



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
 - eLearning
- Semantic Web
 - Components
- Semantic Web in Education
 - Ontology-based metadata
- Limitation and concerns
- Conclusion
- Q/A
- Reference





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

- ❖ e-learning quickly adopting new technology.
 - ❖ Web-based education is one form of E-learning.

 - ❖ Web-based is about delivering the education material through internet using a web browser.

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

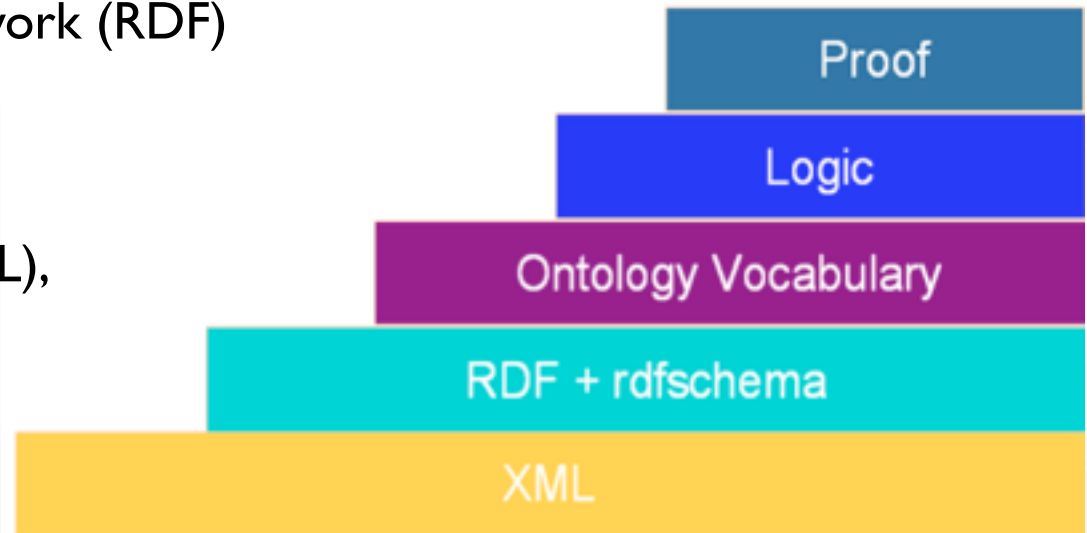
*<http://en.wikipedia.org/wiki/E-learning>



- ❖ 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 data.
- ❖ It is an extension of the current Web and **NOT** its replacement.



- ❖ 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 rdfs:type rdfs:Class`

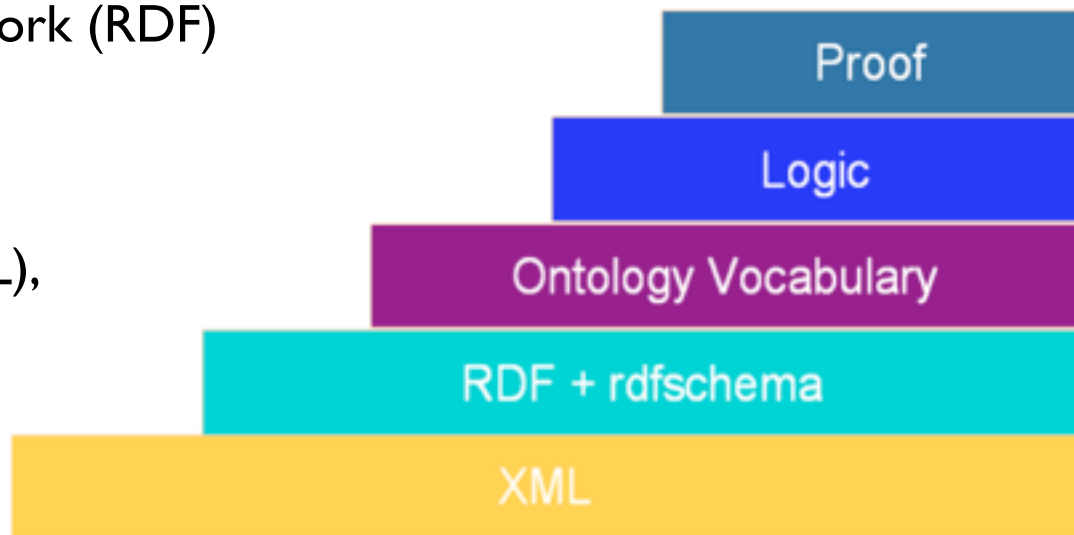
- `:Dog rdfs:type rdfs:Class`

- `:Fido rdfs:type :Dog`

- `:Dog rdfs:subClassOf :Animal`



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❖ 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:

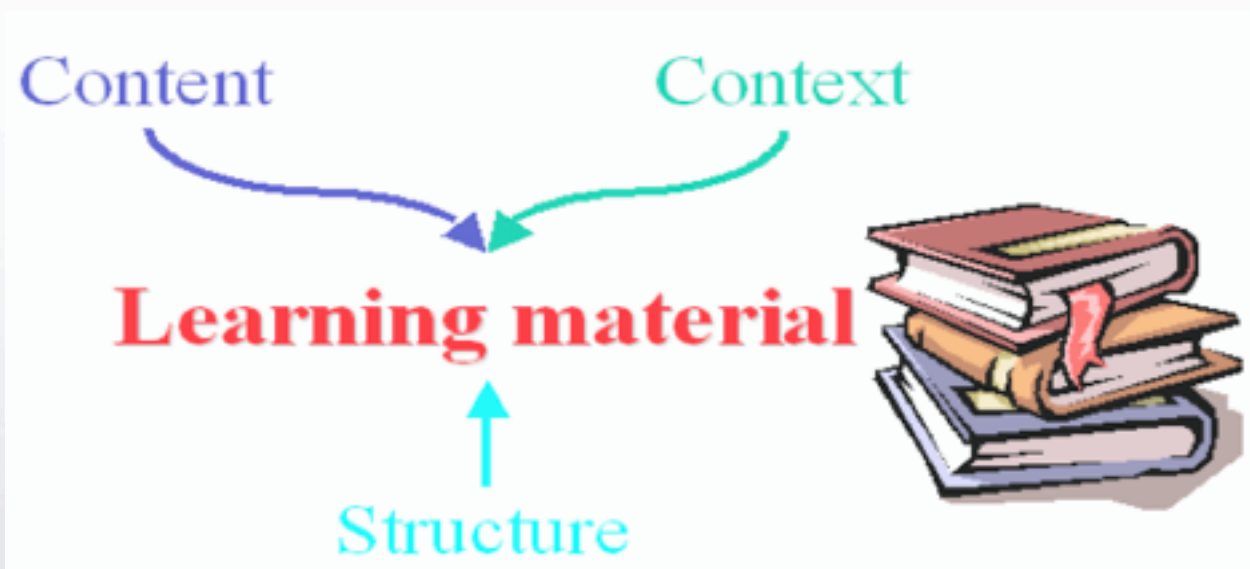
- ❖ In general, an ontology is used to define the basic terms and relations in the domain.
- ❖ It focuses on knowledge sharing and reusability.
- ❖ It provides axioms as rules and constraints for managing the terms and their relations within this common domain vocabulary.*

* *The Educational Semantic Web*



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:

I. 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.
 - ❖ Prev, Next, IsPartOf, IsBasedOn, IsBasisFor, IsRequiredBy.



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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.



- ❖ 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.



References



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- <http://infomesh.net/2001/swintro/>
- <http://www.w3.org/TR/rdf-schema/>



Questions ?



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*