

Integrated Framework for Applying Personal Ontology Learning Style

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Abstract—Despite the great technological development, that is increasing every day on an enduring basis in all fields of life especially in the educational process, there is no interactive system between the student and the material that is being studied. all students is studying the same material with the same style, quantity, time and other factors, all of these factors leads to an imbalance in the educational process. This research proposed a solution to make the content of courses related to the students' learning style that differs from one student to another, according to several criteria: in the sense of age, knowledge, experience, culture and other factors that affect it. Therefore, we can formulate the research problem as " there is a gap between educational level and knowledge level of students to understand material components " therefore we will try to adopt a proposed framework to reduce this gap by using BI techniques to enhance ontology learning style.

The model will develop to introduce the dialogue between the student and our system in each course to identify the scientific capabilities to determine the appropriate scientific content and preferred learning style for each student.

Index Terms—E-learning environment, ontology learning style, metadata, semantic web, personal ontology learning style system.

I. INTRODUCTION

Modern universities, colleges, and high schools are vitalizing their teaching methods through e-learning platforms, that have many benefits and advantages as work any time, anywhere, use collaborative tools, and support different styles of learning. Whereas, the e-learning platforms do not cover all teaching aspects since they do not usually provide teachers with tools that allow them to thoroughly track and assess all the activities performed by all the learners. In addition, do not evaluate the structure of the materials content and its effectiveness in the learning process. E-learning platforms do not cover the learning style that the student prefers it to learn his course, and the activities that used to control on the e-learning process [1].

In fact, the Personalized E-learning environment is a new trend to improve the learning process. It is used to solve many problems in traditional learning and provides the students with tools that help them to interact with the e-learning environment; as it helps them to select the courses, the time of lectures, and review the previous lectures and lessons. In addition, it provides the teachers with tools that help him to access and control learners' activities for example number of students who joined to the course and the number of mails that is being sent by each student.

Finally, many tools are developed to get access on and control the e-learning platform. However, not all of them cover the suitable style for each student to learn his lessons by selecting the preferable learning style for each student. In addition, it does not provide the suitable course content according to the students' preferable learning style. Therefore, in our research we try to adopt Personal ontology learning style based on Business Intelligence (BI) technique.

The paper is structured as follows: In the following section, we will define learning style and the different types of learning style in addition; we will discuss the related work. Section 3 describes the metadata that used to design courses content and learning style. Section 4 discusses the semantic web in e learning. Section 5 introduces the proposed model for Personal Ontology Learning Style System (POLSS) that used to solve the research problem.

II. LEARNING STYLES AND RELATED WORK

There are many definitions of learning style. Lawson & Johnson defined learning style as "A preferred way of acquiring and using information"[2]. Cranton defines learning styles as "preferences for certain conditions or ways of learning" [3]. In addition, the learning style defined by Karagiannidis and Sampson as "the way in which learners perceive, process, store, and recall attempts of learning" [4].



Fig. 1. Learning process factors.

Students learn in various ways. So to encourage or motivate student to learn effectively, student must learn with suitable learning style. Each student has different behavior, and knowledge from others. This makes learning style differs from one student to another. On the other hand, the student may learn each course with different learning style according to the nature of the course content, the course may be practical course so the student may prefer tactical learning style, or it may be a theory course so the student may prefer another learning style as auditory learning style. Therefore, learning style is not standard for each student but it varies from one student to another according to some

factors that illustrated in Fig. 1, in addition, it may differs from one course to another for the same student. That means, the learning process consists of several learning styles that can mix them together to obtain the most suitable combination for each learning event. The following figure illustrates the factors that affect in learning process.

By implementing learning style in E-learning environment, it will lead to improve the level of understanding of lessons for each student. Therefore, the benefits from applying students learning styles are as follows:

- 1) It allows each student to identify the preferred method to learn.
- 2) It makes students aware of their particular preferences [5].
- 3) It improves student skills, knowledge, and information.
- 4) It allows each student to monitor the level of improving in education process.
- 5) It provides graphical summary for each student about his level.

Students learn lessons through different methods. Each student prefers the method that helps him to understand his lessons. Students may understand the lesson by hearing, seeing, acting, or reflecting. In addition, teaching methods are different from instructor to another. Some of instructors depend on summarizing and memorize the lessons, others prefer to explain all points in the lesson in details, and others prefer to illustrate the lessons by diagrams, tables, and practical examples. Therefore, "how much a given student learns in a class is governed in part by that student's native ability and prior preparation but also by the compatibility of student's characteristic approach to learning and the instructor's characteristic approach to teaching".

Since mid 90's, a few educational hypermedia systems, which model student's learning styles have been developed, The system developed by Carver et al.[6]. Relates learning styles based on Felder- Silverman Learning Style Theory to course components, e.g. slides, hypertext, media clips. According to student's learning style, the system presents a list of course components with links by order, and student can explore the course by click the links. Arthur system [7] assumes four leaning styles: auditory, visual, tactile or a combination of these styles, and there is respective course material for each style.

At the end of the 20th and the beginning of the 21st centuries, the term ontology (or Ontologies) gained usage in computer science to refer to a research area in the subfield of artificial intelligence primarily concerned with the semantics of concepts and expressive or interpretive processes in computer-based communications. In this context, there are many definitions of the concept of "ontology" in the E-learning field, but in our study, we will adopt the Gruber's definition 1993: "ontology is a formal, explicit specification of a shared conceptualization." The term "conceptualization" is the abstraction of some concept through the definition of its peculiar characteristics.

