# The Design of a Social Instructional-Design Platform[1]

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**Abstract.** As more and more instructors bring their courses online, some issues on the effectiveness and efficiency emerge. To improve their learning outcomes, we propose to bring learners' behaviours closer to the designed activity itself. We believe that if we involve the students to the process of creating, improving and populating instructional design, there will be a remarkable growth in their learning motive and enthusiasm which not only helps them to achieve better learning outcomes, but also the teachers to better adopt their design to learners' requirements. We introduce instructional design to our LMS, which breaks the learning process to a set of activities, making it possible that learners can contribute by supplying tips, suggestions within each activity. Furthermore, other participants can rate contributions or give comments on them, and the instructor can make the final decision whether to accept them and then give a plus to the contributor's final score. We ensure the learning flow security by role-based access control[2]. The design shows great potential in enhance learning outcomes by enable effective social learning.

**Keywords:** Social Learning, Instructional Design, Web2.0, RBAC.

## 1 Problem Identification

To what extent the students can devote their attention and energy to the online learning hours? How can we help them to get the most out of their time and energy?

One of the facts is the lack of effective interaction when using most of the online learning systems. What the students can do is simply browse the contents the teacher has posted, maybe in different formats. And there might be some forums, chatting rooms or blogs, allowing the learners to express their thoughts, but how can we ensure that those activities are always relevant to the learning process and can finally enhance their learning outcomes?

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[2] It will be referred to as RBAC in the subsequent sections; a basic RBAC model includes User-Role assignment (URA), Permission-Role assignment (PRA), and Role-Role assignment (RRA).

Joseph Fong, Reggie Kwan, Fu Lee Wang (Eds.): Hybrid Learning: A New Frontier, pp. 108-116.
ICHL 2008, City University of Hong Kong, Hong Kong, August 2008.

## 2 Introduction

The research within this paper is mainly focused on possible ways to fully develop the potential of instructional design to address some of the drawbacks of e-learning systems compared to traditional classroom. In this section, an overview of the differences of these two types of learning is analyzed and relevant technical backgrounds are summarized afterwards.

### 2.1 Comparison between Traditional Learning and E-learning

There have been a lot of debate and discussion on the advantages and drawbacks of web-based learning against in-classroom face to face tutoring. The comparison is mainly focus on 4 dimensions [1]:

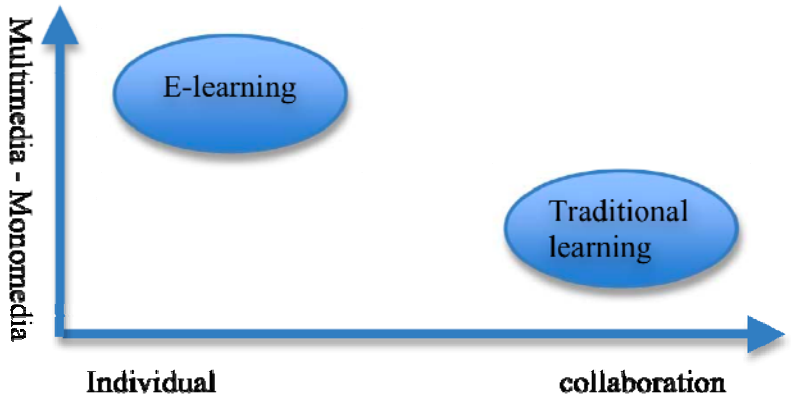


**Fig. 1.** Comparison of learning types

1. Individual-Collaboration
2. Passive-Active
3. Monomedia-Multimedia
4. Unidirectional-Bidirectional

As shown in Fig. 1, the web-based learning is born connected with computers, so it can easily top classroom in dimension 3; but for the rest ones, there are still a lot to be done. When a learner gets into an online learning environment, their behaviours tend to be personal, and rarely interact with others. How do they get in touch with peer learners or the instructor? Email, messages, forums are the most common approaches, which are also found in every general online community, thus do not have special concerns over the learning process. Discussions in forums are not often so related to learning, while email does not work well for instant collaboration. Furthermore, none of these methods links directly with the learning process.

