

## Ontology based e-Learning approach over Traditional e-Learning

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**Abstract**—This research paper covers the possible enhancement on tradition e-Learning approach to Ontology based e-Learning approach. Traditional e-Learning environment has the number of limitation. These limitation of the tradition e-Learning will overcome in proposed ontology based e-Learning approach. The first section of this paper covers the growth of information technology in education sector for e-Learning. The second section describes about the e-learning. The third section of this paper shows personalized e-learning. The fourth section highlights the problem faced by the e-learner. The fifth section shows the proposed approach of modern ontology based e-learning technique which will overcome the limitations of the current e-Learning methods. Six section is about the various tools used to create ontology for proposed e-learning approach in this research paper. The benefits of proposed approach are listed in the seventh section.

**Keywords**-Ontology; e-Learning; Personalized; Semantic Web Technology; LAMP

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### I. INTRODUCTION

Now a days, the growth of information technology is very fast in all public and private sectors. All the tradition approach of doing paper based work now converts into electronic based system because of it comes with the large set of advantages. This paper is focus on the education sector. Now a days, Schools, institutions or universities are using the e-learning system for their students to obtain the advantages of anytime, anywhere, anything teaching-learning activity. Currently, these all available e-Learning systems have their own unique advantages as well as applications. The proposed approach in this paper for the e-Learning model is about personalized e-Learning. So that the online learning activity become more comfortable, time-saving, learner friendly, personalized and more relevant than others approaches of tradition e-Learning approaches.

### II. WHAT IS AN E-LEARNING

E-Learning stands for electronic learning, it means a learner can learn anything at anytime, anywhere without any boundary of traditional learning. E-Learning can possible through the various resources like computer, DVD, network, online portal with the help of information and technology [1].

In the e-Learning approach a learner can start learning himself without depending on others. Learner can make more focus on his interest and needs of learning resources. The concept of pull the knowledge is possible. If the e-learning system is properly designed and implemented then it will cutting down a large cost of organization of employees and other infrastructure. It is possible to share knowledge of different experts on e-learning systems so learner can ask query

to many experts sitting at the single place and single effort. It is 24\*7 available. This approach saves paper so it is environment friendly approach also. It is easy to manage the updates.

### III. PERSONALIZED E-LEARNING

Better teaching-learning process is possible after analyze the individual e-learner's needs and aptitude regarding the learning. Personalized e-learning first analyze the learner profile, behavior, aptitude then retrieve the highly semantically personalized e-learning resources, categorize them and finally serve this customize content to e-learner. The personalized e-learning is achieved by the use of ontology.

This Personalize learning technique include different set of learner characteristics like profile, background, needs, interest, skills, time of learn, intension, level of expertise, learning style, and media preferred for learning [1].

#### A. Learner Profile:

It includes the parameters like learner user-id, name, email, date of birth, address, and course.

#### B. Learner background:

It includes the degree of qualification which he obtained.

#### C. Level of proficiency:

It includes the level of knowledge in the domain like beginner, intermediate or proficient.

#### D. Media preferred:

It is called as style of learning or learning objects indicate which category of content a learner supposed to wants like

document (DOC, PDF, PPT, XLS etc.) image (JPEG, GIF, PNG etc.), video (MPEG, FLV etc.).

#### E. *Learner's preference:*

This is the type of learning category of learning resources a learner wants to learn. For example conceptual idea, example-oriented, case study or assignment-oriented, demonstration, simulation approach, graphical format or any other.

#### F. *Learner's Intention:*

This is the reason behind the learning i.e. study and information purpose, research, survey and analysis.

#### G. *Learning State:*

- 'Studied' – if the learner has gone through each and every lesson and in test he/she has not performed well then this value is considered.
- 'To Be Studied' – if the learner skipped some lesson then this value is considered.
- 'To Be Revised' – if the learner has not performed well in test, then this value is considered.

### IV. LIMITATION OF TRADITIONAL E-LEARNING

#### A. *User-hostile*

Traditional e-Learning system are programmed and work based on how they are actual designed. They cannot work according to the way of learner learn from it.

#### B. *Unstructured organization of Contents*

Sometimes the enough contents are available but they are very poorly designed or presented. So how to follow and learn them is become problem to a new learner [2] [3].

