

Knowledge Transactions in a Semantically Enriched eLearning Platform: Using ICT for delivering relevant content to users in a distributed educational setup

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Abstract: *The entire educational infrastructure has been revolutionized by ICT. In a distributed educational setup, ICT has made it possible to capture and deliver contents to students, faculty and other information seekers creating a situation where eLearning becomes more appealing. The use of ICT made it possible to have access to most up-to-date information when and wherever people want to have at their convenience. The modus is becoming more user friendly with a wide array of user friendly open source applications. In this paper the role and significance of content users is discussed in context of semantic eLearning systems. The ontology characteristics and advancement in eLearning is also discussed. An ontology is also proposed for rule based semantic eLearning portal architecture detailing the users' rights management.*

Keywords: *Knowledge Transactions, eLearning, ICT, Content, Ontology, Portal, Users' Right management*

1. Introduction

The concept of distance education can be attributed to eLearning and the same was founded on the principles of flexible access. The main aim was to allow distance learners especially adult, employed and persons with physical disabilities to learn from a place and time of their convenience. Its main aim was to facilitate learners and free them from the typical constraints that an average regular learner might not have. It also freed learners from the traditional residential or physical educational systems where they had to physically attend classes. The printed course materials helped distance learners to a great extent but it came with its own limitations.

The use of ICT changed the scenario and offered incentives that allowed acquisition and dissemination of all types of contents in a distributed educational setup. This implies provision for accessing knowledge content and resources via networks by means of Information and Communication Technology (ICT) across a wide array of platforms and community centres. The use of ICT have allowed users to have access to the most up-to-date at their convenience and the interaction related to that content with peers and contributors have made it more

lucrative. This is also becoming more pleasing for the audience. Computer conferencing technologies and protocols along with collaborative inquiry among students with asynchronous interaction from any corner of the globe have made it more popular among users.

ICT has made it possible to remove the spatial and temporal constraints of the conventional educational infrastructure. The networked ICT and inexpensive storage technologies have made it possible to have cloud infrastructure that could be deployed anywhere and anytime. Also the scalability in cloud computing can help us in various ways. It allowed storing multimedia along with conventional textual material that changed the entire paradigm of the eLearning environment. The provision for such work is considered in future publications and would be dealt with as it is out of the scope of this article. Nevertheless the main aim of eLearning was to replace the traditional content-place-time bounded learning with a just-in-time and customized-on-request process of learning.

2. Users in eLearning

There exist different users in the context of eLearning systems. The group consists of students, teachers, administrators, content creators, educational institutions, technology providers and it also involves the role of accreditation bodies, employers and so on. The first five are directly involved with the system directly.

Students: they are the primary clients of any eLearning system. The systems are so built that they fulfil the basic educational needs. Students are entitled to register for any course that suits them and login using their login ID and passwords. They get the privilege to search and retrieve course materials and use them at their convenience and method of learning. They can even interact among each other using blogs, participating in quizzes, story writing and chats with their respective tutors. However the chat and few other interactive features are not included as availability of resource persons are not always possible. But this can be achieved at ease by embedding few plugins and extensions.

Teachers: they are generally playing the same role as they played in the traditional setup. They are responsible for chalking out the syllabus that would be beneficial for the course, select the contents of the course, provide online instructions to the students, redirect them to the reference readings, create and evaluate the activities and are responsible for similar activities of same kind.

Administrators: they are responsible for maintenance and updating systems with their knowledge base. They can modify the ontology, add/ edit/ delete the rules prevailing in ontology, maintaining the student database, maintaining profiles, keeping track of student performances, updating the system and system architecture with evolving time and so on.

Content providers: the present system architecture shows that the current content providers are the teachers themselves who are involved in a particular course. However there is a provision for an external content provider that but that is not taken into consideration in the present scope of work, but an attempt would be made in near future for discussing the distributed content collection.

Educational institutions: they are merely learning promoters that facilitate the online and eLearning framework providing one of the required infrastructures. They make the learning facilities available to the masses and offer courses that would draw its own audience.