### 2.2 Polishing E-learning Systems with Web 2.0 Technologies

What we need is more active participation, more collaboration and more effective and instant ways of communication. Those requirements are difficult to fulfil before Web2.0 emerges. But as the technologies evolve and more and more Web2.0 applications are showing their power in encouraging users' participation and gaining major success, e-learning systems should do the same. We can see that there has been a lot of work being carried out, such as in [2], a social learning environment adopting SECI model. And it is without any doubt that there is many cross paths between eLearning and web 2.0 technologies.

Instructional design, also known as “learning design”, has shown its power of bringing more advantages of classroom tutoring, such as interaction, collaboration, to online learning environment. There are lots of e-learning systems that support instructional design in different levels. The most remarkable feature of instructional design is that the introduction of “activity”, considering beyond static learning resources, but to a broader domain of roles, environments, etc. It breaks a course into several scenarios and then organizes activities in a structural and cooperative means, which supplies a good opportunity to gain better interaction among learners and their instructors.

So we can grant more capabilities to the activities, where all the interactions originate. When a learner is performing a certain activity, the system supply several ways to interact with other people including peer learners and the instructors. So they may post questions, start relevant debates, or perform group work - all based on the undergoing activity. So their behaviours are organized and tightly related to the learning process itself. At the same time, supervision and monitoring are quite necessary, which can be done by instructors or teaching assistants. So far there have been a lot of successful Web2.0 applications that can be integrated this way to existing learning systems, like RSS, wiki, blog, Q&A system, etc. Among all these possibilities, we take a closer look at how to involve students in to the process of instructional design by encouraging them to contribute tips or corrections to instructor's design and the potential improvements and benefits.

## 3 Related Work

There have been quite a few systems and tools that support instructional design, such as LAMS, CopperCore, RELOAD Editor, etc. We have also developed a simple Learning Design authoring and playing system using Description Patterns [3].

The major contribution of LAMS is that it is one of the earliest systems that focus on learners’ activities instead of static resources [7]. But it can only support IMS-LD level A [9], which is preventing it from better interoperating with other systems.

RELOAD Editor is an instructional design authoring tool that supports IMS-LD level A, B and C, and CopperCore, on the other hand, is a runtime engine with support for all the IMS-LD levels, especially the support for collaborative learning. Besides, CopperCore provides the developers with API to utilize this runtime engine [8], which makes it a first reference and choice to build IMS-LD-related systems.

Our work has showed that the RIA approach is ideal for the implementation stage of IMS-LD related systems, with rich interaction and better client-server load balance.

The analysis above leads to the decision that great jobs have been done in different aspects of instructional design and our work should bring it to the next level: the learners can also make active contributions to instructional designs, if and when they are properly guided by the platform which permits and encourages them to.

## 4 System Design

The engagement platform we propose, to some extent, is an instructional design engine, with enhanced security by RBAC and involving action extensions. The architecture is shown in Fig. 2, which is supposed to accomplish the following goals:

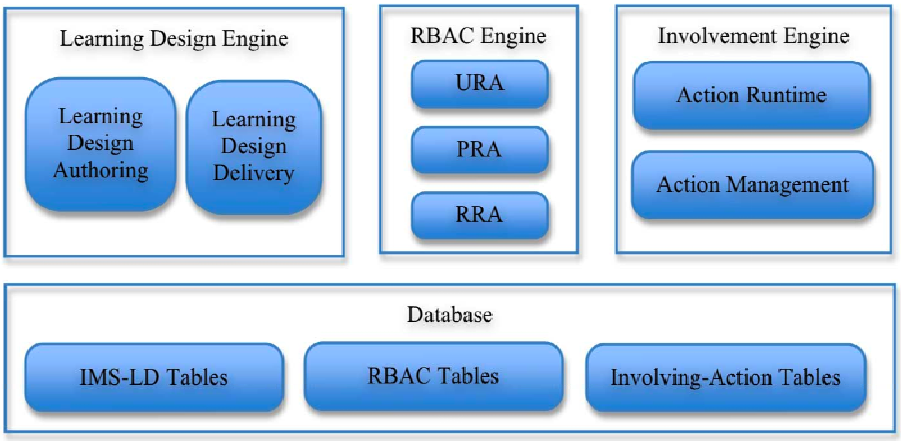


**Fig. 2.** System Architecture

### 4.1 Conformance with IMS-LD

The IMS-LD specification binds the workflow model to XML format and makes it convenient to share and exchange a UnitOfLearning. It focuses on learner activities and interactions between multiple learners and supporting staff, and offers great flexibility for different approaches and levels of use [4].

