Authoring for E-Learning 2.0: a Case Study

Fawaz Ghali and Alexandra I. Cristea
Department of Computer Science, University of Warwick,
Coventry, CV4 7AL, United Kingdom
{F.Ghali, A.I.Cristea}@warwick.ac.uk

Abstract

E-learning 2.0 is a term refers to the second generation of e-learning, which uses the technologies of the Social Web, such as collaborative authoring and social annotation, in order to enhance e-learning environments. In this paper, we report the utilization of Social Web techniques for e-learning at the University of Warwick, UK, in general; then we present MOT 2.0, an E-learning 2.0 adaptive authoring and delivery system, followed by a case study that examines the usefulness of E-learning 2.0. Our main contributions are: 1) adding a new Social Layer for adaptive hypermedia and e-learning systems; 2) allowing students to contribute in the authoring process of e-learning, with different privileges; 3) adding collaborative authoring and social annotation to e-learning environments.

1. Introduction

The Social Web can play a vital role in changing the current Web from a Web of *information* to a Web of *knowledge*, essential for e-learning environments [9]. On the Social Web, every web page is the focus of a community and each member of this community can evaluate, edit and share content with others [7]. E-learning, in combination with the Social Web, brought forward the new term *e-learning 2.0* [13]. In e-learning 2.0, students and teachers are all involved in the content creation process, and thus the strict delimitations between tutors and students disappear.

On the other hand, prior research has shown that authoring of personalized e-learning is a conventionally difficult task, when using intelligent tutoring systems (ITS) [14], or adaptive educational hypermedia (AEH) [10], as adaptive lessons are more complex than their non-adaptive equivalents, and thus require more time, effort, and proficiency in their authoring [3].

Our method to overcome the difficulties of personalized e-learning authoring is thus to use the strengths of the Social Web, which are: 1) user-generated content; 2) harness the power of the users by collaborative authoring and social annotations techniques; 3) generate richer authored materials based on communities of practice [7]. Authors who belong to the same community can cooperate in providing more valuable e-learning content within the community, based on their different backgrounds and knowledge.

In this paper, we present the utilization of the Social Web technologies in e-learning at the University of Warwick, UK, in general. Particularly, we present, MOT 2.0, which is an adaptive authoring and delivering e-learning 2.0 system, developed at the University of Warwick, followed by a case study and evaluation of MOT 2.0. Finally, we report our findings from the evaluation of MOT 2.0.

2. Related Work

Authoring for e-learning presents serious technical challenges for non-experts [4], related to usability, accessibility and beyond. Thus, a lot of research has focussed on authoring for e-learning. E.g., [14] analyzed specifically authoring for intelligent tutoring systems, while another study [10] explained how design models can be transformed into authoring tools for educational hypermedia systems. Other related work looked into patterns in authoring of adaptive educational hypermedia [6].

None of previous researches have modeled or included social activities from the Social Web in the authoring of e-learning, which focuses on the relations between authors (including students in the case of e-learning 2.0), nor their collaborative activities; despite the fact that some authoring tools can provide some collaborative activities, most authoring tools were designed primarily for individual users.

On the other hand, many of the actual experiments using social software within higher education have

focused on particular specialist subject areas or research domains [11].

The main goal of MOT 2.0 as an authoring system for e-learning 2.0 is to make the process of building the courses easier by using the strength of the Social Web. This easiness interprets into: 1) reducing the cost of creating the courses via the use of the recommended contents; 2) decreasing the skill threshold for potential authors via adapting the authoring environment; 3) allowing students to contribute in the authoring process, with different set of privileges, as set by designers.

3. Examples of E-learning 2.0 at Warwick

Recently, the results of the 2008 Research Assessment Exercise (RAE)[1] reiterate Warwick University's position as one of the UK's most important research universities, with Warwick ranked 7th overall in the UK [12]. The RAE is a UK-wide exercise run on behalf of the four UK higher education funding bodies. Early analysis of the 2008 results place a significant number of Warwick departments in the top 10 in the UK in their unit of assessment.

