

Dynamic Learner Framework for Corporate E-Learning System

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Abstract;-E-Learning has come up with technology to deliver a part or entire part of a course independent of permanent time and place restriction. Courses in the E-Learning systems are designed in broad sense while considering different aspects, the need to tailor content based on course request objective is crucial. The customization of content is made by considering various context parameters such as learning style, learner's interest, and learner situation. Context aware E-Learning systems select or filter the learning resources in order to make the E-Learning content more relevant and suitable for the learner in his/her situation. Taking into account learner background and intention, in this work, we developed a framework that dynamically represent and manage learner profile context information for the purpose of facilitating the delivery of learning material that fits to learner actual context. The adaptive functionality of the proposed E-Learning approach uses the combination of dynamic details of the learner and the category and contextual course information. Once a learner context with course taken information is generated, it is going to be re-used to recommend the upcoming courses, so that learner context information is always considered. For the implementation of the prototype an open source E-Learning system named Moodle; is used and customized in a way it will address the thesis objective and the semantic data is stored outside the Moodle system and the enrichment process operates on the extracted information.

Keywords:E-Learning systems, Learner context, Ontology, Dynamic learner context

1.INTRODUCTION

This Education is a key factor for economic development [1]. There is no country that has achieved sound economic development without a well-established educational system. With this regard, Oztruk [1] noticed, countries are looking for alternative systems to enhance the delivery mechanism to become more reachable.

Distance Learning/Education based on the concept of "global dissemination of knowledge" is making a great contribution in educating learners around the world by eliminating costs of traveling, infrastructure, human resource etc. Distance learning itself is complemented by E-Learning (electronic learning) which involves online provision of learning contents for the learners. As Schmidt, Winterhalter [2] states, E-Learning has been also considered as one major alternative and it is believed that it can help developing countries to meet developmental challenges.

Technology-based E-Learning encompasses the use of the Internet and other important technologies to produce materials for learning, provide courses to learners, and also regulate courses in the organization [3]. To get a highly customized learning content based on work environment and learner interest with any other learner objective, contextualization is a better solution. A context model is a system of concepts (entities) and relations, Sarwar et al. [4] and Jovanović et al. [5] discuss as ontology is a possible means for context modeling to specify the representation of contextual knowledge. Educational systems are gradually incorporating semantic web technologies aiming to provide a more adaptable personalized and intelligent learning environment [6]. The ontological approach for an enhanced representation of the relevant knowledge about the user context and domain contents will enable improvement in the retrieval process and the performance of adaptive capabilities [7].

Context aware ELS (ELSS) help a learner to get highly customized learning content. The customization of content is made by considering various context parameters such as learning style, learner's preferences, learner's intention and learner situation [8]. The ontology-based context model contains hierarchical content relationships between concepts. It can provide related and useful context-based information for searching learning material in E-Learning environment.

Thus, the main aim of this work is to develop ontology based dynamic learner framework for contextualizing learner profile which contains a hierarchical content relationship between concepts and provide course content considering the learner job position, working position and experience (if any) in order to provide corporate level training content.

2. Related work

A.Semantic web-based ELS

Web-based semantic technologies can provide system interoperability and reusability of content by integrating existing adaptive technologies with the idea of the semantic web for content representation [9]. An ELS model by Ghaleb et al. [10] come up with an approach of developing a semantic web based ELS, which focus on the RDF data model and OWL ontology language. Jovanović et al. [5] designed an ontology-based framework aimed at explicit representation of context-specific metadata derived from the actual usage of learning objects and learning designs. Developed an ontology framework Learning Object Context Ontology (LOCO) as a

formalization of the concept of learning object context (LOC) data. LOCO Analyst tool is used and proved that the LOCO framework is useful for generating feedback aimed at informing content authors and instructors about the relevant aspects of the learning process.

B.Context Aware Adaptive ELS

The other type of ELS is with context aware adaptive feature. In context aware adaptive e-learning approach, the adaptation process consists of collecting contextual information about the learner and the learning environment (such as device and means of communication) will be maintained. It is the process of initializing learner model with context information and obtaining context-aware adaptive delivery of learning material based on the learner context model. Below are some research works in related environment.