As the support for “learning design” is the most fundamental step for the whole engagement platform, we ought to choose the method carefully. Based on the analysis above, enabling IMS-LD support seems to be the most appealing idea so far. There lies great potential in IMS-LD that can help us to build an amazing system.

### 4.2 Easy Involvement for Learners

As we explore the current situation about how students interact with others in online learning systems, it turns out to be quite necessary to improve the way we do it. It will be much better if learners' behaviours can be bound tightly to a corresponding learning activity, not just scattered around in some stand-alone sub-systems.

When a learner is carrying out a certain activity, he/she may want do something about it: asking a question on an ambiguous knowledge point, correcting some spelling errors within the slides, offering other peer learners some great tips on how to comprehend better, initiate a debate on a controversial topic, etc.

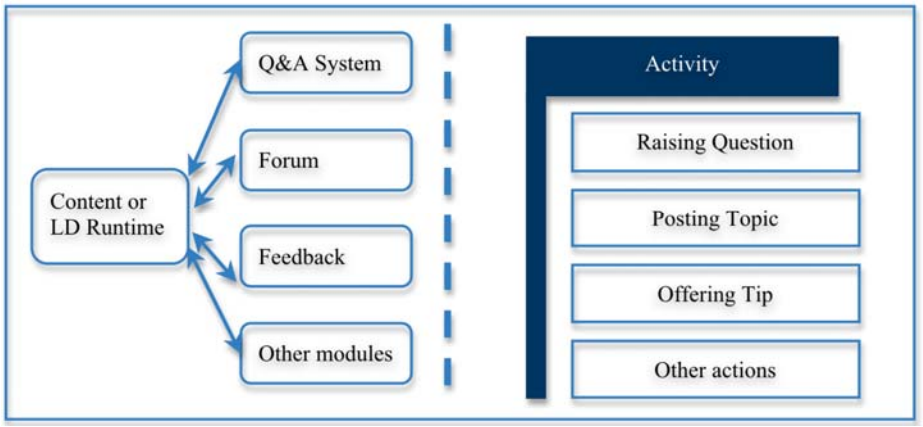


**Fig. 3.** Different level of integration

There are some systems that do support such functionalities that enable learners to do so, but a learner has to leave the current activity and go to somewhere else to do it, then after it is done, resume the activity that has just been "interrupted" – at least it seems to be. It is quite important for us to help them eliminate such 'gaps' where the learning process is interrupted, instead, having done more than the instructor has intended, the learner gets a richer and smoother learning experience.

Another advantage is that what the learner does can be instantly displayed to himself as well as other learners who is also performing the same activity. This gives the learner some sense of achievement and peer learners can be greatly encouraged to join him/her or do something similar.

The difference in levels of integration of LD-engine and other sub-system in a normal e-learning system and our design is show in Fig. 3.

### 4.3 Adequate Security and Permission Control

What we have established so far is that learners can be offered great freedom to carry out involving actions while approaching along the instructional design workflow, which leads us to another problem – how to supervise their actions, what if within a

certain learning activity, the debate went out of control and flooded away the supposed focus of attention?

Therefore a flexible and sensitive access controller is a must to ensure that the learning flow is going normally. Since there has been some concerns on roles in IMS-LD[6] specification. The roles stated within IMS-LD adopts the tree-like hierarchical structure, which is the most common implementation of partial-order relations among roles within RBAC model. Having the same foundation, we can easily extend the role structure of IMS-LD to enable RBAC[5] and make our engagement platform have the capabilities of an RBAC engine.

