Chemistry of Education Resources using a Chemistry-Inspired Framework

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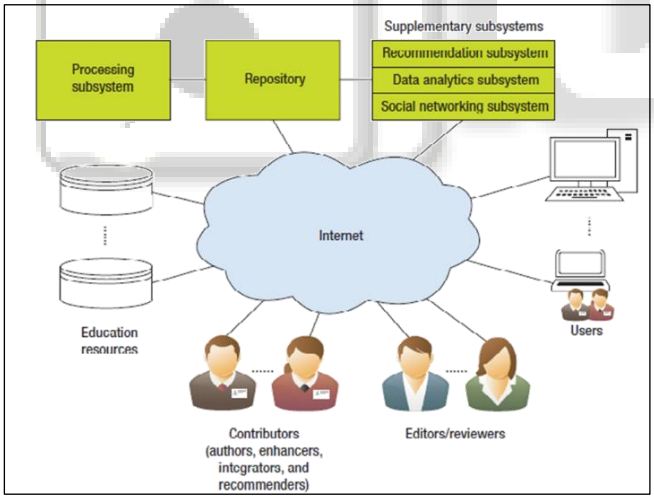
Abstract— Open education resources (OERs) are public domain learning objects used extensively in both online and traditional education settings. To facilitate the use of OERs, a novel chemistry-inspired framework links learning objects to help the education community contribute, augment, and locate these valuable resources.
Key words: Chemistry-Inspired Framework

I. INTRODUCTION

Open education resources (OERs) are public domain learning objects used extensively in both online and traditional education settings. Facilitate the use of OERs, a novel chemistry-inspired framework links learning objects to help the education community contribute, augment, and locate these valuable resources. OERs are "teaching and learning materials that you may freely use and reuse at no cost, and without needing to ask permission." With open source authoring tools, OER-based video lectures are cost-effective to produce. OERs are also particularly well suited for teaching computer science courses, which naturally lend themselves to digital materials. OERs can also be used to teach students in complex clinical or healthcare settings, or they can be produced as a way to help teach people with disabilities.



II. LITERATURE SURVEY

A. Various Perspectives Opening the Education of Engineers

Current applications of OER [1] in engineering education will continue to mature. Topic-related definitions, open licenses, use and reusability, enhancing discoverability, open policies, opening up OER repositories and datasets, and OER quality are all issues that must be managed and understood [3]. This Special Issue looks at the current state of OER practice and at issues associated with improving the use and reuse of OER. OER initiatives will make it possible for teaching staff to concentrate on the actual process of teaching and on the teacher–student interactions that are the real core of teaching and learning, rather than on the continual creation of educational materials [6].

The benefits are they provides a simple but powerful idea. Provides an extraordinary opportunity for everyone to share, use, reuse, and adapt knowledge. Easy to access.
The deprivation are they makes students vulnerable to potential pitfalls.

B. A Quantitative Study on Factors Influencing the Motivation to Share and Collaborate

In this paper, we have addressed OER [1] barriers in one of the first quantitative studies on the topic. Through regression and exploratory factor analyses, we were able to define how the inspected barriers influenced lack of motivation [2]. Our focus was on social OER environments where teachers are the main users. The results indicated that language and cultural barriers were the strongest predictors of lack of motivation [4]. An almost similar level of influence was identified in lack of organizational support and quality aspects [5]. These findings provide evidence of measures that both OER providers and educational institutions can take. Through this research effort, providers and educational institutions can likely lower those challenges that negatively influence the motivation of teachers to share and collaborate in social environments around OER.

- The benefits are an efficient mechanism to complement other types of learning materials. Make education more transparent.
- The deprivation is can't be explained all factors that influence motivation. Could not take into account all potential barriers.

C. Open courseware and shared knowledge in higher education

The sudden appearance of multimedia technology and, even more, on-line technology is requiring a transformation in higher education (Olsen, 2001a). This inevitable transformation can be defaulted to commercial enterprises (Blumenstyk, 2001b) or actively pursued in shared academic knowledge communities that promote open source code (Carlson, 2001). In the spirit of promoting an ethics of pedagogy, noncommercial LMSs offer open-source software suites that are meant to be a part of the evolving shared software for creating and managing on-line teaching and learning resources. By sharing knowledge in ways that parallel those of science, academics can revitalize the teaching profession through the rapid evolution of pedagogy, technique, and content material in ways that allow peer review of work and due respect for those who contribute to the community of knowledge.

- The benefits were the knowledge base will develop rapidly and spontaneously. Provide the basis for peer reviewed criteria for promising practices in teaching excellence.

– The deprivation is the potentially less secure in future on-line courses.

D. A Learning Object

The discussion board is a learning object that contains chunks of information or sub-objects that are themselves made up of smaller components or sub-objects. Additionally [2], a discussion board as a learning object is a sub-object or chunk of a larger learning object. It is simply a matter of contextualization. This is an important insight because it confirms what has been learned in the literature about learning objects. It also confirms that learning objects generally conform to certain observable phenomena in nature, namely, interval numbers. Being infinitely divisible, the discussion board demonstrates that learning objects resemble interval-level data that are by definition equally and infinitely divisible [6]. Being infinitely compoundable, the discussion board also demonstrates that learning objects resemble interval-level data because as is the case for interval-level data the process of division can be reversed and the process of multiplication can move towards a larger data value or larger datum.

The benefits which confirms that learning objects generally conform to certain observable phenomena in nature. Enable the development of learning objects in units that can be combined and de-composed in meaningful ways. The object is not platform dependent and can function in any delivery media regardless of technology and protocol.
The deprivation are the negative views on technology.