C.Dynamic learner ELS

From many research works conducted on E-Learning improvement, here some of the papers that focus on context aware ELS that provide learning content according to a learner's context will be presented. Bachari et al. [11] develop a framework called LearnFit for building an adaptive learning management system by considering learner's preference. They use Myers-Briggs Type Indicator (MBTI) tools for learner's personality processing. Their system is delivered as an Add-On to the popular Moodle Learning Management System to provide adaptivity learning experience. To achieve the goal of individualized instruction they used Xin Li [12] models: Domain Model, Pedagogical Model and Learner Model. Modules for personality recognition and selecting appropriate teaching strategy are used to achieve a better learning content. The authors showed as learning styles matching with the learners' psychology is helpful to students in enhancing both learning efficacy and efficiency. Their system evaluation result showed that students understood the process and liked being involved in it.

With the rapid change and growth in knowledge on information technology, especially companies as well as employees need to acquire recent knowledge in their working environment. Semantic E-Learning is a better means to get such dynamic, learner oriented and 36 just in time content [13]. Here some research works that show the implementation of E-Learning in working environment will be discussed. Zenk et al. [14] propose a methodology for managing situated individual and organizational learning and develop a questionnaire platform named Learning Assessment Questionnaire (LAQ). The questionnaire method assesses organizational factors relevant for individual and organizational learning and provide the foundations for such individual and organizational knowledge and capabilities. To assess their system, the authors analyzed and compared data from telecommunication and healthcare sector. In both cases,

a higher degree of organizational learning orientation is gained.

In an adaptive learning system, context related knowledge allows the system to deliver learning material by adapting learner context. Most of the contextual details from the learner profile can be considered as static such as name, location, identification, organization but other information's like student's educational level, course taken, learning capacity may change. As37 Sudhana [15] underlined the need to develop a dynamic learner ontology model, addressing this issue means, once the learner signs up and give his basic information, then the system will update the learner profile as the learner take courses and his knowledge increases and/or decreases while learner forgetting the knowledge or miss understands basic concepts. Work-related individual and organizational learning processes in organizations provide the foundations for maximizing individual and organizational knowledge and capabilities [14]. Even though, E-Learning provide courses for corporate level, it is not aware of the specific company it takes place in, so that tailoring the learning material towards internal business processes is too expensive [2]. So far, the rules applied to reason out the context is by interpreting context information for searching learning material in the E-Learning environment. Sudhana [15] recommend to work any other means to make E-Learning more suitable for corporate level training service.

The aim of this study is thus to develop ontology based dynamic learner framework for contextualizing learner profile doing a hierarchical content relationship between concepts basically on learner, course and topic. In addition, building corporate level ELS which provides work environment related course proposal for learners will be the target of this study. So that, learners in a company will get a better course list with actually matching their carrier and employees in their field interest will get target course that will best fit to their work environment.

3. Proposed system

The proposed dynamic learner model enables the discovery of suitable learning resource based on recent profile and changing interest of a learner. The extensive features of the prototype enable learner to extract and understand complete details of relevant learning topic and help to improve learner understanding level through providing related list of courses in the chosen topic

The main contributions of this work are give insight on the characteristics and drawbacks of ontologies developed to explicitly ,specify metadata of E-Learning domain, Briefly discuss the need for ontological approach to enrich existing ELS, Design a dynamic learner model ,Utilizing currently developed open source ELS for further enhancement purpose, Provide a study on semantic E-Learning technology and its adaptability, Study and model a better user interface

that is used for learner registration containing and a detail learner current status and interest.

4. Implementation

5. A. System Architecture

A system architecture is the conceptual model which present different system components that will work together to implement the overall system. For the implementation of the thesis work components are organized in layer approach: user, access, business, knowledge base layers. Figure 1 shows the proposed system architecture adapted from [16] (in which components inside red box are from existing work)