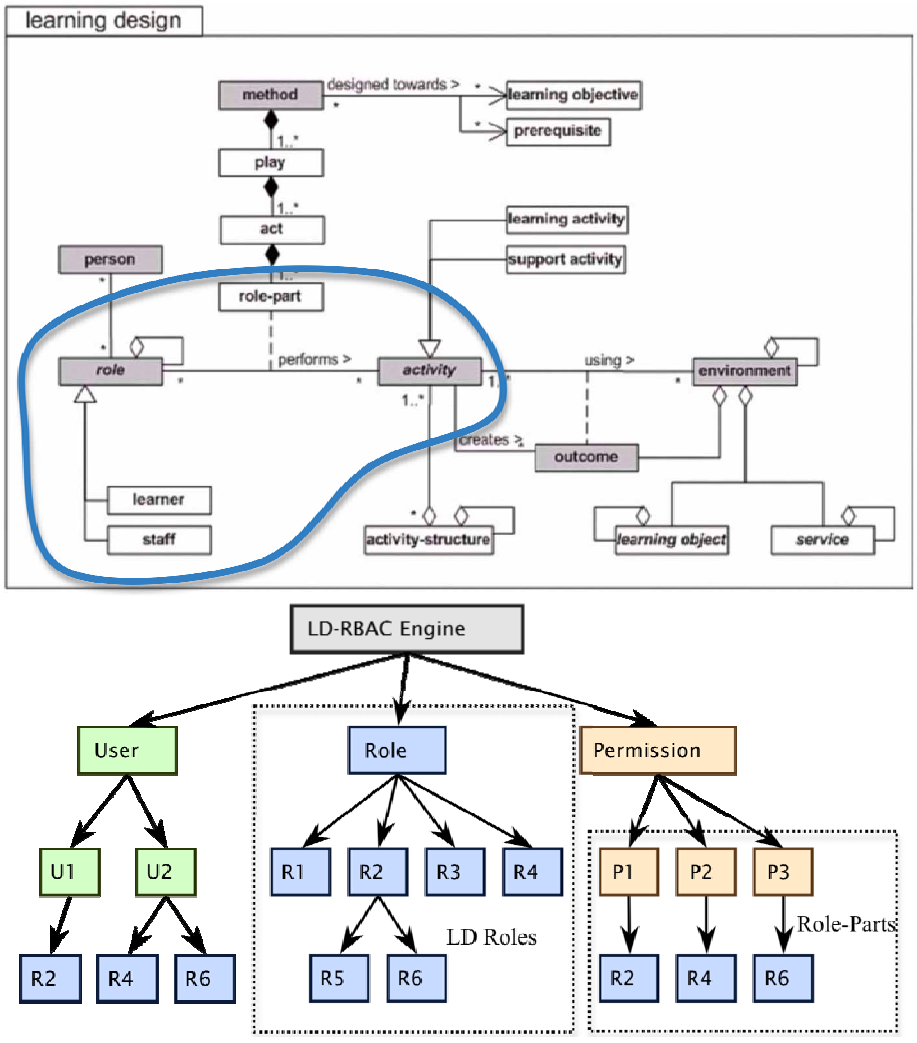


**Fig. 4.** Plant LD roles into RBAC Engine

The IMS-LD specification describes the activities a leaner can perform by role-parts – a pair of activity and activity, which can be easily mapped to the Permission-Role assignment. We can extend it to specify the involving actions a learner can take by assigning extra permissions to one of the learner's roles. Fig. 4 shows the common ground of the two role concerned model where we can combine them into one.

The only thing we should pay attention to is that there is a difference between the IMS-LD and RBAC on how to define the direction of permission heritage between a role and its parent, for example R5 and its parent R2 in Fig. 4. In IMS-LD, this implies that R5 inherits all available permissions of R2, while in typical RBAC models it means the opposite. So when implementing the RBAC engine used in the system, the direction of heritage should be configurable so that it is capable of representing the role schema in IMS-LD while sustaining the compatibility with common RBAC engines [10]. Such efforts could greatly benefit potential future reuse of this engine in other parts of the system.