E. A Learning Objects Recommendation Model based on the Preference and Ontological Approaches

This paper proposes an adaptive recommendation model for retrieving and recommending to a learner the suitable learning objects. This model enables e-learning systems to easily reuse and share learning objects published by various systems [3]. It uses specific ontology to infer what learning object a learner should study and what learning objects a system should look for automatically. Similar learning objects retrieved are recommended to a learner according to the result of a ranking mechanism [4]. This ranking mechanism not only uses a learner's preference but also adjusts periodically the ratios of two weights to achieve adaptive personalized optimal recommendation.

– The benefits were approach can prevent the weight from swinging widely. Provide adaptive, personalized recommendation for each user.
– The deprivation where the Performance is low.

Algorithm used Preference-based algorithm to relate and find the keywords:

– The algorithm learns a preference function defined over pairs, as in a standard binary classification problem and it makes use of that preference function to produce an accurate ranking, thereby reducing the learning problem of ranking to binary classification.

$$\mathrm{I} = \mathrm{AUC}(V^+, V^-, \sigma) = \frac{1}{m^- m^+} \sum_{u \in V^+, v \in V^-} \sigma(v, u).$$

F. The Ariadne Experience

The presented approach aims to enable exchange of metadata by relying on standards. In this work, the ARIADNE application profile has been mapped into IEEE LOM, and valid exchangeable LOM XML metadata instances for ARIADNE metadata have been produced. This work will increase the interoperability between implementations based on the LOM standard. The LOM XML [11] Schema was used to validate the LOM XML instances that have been generated from the ARIADNE metadata. This schema provides the formal specification of names, values and ordering of data elements. Therefore, we customized this common schema to accept multiple instances and vocabulary values of ARIADNE when it is appropriate.

– The benefits where it Increase the interoperability between ARIADNE and other Learning Object Repositories that rely on IEEE LOM allows to share and to exchange learning objects as well as their metadata.
– The deprivation where the Performance is low. Quantitative Analysis of Learning Object Repositories

G. Quantitative Analysis of Learning Object Repositories

This paper is the first quantitative analysis performed to the publication of learning objects. We have raised and answered several basic questions important for the understanding of the publication process and the design and operation of learning object repositories of several types [3]. Maybe the most relevant conclusion from the quantitative analysis is that the publication process is dominated by heavy-tailed distributions and the usual Gaussian-based statistics are not enough to gain insight on the nature of the compiled data. These distributions also provide the repositories with several characteristics not found in more normal sets. For example, difference in size or productive can span through several order of magnitude. Depending on the parameters of the distributions, it will not be unexpected that most of the content of a repository is produced but few individuals or that 99 percent contributor base only publish one object [5]. The black swan effects can be seen, measured and modeled in the composition of all repositories. Finally, measuring the publication process enables us to take better decisions about the architecture and infrastructure needed to support the Learning Object Economy. Moreover, measuring is our only way to test the unproven assumptions over which some of the current Learning Object technology rests.

– The benefits where they provide a wide view of the publication process. Can share, reuse, improve, and share again the data.
– The deprivation where the Statistics are not enough to gain insight on the nature of the compiled data. Can't be found in more normal sets.

The proposed algorithm is to calculate a numerical weighting, called PageRank, to each element of a hyperlinked set of documents. The formula is as follows:

$$PR(T_i) = \frac{(1-d)}{n} + d \sum_{t=1}^{n} \left[\frac{PR(T_i)}{L(T_i)} \right],$$

H. Ranking Metrics and Search Guidance for Learning Object Repository

In this paper, we enhanced our previous works, especially on the Reusability Tree, based on SCORM and CORDRA [7]. First, we proposed to utilize data mining technologies for time series data to gather the relevant information, such as citations, of specific LOs in different timescales. That is, citations in different timescales represent different meaning of the LOs. We revised the Time- Fading Model and Tilt-Time Window Model to measure the weight of Los [6]. In addition, we provided a mechanism to rank these LOs. Utilizing the proposed mechanism, it can enhance the reusability of Los [6]. Furthermore, to assist users in the searching phrase, we revised the algorithm of Relevance Feedback and combined it with the weight of LOs that we proposed.

- The benefits which it Provide a novel mechanism for repository to calculate the significant degree of LOs. Provide a set of guidance algorithms to assist users in retrieving relevant information by revising their queries.
- The main cause it doesn't provide actual items, like the recommendation systems, to users.

I. Architecture for Learning Objects Sharing among Learning Institutions—LOP2PAuthor

The objective of this paper is to present the LOP2P architecture: full technical details about the architecture would be impossible to cover in a single article. Therefore, this paper presents the main features and guidelines of the architecture, with the intention of demonstrating the purposes and viability of the LOP2P.

- The advantages where the LOP2P architecture has the dedication to share Learning Objects with a free license of use. It Enables network interoperability.
- The deprivation is that the results in a lack of interest in studying.

J. Enhancing Learning Objects with an Ontology-based Memory

We presented a platform, the Knowledge Puzzle Project, which enables to capitalize existing learning objects with the creation of an ontology-based organizational memory. The organizational memory concept, as presented in this paper, represents a new perspective for the e-learning field as it is founded on a rather different idea:
learning objects as content packages must not exist. Instead, assets, i.e. small fine-grained instructional units, can be exploited by composition mechanisms and learning services in order to aggregate Learning Knowledge Objects to fulfill specific training needs. This vision must be sustained by an ontological structure that represents the different necessary knowledge types: the domain knowledge, the instructional knowledge, the instructional learning theories and the competence model.

- The benefits are to conserve the reusability of learning objects. Produce a memory with new semantic structures to store fine-grained resources.
- The deprivation where it is noisy.

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