3. Role of users in eLearning systems

Any successful deployment of an eLearning system primarily depends on the factor to which it would be able to cater the information requirements of the information seekers. Thus it is very crucial to model the users or group of users' needs explicitly and semantically. It is imperative to encode details of each user, their roles and needs to make the learning system more useful. Let us consider a case where a semantic based learning is more promising than other employed tools. We all know that classroom teaching is handled by teachers who are aware of the student's previous experiences with knowledge since they can be met physically. The teacher is aware of what to deliver and how much and in what sequence. But in an eLearning environment all these are not possible sometimes. Therefore a semantic based learning method is the best solution in this position. Personalised materials are difficult to employ for each student by a teacher but with the help of semantic web based technology the same can be achieved in a better and more efficient way.

Another identifiable area is education level of a student. Based on the educational level study contents can be classified and be delivered to the right information seekers. It would not be advisable to disseminate a particular content to a bachelor's level and a master's level student, they have different requirements and state of mind to grasp the concepts. The system must be in a state to distinguish them and deliver only those materials that are deemed as fit for the user. Considering the following relations like *isFriendOf*, *isSupervisorOf*, *isStudentOf*, *hasAffiliationWith*, etc etc can be used to emphasis and establish a semantic relationship among different group of users.

4. Features of Ontology

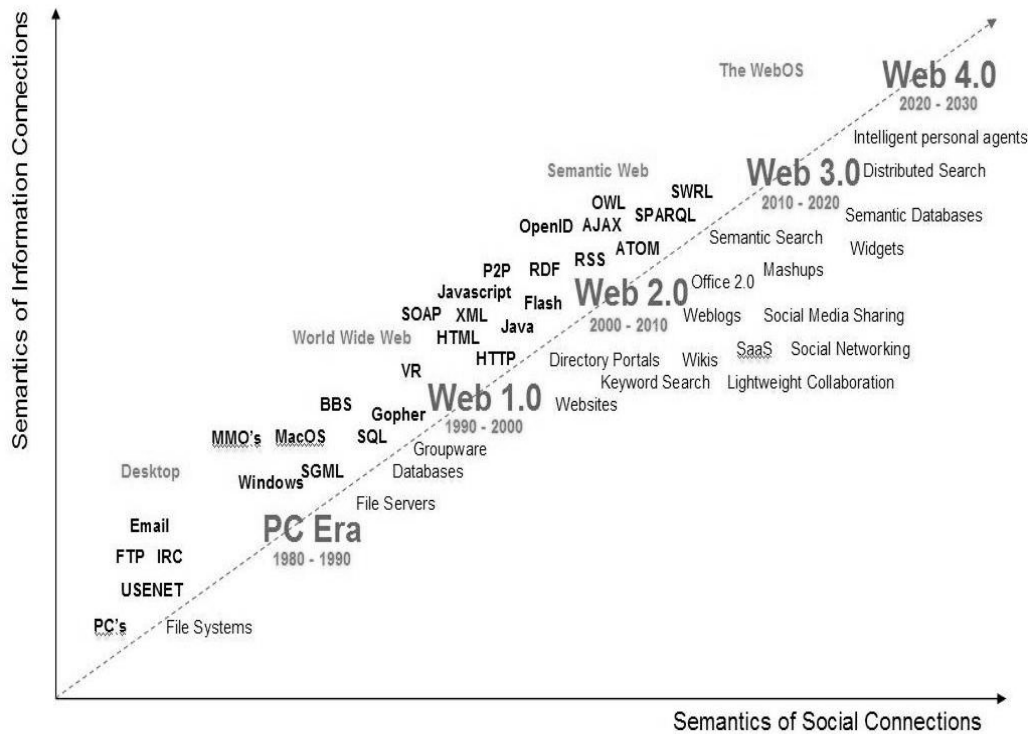
As Gruber described, ontology is defined as “*an explicit specification of conceptualization*”. Later on Studer *et al* extended the aforesaid definition as “*a formal, explicit specification of a shared conceptualization*”. His idea mentioned of the idea ‘shared’ in the notion of conceptualization and formal relationship among concepts. This theme involves a perspective of a specific reality which is constituted in the conceptual structure of the knowledge base. The ontology defines terms and formal relations within a particular knowledge domain. Thus ontology can be defined as “*a set of shared conceptualizations with their formal relationships developed in a polynomial hierarchy*”.