### 4.4 Expandability

Another issue we have to consider is that the expandability of the system. We have now designed the engagement platform to work this way:

The base is a Learning Design engine that guides the learners to carry out a series of activities;

Within each activity, we supply several options for the learners to take some involving actions: raising questions, starting debates, offering tips, etc. As the requirement changes, there are probably new types of actions learners want to take and the platform should easily adopt them, without major changes to the architecture or modifying too much code. In this sense, we should design the platform capable of plugging involving actions in and out gracefully. What we figured out to be a decent solution is an extensible activity plug-in interface, shown in figure 6.

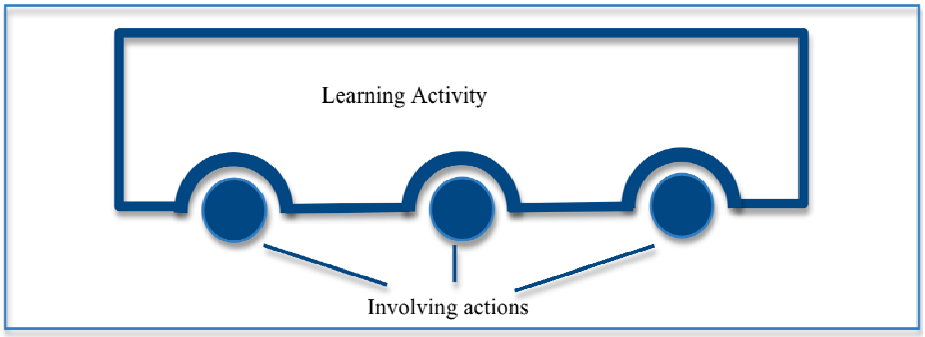


**Fig. 5.** How Activity attaches pluggable involving actions

## 5 Beyond Extending Activity

It is suggested that a plug-in point must be well defined to address the issue of expandability; now we step forward to see whether we can do more.

As learners are contributing their thoughts related to the learning activity, it is natural for the instructor or the author of the instructional design to take some of the contribution in and enhance their original design.

So it is necessary to supply the author of the instructional design easy ways to convert some undergoing involving actions to a activity. For example, we can allow authors to convert an active forum thread to a discussion activity, and a useful tip can be converted into a optional reading activity, or a tip sharing activity. At the same time, we must note that not all types of extra actions can be converted to a new activity definition. Actions like spell corrections only affect existing learning environment, so authors have to manually take this kind of contribution in.

Also, after the action is converted to an activity, part of the instructional design, learners' action records must be converted to records corresponding to the newly generated activity, which is out of the scope of this paper. Some issues on copyright are also worth attention at the stage of implementing such functionalities.

## 6 Supervision and Assessment

All the actions need proper supervision so that the instructors can make sure that they take place the way that best benefits the learning outcomes. So when the instructor logs into the system, he/she should be able to perform some management tasks besides ordinary actions. This means the instructor should have more powerful roles attached, which have been assigned management permissions to.

While keeping the learners well behaved, instructors may want to make feedbacks to learners' actions, like grading their tips or writing comments. Also the learners may want to grade tips or debates of peers, vote for the best answers, etc. Based on the grades and votes, we may find tip of the day, or the best answers. When we are doing the calculation, grades and votes from instructors and learners may weigh different, which can be customized. And if he/she wishes, the instructor can give a plus on a learner's final score based on their involvement in collaboration and interaction. The purpose of assessment is to produce more encouragement on the learners to join and help each other in the learning process.

## 7. Conclusion and Future Work

Man is a social being. So is he while learning. That is the reason why we try to bring sociality to instructional design. By breaking up the learning process to organizational activities, we can integrate a lot of successful web2.0 applications to the learning flow, which can greatly enhance the interaction, collaboration and efficiency of the learning behaviours and finally improve the learning outcomes, furthermore the quality of the

instructional design itself. Promising as it looks, we do have to consider the premises, one of which is that the instructors shall not mind the efforts to break up their slides to generate a series of online activities and how they care about the contributions of the learners. Before developing such a system, these requirements must be justified. As we have developed a learning design engine and a RBAC engine, we are eager to bring them together and integrate several social applications to enable involving actions and find out how the users like it.

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