Semantic Web in Education *
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* Based on eLearning based on the Semantic Web & The Educational Semantic Web research paper, and other resources.
Outlines

- Introduction
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- Semantic Web
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- Semantic Web in Education
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- Limitation and concerns
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Introduction

- e-learning comprises all forms of electronically supported learning and teaching e.g. C.D and audio clip.*

- e-leaning quickly adopting new technology.
  
  - Web-based education is one form of E-learning.
  - Web-based is about delivering the education martial through internet using a web browser.

- What is the next step in the evolution of e-learning?

It is web of data allowing machines to understand and process the information on webpages.

- Example search for a specific text.

- It gives the machine the ability to understand, share, and reuse the date.

- It is an extension of the current Web and NOT its replacement.
Semantic Web - Components

- XML (eXtensible Markup Language)
- Resource Description Framework (RDF)
- RDF Schema language,
- Web Ontology language (OWL),
- Logic, and
- Proof.
XML (eXtensible Markup Language):

- Tag-names layer that provides a way of formatting documents in general.
- However, it does not provide semantics. Thus, it is not the solution for propagating semantics through the Semantic Web.

Resource Description Framework (RDF):

- RDF is not a data format but a simple model.
- It gives meaning to XML structure.
- RDF statements, which are machine understandable, search engines, and intelligent agents,
- “It is a framework for describing web resources e.g. the title, author, modification date, content, and copyright information of a Web page.”

* http://www.w3schools.com/rdf/default.asp
RDF schema:

- It designed to be a simple datatyping model for RDF.
- Using RDF Schema, we can classify RDF tags.
- It can create properties, classes, and relationships.

Example:

- rdfs:Class rdf:type rdfs:Class
- :Dog rdf:type rdfs:Class
- :Fido rdf:type :Dog
- :Dog rdfs:subClassOf :Animal
- XML (eXtensible Markup Language)
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- Logic, and
- Proof.
Ontology:

- It describes a formal shared conceptualization of a particular domain of interest.*
  
  - E.g. one source may use the term “author” & other may use the term “creator”. Ontologies describe the fact that the relationship described as “author” is the same as “creator”.

- It is well-suited for describing heterogeneous, distributed and semistructured information sources.

- By defining shared and common domain theories, ontologies help
  
  - both people and machines to communicate concisely,
  
  - supporting the exchange of semantics and not only syntax.

- Characterize possible relationships.

  * eLearning based on the Semantic Web
Logic:

- It enables intelligent reasoning with meaningful data.
  
  - E.g. If the weather is freeze outset, you must wear coat.

Proof:

- It ensure the correctness of the information that generated.
  
  - e.g. if one source says If the weather is freeze outset, you must wear coat, and other says must NOT wear coat.

- Proof can be done by some mechanisms e.g. checksum, or “web of trust”.
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Ontology-based metadata:

- In general, an ontology is used to define the basic terms and relations in the domain.

- It focuses on knowledge sharing and reusability.

- It provides axioms as rules and constraints for managing the terms and their relations within this common domain vocabulary.
Ontology-based metadata:

I. Metadata for describing the **content** of learning materials.

II. Metadata for describing the **context** of learning materials.

III. Metadata for describing the **structure** of learning materials.
Ontology-based metadata:

1. Metadata for describing the **content** of learning materials:

   ✤ There is a high risk that two authors express the same topic in different ways.

   ✤ For example, concept “Agent”: can be an actor, contributor, creator, player, doer, worker, performer.

   ✤ Integrating a domain lexicon in the ontology, then map terms of the domain vocabulary to their meaning.

   ✤ For example, agent, actor, contributor, creator, player, doer, worker, performer are all mapped to the same concept “Agent” in the domain ontology.
Ontology-based metadata:

II. Metadata for describing the context of learning materials.

❖ Material can be presented in various contexts.

❖ For example, an introduction, or a discussion. An example or a figure are some usual presentation contexts.

❖ The context description enables context-relevant searching.

❖ For example, if the user needs an example of the given topic.
Ontology-based metadata:

III. Metadata for describing the structure of learning materials.

- Materials are consist of chunks of knowledge
- It is necessary to build them up from these chunks to produce complete course.
- Note that some material may NOT be read continuously. And course structure is configured depending on the user type, the user’s knowledge level,
- Several kinds of structuring relations between chunks of learning material may be identified e.g.
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Limitations & Concerns

- Transform existing data to Semantic Data.
- Misleading or incorrect data.
- Currently we don't have a web of data. Because data is controlled by applications, and each application keeps it to itself.
- Privacy issue.
Conclusion

- Semantic web allows machines to understand and process the information on webpages.
- This led to easy and smart way to find the answers to the questions.
- Ontologies are metadata schemas providing a controlled vocabulary.
- By defining shared and common domain theories, ontologies would help both people and machines to communicate.
- In E-learning, Student determines agenda and have a direct access to knowledge in whatever sequence makes sense.
- In Semantic Web Education, materials linked to commonly agreed ontologies and access to knowledge can be expanded by semantically defined navigation.


- http://www.xml.com/pub/a/98/06/rdf.html

- http://ltsc.ieee.org/wg12/

- http://infomesh.net/2001/swintro/

- http://www.w3.org/TR/rdf-schema/
Thank you for Listening!

It's a long way from here to there but quite a bit of progress made so far.

And even if we don't ever achieve all of them, we will learn lot from the journey.*

* Serkan Ayvaz