#### C. *Demotivation to Learner*

Learner are self-dependent in tradition e-learning. There is no any guarantee of experts that they can always available to solve learner's query. If the quality of content and presentation of it are poor quality then the demotivation to learner is possible.

#### D. *Lacking of Personalized learning*

Traditional e-Learning based nothing more than a program. They are work as per they are designed. This traditional e-learning system are lacking to check the needs, interest, and knowledge level of learners [2]. They are often fail to understand the type of media a learner wants to learn. Some of the e-learning systems cannot work according to the profile and background of the learner set. It means they are working like a stupid machine without prior understanding the learner demands.

#### E. *Fail to keep track of user action and click behaviour*

.What a user do in e-learning system, what a user is click to learn and which actions he generate for learning resource in

tradition e-learning system, all such types of details are not captured in this traditional e-learning systems. And based on these type of information, it can become possible to understand the type of learning resources the learner needs and the system need to deliver the learners. In the traditional e-learning system, the traditional e-learning systems are missing this concept. So what to need, what to serve, when to serve and whom to serve implementation in this traditional e-learning systems cannot understand and only work every time just like in the predefined order.

### V. PROPOSED E-LEARNING APPROACH

In the proposed e-learning system the key part is e-Learners. The proposed e-learning system will convert all previous limitations of traditional e-learning systems into the advantages and make it possible a better e-learning environment to the e-learners by providing the better learning resources according to their needs, interest and many others.

In the proposed e-learning environments n number of learners can take participate for learning. According to Figure 1, first of all each and every individual learner have to create their own private account using the registration form, where all the micro details about the e-learner can be fill-up by the various e-learner before participating into the further learning process. And this will be called as User Profile. User profile include the attributes like learner name, address, date of birth, gender, UG qualification (if application), PG qualification (if application), needs, area of interest, type of media learn, knowledge level and others. This user profile will be keep and store into the database table. It is used to discover the types of learning resources serve to the e-learner.

The e-Learner can get find and use the learning resources using the query interface. The survey says that the user tendency is to write very small length of query into the search query box and so it is often seen that the e-learning system is fail to understand the correct and exact needs of learning and supply the irrelevant learning resources also. Ultimately this will lead the user demotivation. The user query interface in the proposed e-learning system will provide the facility of query expansion based on the query entered by the e-learner in query interface box. It automatically displays the query suggestions to learner, where learner have a chance to select a best one out of them and this process is called as query processing and query reformulation in our proposed approach.

The most important part in the proposed model is the Semantic Information Access. This is possible through the use of the Semantic Web Technology which includes the Ontology, RDF, XML, SPARQL to feel the learner a personalized e-learning [4]. The Semantic Web Technology is not the separate web, but it is the extension of the current WEB 2.0. The beauty of Semantic Web Technology is that it enables to machine to understand the requirement of user and work internally on

behalf of user in background. Ontology is core in the Semantic Web Technology. The role of ontology is to share common knowledge and reuse the available information among human and machine. RDF stands for the Resource Description Framework. It enables to establish the relation among the documents presents. Relation establish between the Subject and Object of statement and this relation is called as a predicate. For example, Gandhinagar city is the capital of Gujarat State. In the given example statement, Gandhinagar city is a Subject. Gujarat State is an Object and “is the capital of” is a predicate or relation. SPARQL is the query language for querying into the RDF. The proposed model work based on the semantic web technology. It will automatically identify the actual needs and interest of e-learner using the information stored in user profile and the ontology is helpful to discover the most relevant learning resources to user and present on his interface, so this way the e-learner feel better while attaching to the proposed e-learning system.

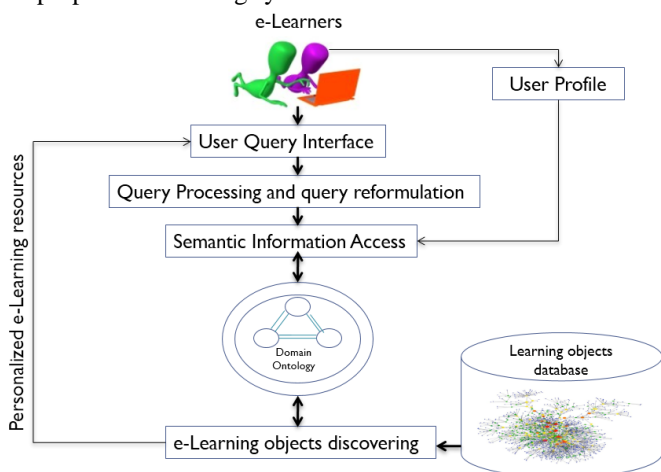


Figure 1. Proposed E-Learning Environment.