While there is a significant debate over the advantages and the disadvantages of combining the Social Web and e-learning, previous work [9] showed the potential of such a combination, particularly, for the authoring process [4]. At Warwick University, a wide range of Social Web tools and services are developed to support e-learning, such as:

1) **SiteBuilder2**: the standard Warwick system[2] for creating web pages. Used as a container for e-learning activities and other tools. The SiteBuilder provides collaborative authoring facilities, such as user-page permission and page history, as it is shown in Figure 1.

Figure 1. SiteBuilder2 Authoring

2) **Warwick Forums**[3]: Warwick Forums is a discussion group system. It forms part of the University's Web Architecture by providing a structured tool for collaboration. For example, the *Computer Science department* has a category for *4th*

year postgraduate modules, which includes a forum for module *CS411* (Dynamic Web-based Systems). This is an example of the logical structure which helps users to find forums of interest.

3) **Warwick Blogs**[4]: the aim being to provide students and staff with an easy method of publishing a personal web site. There are many different uses for blogs at Warwick from developing an essay plan, to creating a photo gallery and recording your personal development process. Blogs have been designed as a tool that will be useful for staff in research and teaching, and have many different applications in e-learning. Currently, there are 5769 blogs, 116621 posts, 21939 tags, 197313 comments, 120772 images.

Finally, these tools can work in any environment in which online learning can take place. In most cases this is the departmental website, created in and managed by SiteBuilder2.

In the following section we will present a new adaptive authoring and delivery e-learning 2.0 system, which was developed and evaluated in the Department of Computer Science, at the University of Warwick.

4. My Online Teacher 2.0

MOT 2.0 is an adaptive e-learning 2.0 authoring and delivery system for adaptive educational hypermedia. The general structure and the main entities were previously described in [8]. MOT 2.0 mainly has four modules: 1) *user module*; 2) *content module*; 3) *group module*; and 4) *adaptation module* (Figure. 2). Each module contains entities to capture the required information, as described in previous work [8].
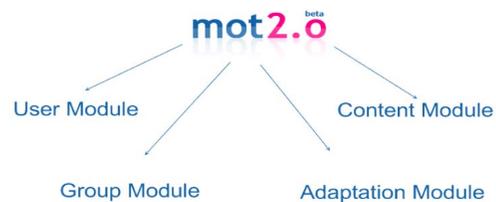

Figure 2. MOT 2.0 main modules

The screenshots provided below illustrate different functions of MOT 2.0, starting from Figure 3: the user module captures the results of all actions the users make using the system, which helps to create the user model in the Social Web; these action results include which groups the user has already subscribed to, what modules the user has created/edited, what tags the user has already used and for which module.

Figure 3. User model in Web 2.0

Figure 6. Adaptive authoring in MOT 2.0

Figure 4 demonstrates the adaptive view of the lesson, which adaptively retrieves *related recommended materials* for further reading. In the following implementation round, we plan to apply other adaptive strategies [2], as well. For example, new collaborative adaptive strategies can be applied to reflect the relations between the learners within same group, or their social actions of the learners.

Figure 4. Adaptive view in MOT 2.0

Figure 5 shows social annotations for the *recommended lesson* (based on the user's privileges for the selected group/course). These social annotations include: rating the content of the item, feedback, and tag items with a set of keywords.
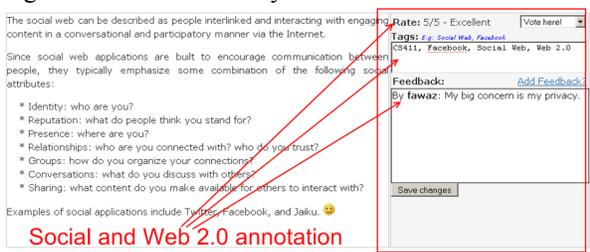

