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Semantic web and its reflections in distance education

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Abstract

Due to the advances in web technology, sharing of information has become easier, but also more complicated. In searches through internet, search engines have been used and these search engines have also shown the content, un-related to the searches. The reason of this is that the data searched is only known to the searcher and can not be commented by the search engines. In solving all these problems, semantic web architecture, used as a new technology, was structured. The aim of this study is to determine what kind of usage area semantic web has in distance education platforms and to structure its ontological and architectural form. Moreover, URI and UNICODE, XML and RDF forms will be determined with their usage styles in distance education platforms. In conclusion, the semantic web-based properties of education environments are determined.

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Keywords: Education; ontology; semantic; technology; web.

1. Introduction

Web platform (Ateş, 2008) was emerged by computer programmer Tim Berners-Lee using HTML computer language and in time it made progress continuously in order to satisfy people needs. When these developments are examined; it is seen that the first technology is the static web pages in the web pages. All these developments revealed the concept of *internet based distance education application* as a new dimension *which are made with Radio, Television and Computers*.

Distance education is a way of providing the education areas independent from time and environment by using communication technologies (Bulun and others, 2004). Thus, by this way; the people who can't find any time to their education or individual development due to their working time or the inadequate education opportunities can get the intended education. In the Web technology, the communication between requester and server is made as a oneway and because of this HTML language is used. In this technology, the oneway communication caused to the misfire of desired results in some points, thus it revealed the necessity of a new technology and so the Dinamic Web Technology was appeared. As for the Dinamic web technology communication, it is made by two-way. Owing

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to this technology, the server responds the requester's demands. In the point of responding, if the requester's demands on the static web pages the server send the data which includes pages directly to the requester. If the dinamic web pages demand the data which has a purpose of the communication, the server work the dinamic pages within its scope and transform these to HTML codes then it send to the requester.

Owing to the web technology, the opened pages due to intended responses to the requester's demands became dinamic. Also the other advantage of this technology is the keeping of the data in the server computers so all the authorised people can get the data and communicate easily. The developments in the Web technology increased and static web pages were called as Web 1.0 and dinamic web pages were called as Web 2 (Kardemirci, 2008). Great numbers of innovations which revealed with Web 2.0 (blogs, wikis, facebook etc) increased the users of the web technology and the people which have got standart computer knowledge benefited the Web 2.0 technology thus the knowledge and data sharing increased each passing day. Because of the Web 2.0 technology, the increased users number and data sharing causes the confusion in the Web environment. Although the search engines (yahoo, google, bing etc.) were developed in order to avoid from this confusion and to filter this enormous library in the web, filtering wasn't made sufficiently. Usually, a good deal of results irrelevant with searching are displayed. As for this, the search is just textual quality and there is inadequate logical searching process. For this reason, to get the meaningful knowledges in the web the new technology was needed. The name of this technology is 'Semantic Web'.

2. Semantic Web and Architecture

The most of the knowledge accumulations make difficult to reach the desired knowledge. Moreover, the fast increasing knowledge accumulations every passing day and the dissappearing of the people in the web were taken into consideration and it was aimed to advance the insufficient points of web 2.0. In order to solve this problemn, semantic web technnology was emerged (Kardaş,2008).

The development of this technology is organized by W3C (World Wide Web Consortium) W3C is the international institution which determines the web technologies standarts and Tim Berners- Lee was the president of this institution in 1994. The basic architecture of semantic web is determined by W3C (Gençoğlu,2007).