## VI. TOOLS USED FOR THE ONTOLOGY DEVELOPMENT

There are the number of tools available to design the ontology. This paper discussed some of the famous tools used for the ontology development.

### A. Protégé:

It is a free, famous, open-source ontology editor and framework to construct domain models and knowledge-based applications with ontologies for building intelligent systems. Protégé provide a wide range of plug-ins so it is easy to build any type of ontology based application. It provides the features like editing ontologies, sharing, customizable user interface and web forms for application specific editing, import and export ontologies in multiple formats [5] [6].

### B. OBO-Edit:

OBO-Edit is an open source ontology editor written in Java. It has a very easy interface for editing ontology, a simple but fast reasoner, and powerful search capabilities. It is optimized

for reading and writing ontologies in the OBO biological ontology file format [7].

### C. Tool for Ontology Development and Editing (TODE):

Tool for Ontology Development and Editing (TODE) is the first development tool designed using Dot Net environment. Despite the availability of the large number of tools for ontology development, no other Dot Net based ontology editor was available. It covers the features like easy to use, AJAX based web environment, W3C compliant web interface, and support for OWL-Lite, reasoning and inference, visualization, import and exports facility [8].

### D. Swoop:

SWOOP is an open source project and tool for creating, editing, and debugging OWL ontologies. It was produced by the MIND lab at University of Maryland, College Park [9].

### E. OilEd:

OilEd is a simple editor that allows the user to create and edit OIL ontologies. The main intention behind OilEd is to provide a simple, freeware editor that demonstrates the use of, and stimulates interest in, DAML+OIL. It will not actively support the development of large - scale ontologies, the migration and integration of ontologies, versioning, argumentation and many other activities that are involved in ontology construction. It should, however, provide enough to allow the basic construction of OIL ontologies [10].

## VII. BENEFITS OF PROPOSED E-LEARNING APPROACH

The limitations mentioned in the traditional e-learning approach will overcome in this proposed approach of ontology based e-learning. The benefits a learner can get are like:

### A. Pull knowledge knowledge is possible:

Learning resources in Ontology based e-learning approach are interrelated with each other in the sense of relation. So, this proposed approach of learning will discover the present all the related learning resources to the e-learner. So, learner can spend more time in actual teaching-learning process.

### B. Systematic organization of learning resources:

Semantic web technology provides covers the concept of Resource Description Framework (RDF), which keeps and maintain the relationship between a statement using relation or predicate. So learning resources in this proposed approach are not just hyperlinked using html, but they are well related with each other in the sense of relation [11]. So that the machine can able to find what to serve, when to serve and whom to serve. This is all happen due to the structured organization of learning resources using RDF and Extensible Markup Language (XML).

### C. Learner friendly:

This proposed approach is learner friendly because here a machine can discover the actual needs and interest of learner and according to such parameters it can automatically identify which learning resources to present to learner. That is why a learner does not involve into the categorizing of the learning resources. It is automatically perform by the machine in the background.

### D. Personalized learning:

The knowledge level, expertise in learning contents, media prefer to learn (audio, video, ppt, pdf, docs, etc.), needs, and area of interest are different of students who are in the same standard, having same qualification. So, this proposed approach study the learner profile first, and while discovering and categorizing the learning resources for learner from the database, it also keep the learner profile in mind before presenting them to the learner. So that the concepts of personalized learning will fulfill in this proposed learning approach.

## VIII. FUTURE WORK

Future work includes the real practical development work of ontology for e-learning system of a university (which includes various departments). Ontology can be develop using the above listed tools in section VI. The whole proposed approach can be implement in LAMP package (Linux, Apache, MySQL, PHP) [12], it is open source and free available so the issues of license is no longer available.

## IX. CONCLUSION

Traditional e-learning system works according to how they are programmed and produced results accordingly. Proposed approach can understand the exact needs, interest and profile of e-learner by machine itself with the use of semantic web technology. So personalized and dynamic e-learning is make possible.

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Shaileshkumar K. Patel received degree of Master of Computer Applications in the year 2006. His current research interests focus on Semantic Web Technology in the area of e-learning.

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