Towards Personalised and Collaborative Learning Management Systems

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Abstract

This paper proposes a framework for the integration of personalisation and collaboration in Virtual Learning Environments (VLEs). The paper describes two models of personalisation, i.e. assessment-based personalised learning via suggestions and personalised space. Collaboration is achieved via Learning Service, which provide specific collaboration services for learners. Although the proposed system integrates personalisation and collaboration in the learning environment, users have the option of switching off the personalisation so the learning space can act as a collaborative environment.

1. Introduction

In this paper, we propose a framework for integrating personalisation and collaboration in Virtual Learning Environment (VLE). A virtual learning environment (VLE) provides a learning management system that consists of a set of tools for creation and management of web-based courses [6]. It also provides support for interaction between learning space participants. These tools provide mechanism to deliver course materials over the Web, administrative components to allow instructor tracks student records and monitors their progress and collaborative components like Bulletin Board, Chat, Email etc. There are many off-the-shelves VLEs available in the market. Examples of the commercial solutions are WebCT [1], BlackBoard [2], TopClass [3]. They provide very little functionality for personalisation.

One major drawback of existing VLEs is that it is content-centric. Many instructors simply move all their teaching materials to the system. The materials are presented uniformly to all learners regardless of their background, learning styles and preferences. Nowadays, we are seeing the trend in education that emphasis on learner-centric learning. A learner-centric learning places learner at its heart. Learners are expected to actively engage in the learning process to construct their own learning. Thus they have more responsibility for their learning. Instructors are still responsible for learners' learning, but they play the role of "facilitator" who guides the learning process instead of being the sole information provider. A learner-centric learning will give learners a deeper and richer learning experience, as there is greater participation and involvement in the learning [4].

Thus, our question is how can we provide a learner-centric learning in virtual learning environment? More specifically, what are the criteria and functionalities required to produce this type of learning in a virtual learning environment, in which learners can define their learning goal? In this paper, we propose the integration of personalisation and collaboration in providing a learner-centric learning in virtual learning environment.

Due to the diversity in learner's knowledge background, skills, learning styles, preferences, personalisation plays an important role in providing individualised learning that is taking these factors into consideration. There are two models of personalisation in the proposed system, i.e. *assessment-based personalised learning via suggestions* and *personalised space*. The difference between these models is that the former is *instructor-driven* (the suggestions are derived from information given by instructor) and the latter is *learner-driven*.

The first model of personalisation attempts to assist learners in their learning based on their assessment results on the learning materials. In other words, it provides a personalised feedback on their performance and suggests the most suitable learning content to be learned next. These suggestions are provided by the domain expert (i.e. instructors) based on several kinds of relationships of the learning materials, i.e. *hierarchical, pre-requisite, sequence* and *relevant.* We provide only suggestion because we do not want to second-guess learners' needs. Besides, we do not want to restrict learners to learn in a particular way. They have the choice of whether to follow these suggestions, thus learners make their own decision as they are responsible for their own learning (i.e. learner-centric). Assessment Service provides functionality that allows instructor to associate each learning topic with a set of assessment questions (provided by instructor).

Proceedings of the The 3rd IEEE International Conference on Advanced Learning Technologies (ICALT'03)
0-7695-1967-9/03 $17.00 © 2003 **IEEE**

These questions are used later to assess learners' mastery of a particular learning topic before proceeding to the next one. Questions are categorized into several classes based on the difficulty of the question, i.e. *Beginner, Intermediate, Advanced and Expert.* For learners, Assessment Services provides functionality to dynamically generate questions based on their knowledge profile (stores their previous assessment records). After taking the questions, feedback were given based on the assessment results and suggestions on actions to be taken next were made such as take another test, study the current learning topic again, study the prior learning topic etc. Assessment Service also provides mechanism to automatically generate quiz for the learning space based on the relationships between learning topics. For instance, learning topic A is a pre-requisite of learning topic B. If we want to test the learners' understanding of learning topic B, we can generate quiz which will randomly pull out the question from learning topic B as well as learning topic A since learners are expected to know learning topic A. There are various tun-able parameters for setting up quiz such as *time limit, question presentation, marking criteria (e.g. whether to apply negative marking), number of choices to present for each question* etc.

The second model of personalisation allows learners to create an individualised view of the learning environment such as customising the appearance of the learning space, re-arranging learning contents, inclusion and exclusion of learning services and learning materials that deemed necessary. At any point in time, they can always reset the view to the one generated by instructor (i.e. *Default View)*. This will give more control to learners to modify different elements of the learning environment and thus create a sense of identity and personality in that learning space. Furthermore, group of learners in a learning space can create sub-learning spaces under current learning space for further collaboration. They have access privilege to all the learning contents and learning services in current learning space plus access to further addition of learning contents and learning services that were incorporated into the sub-learning spaces.

Another major aspect of the proposed framework is collaboration. There are many collaborative arrangements as for example described in [5]. Collaboration learning encourages the construction of knowledge through sharing of ideas and interaction with others in a common area. Collaboration provides a way for learners to describe their understanding to other learners, to interact with other learners to explore ideas and to build a (unique) shared view of knowledge. These functions support the learner-centric learning. In this proposed framework, there is a collection of *Learning Services* each providing a specific collaboration services to learners such as Bulletin Board, Reference, Annotation etc.

2. Discussion and Conclusion

One major issues is the extra overhead required by instructors to set up the relationships between learning content upon addition of learning content into knowledge base. The setting up of these relationships is required to assist in the first model of personalisation mentioned before (i.e. assessment-based personalisation via suggestions). We argue that the extra overhead is worth the benefits provided by personalisation. Besides, these relationships has always reside in the head of domain experts and we are providing a mechanism for them to externalise these knowledge that can assist learners in their learning process. The underlying architecture of attaching assessment questions to each learning topic together with the relationships among learning content make it possible to easily and automatically generate quiz to assess learners' understanding of a particular learning topic. Although the proposed system integrates personalisation and collaboration in the learning environment, users have the option of switching off the personalisation so the learning space will acts as a collaborative environment. This is a preliminary proposal for a framework, and it will require further research to determine how to realise this framework. The proposed architecture WebCMS2 will be developed on top of WebCMS [7, 8], a web-based course management system that facilitates the creation and management of web-based courses.

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