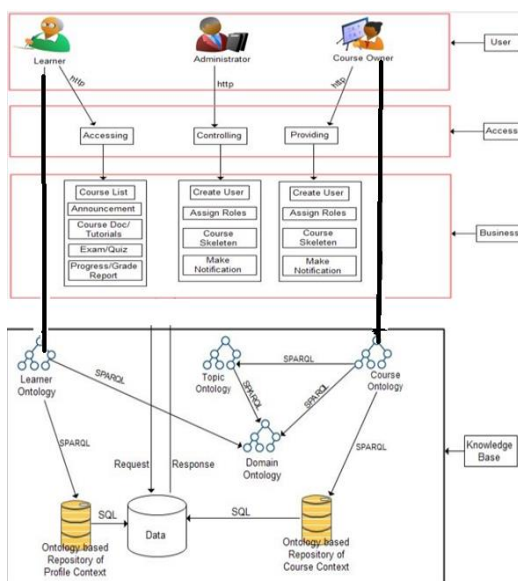


Fig -1 System Architecture

The framework

The design of dynamic learner system is governed by the framework shown in Figure 2 our framework is an implementation in type, it shows available system components with their interaction and flow. It shows the components and the knowledge base that interact specific component. In order to provide the required output, all components should interact and the result from each component will be passed to the next layer for further processing.

While developing the framework proposed by this work, previously done architectures and ontologies are taken as a basis and layers the will help to incorporate the features of the study is added. The proposed framework is made of learner profile manager, course maker and dynamic profile builder subsystems. Those subsystems are executing their specific task and inter process their outputs to provide a result that will be expected from the study.

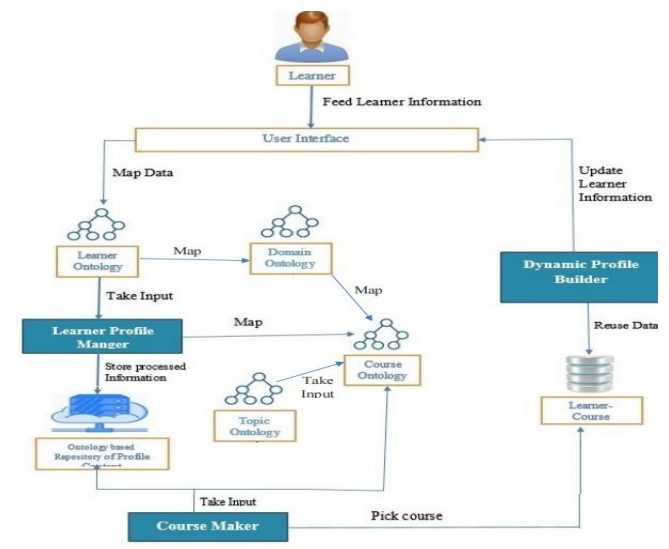


Fig -2 Dynamic learner framework

C. Testing and Evaluation

The experiment and the process executed for assuring that the developed prototype has the expected level of quality, usability and to what extent basic features are addressed will be checked by evaluating the system in the eye of domain experts and using testing tools and methodologies. So, the result of this investigation revealed how accurately the system provide better learner context related course list and to what extent that learners profile is processed dynamically.

The evaluation of a model that is designed to dynamically process and manage learner profile context information as of feedback from users exhibited a 6% enhancement and got 91% with added dynamicity feature. Concerning performance, almost it has no significant change with the previous project but a 0.1 millisecond difference occur in the proposed prototype which could be while processing the semantic layer.

5. Conclusion and Future Work

A. Conclusion

The core intent of the thesis is developing a dynamic learner profile modeling framework for corporate E-Learning so as to provide a relatively learner context-based course list. The system responds accordingly whenever changes in course completion and interest exists per each login to the ELS. This research work also identified the purpose and goals of ontologies for enhancing the feature plus metadata enrichment of ELS.

The primary advantage of the proposed dynamic model is, it contains a hierarchical content structure and semantic relationships between concepts. So that it can provide related and useful semantic based context information for searching learning material in E-Learning environment. The outcome of

the research is generated by analyzing personalized delivery of the learning material dynamically, through mapping learner profile, interest, status of learner with the objective and level of course detail information. In addition, algorithms and semantic knowledge based queries are designed and applied to come up with enhanced search result of courses.

B.Future Work

To improve the usability and performance of the prototype, there are issues that need to be performed for further investigations or tasks. The main thing is it needs further development of algorithms to extract semantic educational information from the course content and thereby make course list recommendation more intelligent. And like the ontologies it is good to have a standard design of semantic information repository (a semantic information stored in the triple store) will use for further enrichment process and enriching several educational recommendation scenarios can be applied.

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