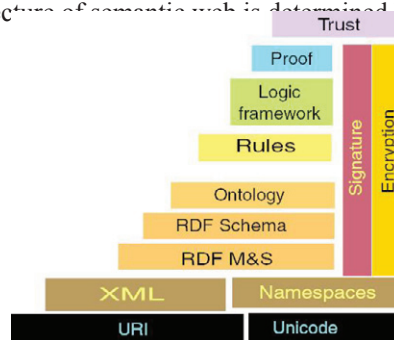


Figure 1. (Design And Implementation of an Example Semantic Web Based System,)

The foundation of this architecture composes URI and Unicode. These layers determine the usage of international character set and make the identification of web resource separately (Özacar, 2004). On this architecture it is appeared XML (Extensible Mark-up Language) and layers. XML is used by forming the rich web documents. As for Namespace, it allows the usage of different words accurately. On XML and Namespace layer RDF (Resource Description Framework) layer is found. This layer is used in the rapid access of web sources and connection between subject and verb in the connections and form. Above this layer it is found RDF schema. This layer is a frame which makes the works meaningful in the RDF sources. These words are needed to define according to their subjects and features.

Ontology layer allows the great deal of complex semantic depiction and formed by advanced RDF Schema. Otherwise, as for that the other layer they are the dialectic, evidence and confidence layer for high degree semantic web(Öztürk, 2004). Semantic web architecture is designed on the basis of distance education according to structure

which we mentioned above.

3. The features of Semantik Web and Educational Pages

The knowledge demonstration with Semantic web is made by some popular concept way concerning artificial intelligence applications. Semantic web can differentiate distinctive knowledge demonstrations. This detail takes place with two important matters. These are ontology and logical forms. Ontology is used both in the defining of the circumstances, the continuity of the connections, the planning the circumstances and making the definitions clearly. (Öztürk, 2004). Formalising is translated by ontology machines. This operation is made by the calculation of the ontologies with machines and getting the results.

3.1. The general features of semantic web pages which will be educational formed

Educational content must be organised and figured by in these ways. It must give the introduction knowledge about students' area of interests, develop their knowledge in these areas and gain problem solving ability (Devedzic, 2006). The requirements which must be made by designer: He/she must enrich the educational content with the contexts as multimedia objects, samples, question, simulation etc. The tests which are suitable to pedagogical lessons and the lesson content which is compatible with lessons and units content must be formed.

After all, educational semantic web ontology must be found. The mission of this ontology is become the unit of which determines the connection between the terminology hierarchy and concept. This structure which will be formed will supply the sharing the educational content, reusability and the usage in different educational areas. These pedagogical factors help us to determine the location, search, make selection, arrange and integrate otherwise they help us to get the educational content from different educational services (Devedzic, 2006).

The students usually attend the education individually. This situation shows that the individual educational aims, styles and preferences must be taken into consideration. For this reason, semantic web must offer the applications which supplies the adaptation of the student and which are suitable to his/her personal characteristics. (Devedzic, 2006).

3.1.1 The student characteristics

- The students can have different characteristics as different age, personality, and occupational group. To take into consideration these differences supply to get the maksimum efficiency (Devedzic, 2006).

3.1.2. The characteristics of the teacher

- The teachers must choose the education material according to appropriate aim and must combine it. Area ontology must help the teachers as regards of explanation, filtration and the configuration of educational materials which were taken from different sources.

- Because of the teacher must evaluate the progress and the problem solving capacity of the student also his/her learning level, the semantic web interface which is used by teacher must have the flexible structure. Hereby, they can control the progress of the student (Devedzic, 2006).

3.1.3. The characteristics of the designer

The software has three main components as educational content, teaching method and adaptation.

Author actualizes two activities.

1. The authorship concernant the area: He/she determines terminology, area concept and associates and must make the taxonomy.

2. He/she must arrange the activities concerning the resource (Devedzic, 2006).

3.1.4. The mission of the system developer

The person who makes the development must take into consideration that the teachers and the authors aren't the computer specialist. This reality must become efficient in the web pages in other words the wieldy pages must be done. The page must be designed in such a manner that the last user can apply easily. It must be arranged easily with different areas. The best way of making this, the specialist design an ontology and combine the educational devices with the other areas.

The different system developer pedagogical and educational devices must be compatible with each other. Consequently, web pages must be designed in the manner that they have a structure which allow the different technologies (Devedzic, 2006).

3.2. Education content

Education content must be defined clearly and the management units must be for education. The education materials are able to become different forms and they can be divided for different educational purposes.