Figure 5. Social annotation in MOT 2.0

Figure 6 explains how the *adaptive authoring* works, by displaying other related recommended courses which can be used in creating a new course.
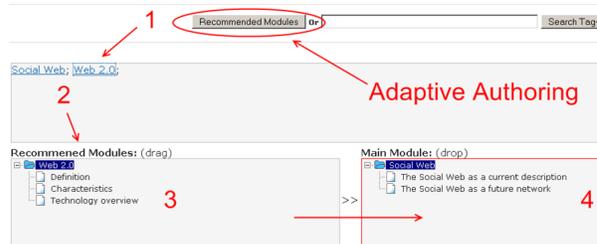
5. Case Study Design

The MOT 2.0 system as presented above has been evaluated with the help of a group of eleven students studying 'Dynamic Web-based systems', a 4th year module at the department of Computer Science at the University of Warwick, in addition to a group of eight course designers from Softwin, a Romanian private company for e-learning. The students and the course designers were introduced separately to the system after they had some lectures on adaptive hypermedia, user modeling, semantic web and social web. Prior to this experiment, the students were required to produce, for an assignment, a whole adaptive lecture with a different system (MOT 1.0, [1] which allows a modicum of collaborative authoring without its social and community aspects). Thus, the students could be considered as having some designer and authoring experience, as well as being involved in the learning process. This fitted well with our image of blurring the edges between authoring and learning. Students were asked to perform some specific tasks with the MOT 2.0 system, which highlighted the new features introduced. These tasks involved also reusing the adaptive lectures that they had created previously, as well as creating material from scratch, and, of course, using the social functions (rating, tagging, feedback, etc.).

6. Results

After performing the required tasks, the students and course designers were asked to respond to especially neutralized questions, which are: ***what do you think about***: **Q1)** browsing other author's modules? **Q2)** the keyword-based access for other authors' tags (keywords)? **Q3)** copying item(s) across from other authors' modules/items? **Q4)** creating a module based on someone else's modules/items? **Q5)** allowing the students to help the teachers in creating (editing) the content of the course? **Q6)** the similarity between the authoring (creating and tagging the module) and the delivering (reading the module) in MOT 2.0? **Q7)** collaborative authoring techniques in MOT 2.0 (i.e. editing the content of other users,

tagging and rating the content, commenting)? **Q8)** authoring for collaboration techniques in MOT 2.0 (i.e., defining groups of authors, subscribing to other authors, communications, etc)? **Q9)** grouping the authors in groups? **Q10)** adapting authoring by recommending related modules/items? **Q11)** recommending modules / users / groups?

Figure 7. shows the mean value of their response on the scale of 1-5 ((not at all useful) 1 2 3 4 5 (very useful)), and Figure 8. shows the variance of the results. The scale was kept numerical for further interval processing.
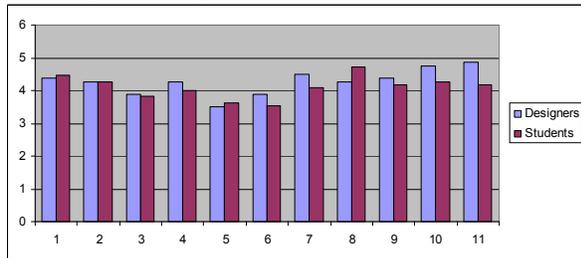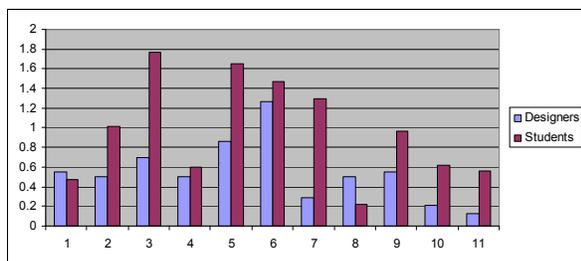

Figure 7. The mean value of the questions

Figure 8. The variance value of the questions

7. Analyses

As Figure 7 shows, the mean of all questions was above 3. This leads to the conclusion that the designers and students considered the possibility to browse other author's modules useful (Q1), that they considered the creation of a module based on someone else's module beneficial (Q4), that they liked the addition of collaborative techniques on MOT 2.0 (Q8) such as defining author groups, subscribing, communications, etc. Specifically, they liked the grouping of authors into groups (Q9).

