effect and affect of these interactions. Teacher agents will track professional interests of teachers relating to their field of subject expertise, developments in new pedagogies with active evaluation and testing of pedagogical interventions.

And a human-to-human communication is a major component of the educational experience. A significant factor in any learning context is access to the support networks that learners need in order to be able make sense of the material which they can all too readily access. In the traditional classroom or lecture hall this is usually a human being appointed by the institute for the purpose of fielding questions. In other situations this might take the form of a tutor. Of greatest importance however are the informal, face to face or online, groups of learners who master a subject by asking questions however trivial, by offering each other differing interpretations of more formal material, by testing these and by negotiating a consensus interpretation – in other words by constructing a piece of knowledge. They are informal groups or virtual communities of learning.

The research on the Semantic Web and eLearning

Now we learn via the Web or from books. In the Web we met the danger of information overload but we have the wealth of competing viewpoints. The Semantic Web provides yet more opportunities for learning in the form of greater access to a multiplicity of diverse learning objects.

The learners need environments which are congruent with what goes on in learning. The learner needs to be able to take a segment of learning material and situate it in a multidimensional space which includes the scholarly, social, economic and political context. The learning objects are the separable units of educational material which can be combined and reused in a variety of contexts. Central to their reusability are the descriptions which their designers provide using a variety of metadata schemes. Another development has been the growth in educational repositories. The example is the Edutella network [5]. The first application of Edutella was focused on network for the exchange of educational resources between German, Swedish, and Stanford universities.

Edutella is a peer to peer (p2p) network for searching semantic web metadata. Apart from many other p2p networks the data are not actually shared in the network rather than the metadata. Edutella is not a single network, it enables various systems to form networks for exchange of metadata according to Semantic Web standards. To enable a specific system on Edutella involves two steps: 1) finding out what information the system contains and how it can be represented on the Semantic Web with help of existing standards; 2) implement a provider peer that realizes the translation between the systems representation and the Semantic Web representation according to step 1. The core of Edutella consists of a library and a query language, which is an extension of datalog suitable for querying Semantic Web metadata expressed in the Resource Description Format.

Another important class of tools here are Semantic Browsers, such as Magpie, Conzilla. Semantic Browser is a tool that enables the users to traverse among the semantically connected documents easily. Magpie is a tool which supports the interpretation of web pages. Magpie offers complementary knowledge sources, which a reader can call upon to quickly gain access to any background knowledge relevant to a web resource. Magpie automatically associates an ontology based semantic layer to web resources, allowing relevant services to be invoked within a standard web browser. Conzilla allows to investigate contexts-maps, concepts, and content. A context-map graphically presents a selection of concepts and every concept may be connected to a range of content.

Conclusions

Our intellectual world is already structured as a set of sometimes overlapping knowledge communities. Semantic technologies can be used to foster and support these communities with ontologies and ontologically informed artefacts providing a means for trans-boundary communication.

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