Other definitions of ontology are: "ontology is a set of concepts - such as things, events, and relations - that are specified in some way - in order to create an agreed-upon vocabulary for exchanging information." In addition, Mike

Uschold and Michael Gruninger 1996 defined ontology as "Ontology is a shared understanding of some domain of interest".

III. METADATA FOR COURSES CONTENT AND LEARNING STYLE

Metadata is describing learning resources. Generally, metadata is set of tags that can be applied to any resources regardless the way that used to create it. Metadata enabled the organization and universities to describe index and search their resources [8].

Metadata is referring to data about data or describing the data that help us to achieve better results. We will use it to describe the material content and the learning style by using metadata classification. In addition we will introduce different Ontologies that used in our model and discuss how use these Ontologies and other kinds of metadata to reach to the better material content and learning style for each student according to specific criteria that determine the behavior and culture for each student to achieve the main goals of this research.

IV. SEMANTIC WEB IN E-LEARNING

Currently the process of search in the web is very easy but the results are very huge but not related to the search topic because when we search about any word, the computer do not understand this word but search on the form of this word not the meaning of the word. Although the word may have more than one meaning. The results include all of these meaning. Although the user need the results of specific meaning about the word. This problem occurred when we make search on anything on the web. the results include pages do not related to the search key such as when search on the science word that mean the computer science such as topics about software engineering, database, etc., But the results will include bioscience and society science. Therefore, the results may not relate to the search [9].

V. PROPOSED MODEL FOR PERSONAL ONTOLOGY LEARNING STYLE SYSTEM (POLSS)

The main function of POLSS is to help users to find out teaching resources quickly and accurately according to their interests & learning style. This model includes 3 layers each one consists of models & Domains as follows:

A. Interface Layer

This is the first layer in our model that interacts with the student to send and receive personal & History information about student. This layer includes.

1) Student profile domain

Saves personal information for student in the first time is like: name, age, interested, background, and other qualifications. This domain Tracks the interests and behavior of students dynamically.

2) History & knowledge domain

Saves all actions that occurred by the student as previous courses, grades of courses, participations, and learning style

for each course.

3) Representing course domain

Displays all Suggested courses for each student, which related with student backgrounds and previous courses.

4) Learning style questioner model

Displays all questions related with selected material. That measures the preferred learning style for each student.

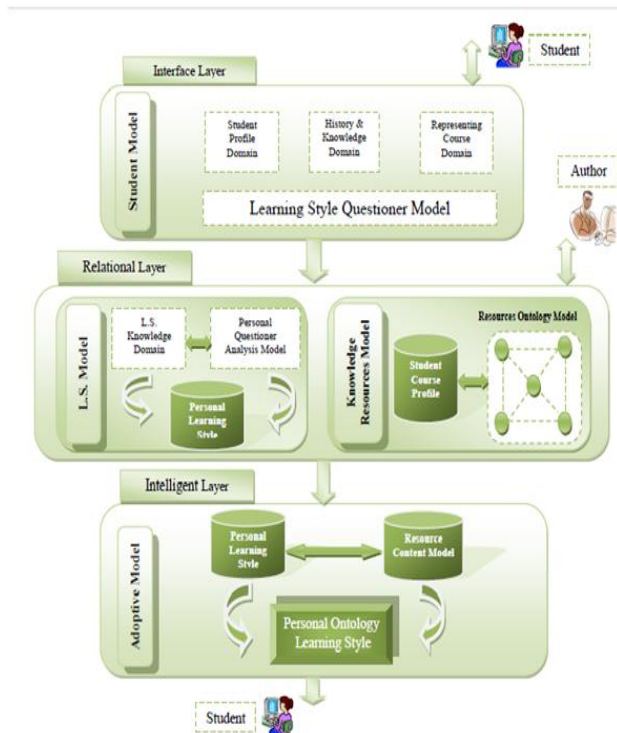


Fig. 2. Personal ontology learning style system.

B. Relational Layer

This Layer responsible for storing all learning style characteristics and the contents of courses and the relation between them, which include:

1) Learning style model domain

Includes all learning style types such as auditory, visual and Kinesthetic in addition metadata for each learning style.

2) Personal questioner analysis model

Store and track the answers of learning style questionnaire for each student and analysis these answers by using specific algorithm and factors.

3) Personal learning style

Store the learning style for the student in specific course via the relation between the results of previous questionnaire and the learning style model domain.

C. Knowledge Resource Model

Includes all courses contents and the relational between these contents and the vocabulary domain, which contain all

keywords, and the relational between them. In addition, specific content for each learning style.

D. Intelligent Layer

This is the last layer in our model which applying specific algorithm to get the results.

Adaptive model:

Responsible for adopting personal learning style with resources course model to get on preferring learning style and the suitable content for specific course.

VI. CONCLUSION AND FUTURE WORK:

This research attempt to present a solution for decreasing the gap between educational level, knowledge level of students and the style of learning , the content of the learning material via POLSS, which allows students to learn according to student learning style and suitable material. Our future work will include some enhancement for the user interface and the questioner model. In addition, it will include some enhancement in algorithm of the material content.

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