3.3. The concept of learning model

The education materials can be seen as resource in the technology supported education. The learning materials appear with the parts which were taken from lessons and the people learning activities. These are able to become in any of the scope. The only constraint is instead of the taking into consideration of the one person's learning capacity, it must take into consideration the general learning. For instance, the writings in the electronic environment, multimedias, animations, video clips, simulation presentations, educational games, web sites, digital films, java applications and online lessons. The most of these applications can be reused and it is advantage to use different applications.

4. Educational Modelling Languages

Models must support the model as pedagogical and must be done as semantic web supported and the requirements as following (Koper and Manderveld, 2004).

Formulation: The learning allows the explanation of the objects clearly. It is important for automatic operations.

Clear authoring: It must be written by dividing little learning objects to large learning objects.

Integrity: It must allow to make the bigger learning objects by organising the connections between the learning objects.

Reusability: It must allow to repeat the application by determining learning complex units.

Supportability: The learning objects must be interpreted well and determined the standarts in order to endure against technological changes.

Convenience: It must be convenient to standarts and determinated definitions.

Life cycle: Fabrication, modification, storage and distribution must be easy. In addition to this, each education designing model needs the following requirement (Devedzic, 2006).

- The adaptation to different model and theories must be easy.
- Education learning objects must come together and describe complex and a new different object.
- It must be able to indicate different education clearly.

5. Pedagogical Factors

Educational semantic web possesses three main objects.

- It must possess productive knowledge storage and access system.
- It must offer to the people by increasing the getting of the knowledge of nonhuman factors.
- It must supply the connection in all the universe with the internal and external communication abilities of internet support.

6. Educational Ontology

Educational ontologies are the framework of the semantic web systems. It is indispensable for students, teachers and authors. The filtering of the students documents, combining and integration are made by means of this ontology (Vladan Devedzic, 2006)

The categories of educational ontology

a. Area ontology: Semantic web and educational design ontology can't continue without this ontology. Domain ontologies isn't just required for semantic web and education it requires for all semantic applications. In education systems with semantic web author must present his/her ontology knowledge.

b. Mission ontology: It consists of the education in any of the application area. Mission ontology supports the area ontology and it provides that the web applications solve the problem. This supplies ontology problems, scenarios, questions and replies.

c. Teaching strategy ontology: This ontology supplies the experiment to the author. By teaching pedagogical events and behaviours it supplies teaching experiment to the author.

d. Student model ontology: The designers which design semantic web education system construct the student model by using learning ontology concept. This ontology and concerned student model is required for the system coherence.

e. Interface ontology: The aim of this ontology is to define the adaptive behaviour of semantic web education system. This ontology offers the transducer models to the different students.

f. Communication ontology: Different semantic systems must be in communication with pedagogical factors and education servers. All of their content and words which are used must be designated by ontology (Devedzic, 2006).

7. Conclusion and Discussion

In this study, it is seen that distance education environment is internet based and reveals new requirements. It is mentioned that, the matters as; the increasing of the user in the distance education environment, content and behaviour analyse become meaningful with the semantic web. It is thought that the Semantic web applications will more efficient and interactive with web 3.0. As in the Öztürk's study in 2004, it is seen that ontolojical structure which represents the architecture in the web applications is the most important. Moreover, it must be remembered that URI and Unicode applications which constitutes the foundation of the architecture are the main elements. Again, as it is seen in the Öztürk's study (2004) in semantic educational applications it is made use of the concept concerning artificial intelligence and it is presented the arrangement of the semantic web in the education environment. In his study (2006) Devedzic defragmented education environments and semantic concepts also he determined the features and missions of the student, teacher, designer and system developer. As for Koper ve Manderveld (2004) they mention the requirements of semantic web supported education environment as formulation, concretization, integrity, reusability, supportability, convenience and life cycle.

It is seen that all these studies support the distance education applications which are established on the internet platform. But, it is seen that the reflections of the semantic web applications to the distance education are inevitables to get more specific in forms of web mining, content mining etc.

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