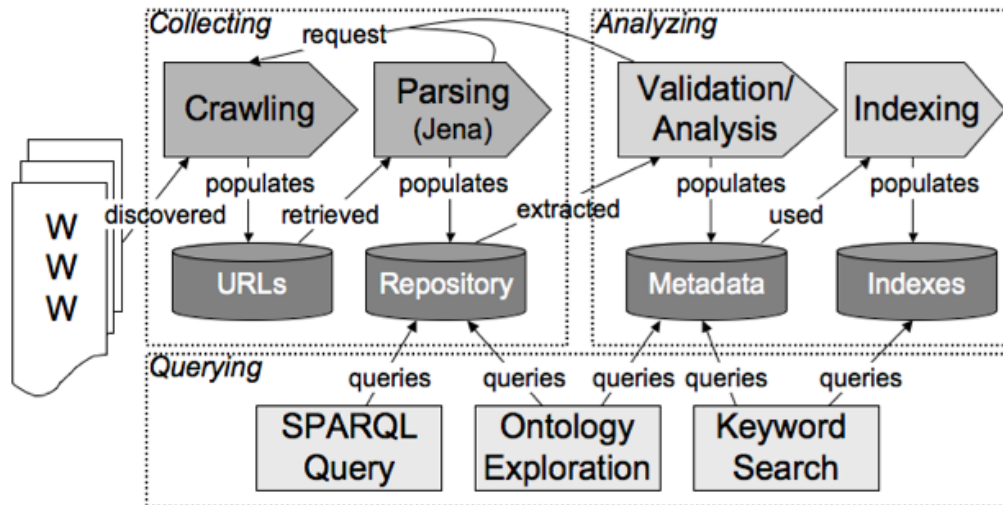
Based on the assumptions the characteristics of ontology can be drawn as shared, where the notion of commonly agreed knowledge is expressed. Conceptualized, where mental formulation of phenomenon in the world identifying concepts is realised so that ambiguity across concepts could be avoided. Formal, where could be understood by a machine and relationship among concept could be established for inference of implicit knowledge. Poly-hierarchical, where the rigid monolithic hierarchy is discarded.

5. Ontology implementation in eLearning environment

For describing learning resources, different communities use different metadata standards as per their requirements. It is known that metadata elements lack formal semantics and their primary objective is indexing that is used for creating access points like ‘creator’, ‘date of publication’, ‘publisher’, etc., etc. Then when need arises to share knowledge resources across a heterogeneous domain or an intra-domain, compatibility issues crop up from the blues. All these ambiguity could be bypassed between various metadata vocabularies by the use of ontology as the backbone of the eLearning system architecture. The goal is to achieve interoperability by including axioms and conceptual knowledge of the domain of interest. The system proposed is based on the principles of standards that are more focussed on semantics rather than syntax and extensible methods for data integration essential in an eLearning system.

The system to work properly requires some layers in an organized and sequential manner for its successful deployment. They include (bottom-top) knowledge base, inference engine, and service layer; and finally to complete it, it requires common integrated user interface layer. The discussed architecture is based on a conceptual framework of semantic learning layer cake.





6. Conclusion

The paper took into consideration about different users, their roles and importance in an eLearning environment in context to a successful deployment of an eLearning system. The ontology characteristics are discussed and exploited to the maximum extent and why should ontology be used as a backbone in such a system is analysed. Also a portal for semantic eLearning architecture is proposed. Moreover it is observed that for a semantic driven eLearning system what variables and factors should be taken into consideration. An endeavour to build a seamless and intuitive e-education system is dreamt of, and how it could be achieved by the community is being considered and people are burning their midnight oil to realize it. More and more research is being carried out to exploit the potential of semantic web technology. The open access tools available in ICT are also being taken into consideration and an effort for continuous improvement and development is a reality now for a brighter knowledge enriched world.

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