From a point of view of adaptation, the designers and the students like the process of adaptive the authoring process by recommending related modules or items (Q10). They also saw room for extension in adding adaptive delivery based on groups, users, modules, etc. (Q11), which is the development direction that we were planning to take but wished to have confirmed as being necessary. The results above are taken from questions with variance below 1, where

thus the opinions were strong and with minimal spread (Figure 8).

The rest of the questions, whilst still showing an average positive result, have a higher variance. The second lowest score combined with the second largest variance was obtained when we asked them about having students helping teachers in the authoring process of courses (Q5). The majority thinks this is useful, but some skepticism remains. Looking at their qualitative feedback, the reason was related to security concerns i.e.: "I chose to answer 3, because of security concerns to prevent the abuse use of the system". It is interesting that designers were slightly more concerned than students; however, looking at Figure 8, clearly, students had varied opinions as well. The lowest score was obtained when we asked them their opinion about the similar representation of authoring and delivery (Q6). Whilst the average is still high, the variance is also high, showing that some designers and students may have either had or seen potential problems with this mixture. Among reasons mentioned were the fact that implicitly there should be more tags in authoring (technical p.o.v.) and even one designer wrote that authoring should be for teachers and delivery for students (thus still advocating the classical p.o.v.). It is clear that we need to continue researching into how to seamlessly introduce authoring and delivery in the same environment. Copying items across from other authors was perceived as useful, but the variance was also quite large there (Q3); by looking at the qualitative feedback, the concern was about the copyrights of the copied materials, which we should include in the next version. Another concern was about the ease of copying, it is possible that a simple answer here would be to improve upon the function allowing the drag and drop between modules. Collaborative authoring, in the form of editing, tags, etc. (Q7) was considered useful; whilst the spread was high, so was the overall value, thus compensating for the spread. Similarly, despite the relatively high variance, the keyword access to other authors' material was considered beneficial (Q2).

8. Discussion

Overall, the experiment that we run on MOT 2.0 showed that the newly introduced facilities of the Social Web were perceived as being useful in the authoring of adaptive, personalized courses, for e-learning 2.0, in addition of the usefulness of the Social Web concepts in e-learning.

Some activities, such as grouping, subscriptions, communications, recommendations, accessing other users' material, were considered of higher use than others, such as tagging, copying of items, etc. More

research is necessary after the functionality of the tool is improved to find out if this was due to some tool restrictions, or some deeper issues. However, as the general feeling is positive, we feel that continuing in this direction is justified. Another issue that needs attention is the apparent lack of distinction between authoring and delivery views. We had expected that students, accustomed to Wikipedia and other social software, to be taking quicker to this approach, but it seems that some worries may remain, when these concepts are translated onto an adaptive, personalized environment. Again, some more intuitive interfacing might lessen such worries; in the current implementation, the views were kept separate so that the students were made aware of using the different parts of the system, but in the future, the intention is to merge these.

9. Conclusion

In this paper, we have presented the theoretical fundaments of combining authoring of e-learning with social web concepts, discussed in general the implications, as well as highlighted this merge with the help of an implementation and evaluation. The remainder of the paper presented the evaluation of MOT 2.0, which confirmed, overall, that this merger is of value and interest.

Our main contributions are: 1) defining a new social layer for generic adaptive hypermedia authoring; 2) removing the barrier between tutors, learners and authors, which all become authors, with different sets of privileges; 3) adding the power of group-based authoring to the course creating.

For the future, we want to connect to prior research, where we have developed a specific portable language for adaptation strategies [2]; and either extend it for social interactions, or create a new, dedicated one. In this way, interactions and adaptive behavior can be specified independent on the content or the people involved, and reuse of adaptive behavior is possible.

Moreover, we want to explore in what way adaptation can deal with typical issues of e-learning 2.0, such as 1) lack of understanding students' learning modes [9]; 2) matters of privacy in social actions (i.e., explicit rating or feedback on the module); 3) encouraging 'Socially outgoing/active' learners [5]: who cooperate with other learners and help them.

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