

Supporting Distance Learning Activities and Social Interaction: a Case Study

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Abstract

The success of Web 2.0 technologies in providing support for social interaction in educational spaces depends on how learning environments benefit from the affordances of Web 2.0 services. These services can be combined with the management of learning activities as done by IMS Learning Design (IMS LD) compliant systems. In this paper, we analyze the ability of an integrated system (blog, forum and IMS LD activities) to instigate and support learner activity and interaction with other members of the learning network. This analysis takes the form of a case study in which a small professional learning community uses the integrated system. Four different aspects are studied in this case: The role of the tutor, the role of socially outgoing learners, the influence of the adopted educational approach, and the system's components. The paper explains how each of these aspects can play a role in augmenting learner activity and interaction, and consequently incrementing the success of learning systems.

1. Introduction

Web 2.0 technologies are potentially playing a key role in transforming the information society into a knowledge society, principally in the context of learning and knowledge transfer [1]. Research on the prospective role of Web 2.0 services in supporting social interaction with educational merits is being recently explored by several scholars, including [1,8]. The emergence of social interactions in Web 2.0 services is typically unbound, in contrast to the interactions that are expected to derive from scripted collaboration [5]. On the one hand, constraining collaboration with scripts may inhibit natural desirable interaction mechanisms. But on the other hand, the educational benefits of interactions depend on their

richness and intensity, qualities that does not necessarily occur naturally [6].

In the context of Web 2.0 services, one of the elements that can favor the emergence of rich interactions is the role specialization of the learning network's members. The study presented in [3] by D. Fisher, et al. analyzes specialized roles by identifying and inspecting the behavior of socially outgoing users in the Usenet network. It describes how different people can assume diverse roles in different contexts and argue about major roles in social support, hobbyists, and political discussion. Socially outgoing users aim for more involvement in ongoing interactions by making use of the rules and procedures in the social network. They tend to specialize in one usage procedure (such as answering questions or greeting newcomers). In a learning context, socially outgoing learners usually encourage others to use the system, interact with the rest of participants and with the learning resources.

An interesting approach to organize these resources pedagogically is to integrate them within a learning process that indicates the activities that can be supported with these resources. This is enabled by the IMS LD specification [6] which provides a language for computationally representing learning activities in such a way that can be played by compliant systems such as the SleD IMS LD player [7]. The combination of IMS LD systems and Web 2.0 technologies provides opportunities to study the affordances of integrated learning environments and the effects of their components on learner activity and interaction [12]. As a first step in this research direction this paper presents a case study in which an integrated learning environment is applied to host a small community of professional learners in the domain of digital cinema. The quantitative and qualitative data gathered in the case study are analyzed so that they provide insight regarding two main issues: the role of the tutor and the

different types of learners (including socially outgoing learners) and the implemented system design.

Therefore, this paper is structured as follows. Section 2 introduces the system implemented in the case study and the applied evaluation methodology. The evaluation results are presented and discussed in section 4. Finally, section 5 concludes this document discussing the results and pointing out the future work.

2. Implementation and evaluation methodology

An integrated system for hosting the community of learners is implemented as the basis to perform the case study. The results of the experience are obtained by following a mixed evaluation method.

2.1. Description of the case study

The case study involves the use of a learning system designed for a small (disperse in location) community of professionals in the digital cinema industry who would like to learn how to design and produce virtual sets [2,4]. The system has three loosely integrated components being a SLeD server that acts as a lesson player [7], a forum dedicated to technical and academic support, and a blog that provides a social space for interaction, both formal and informal, among the learning community.

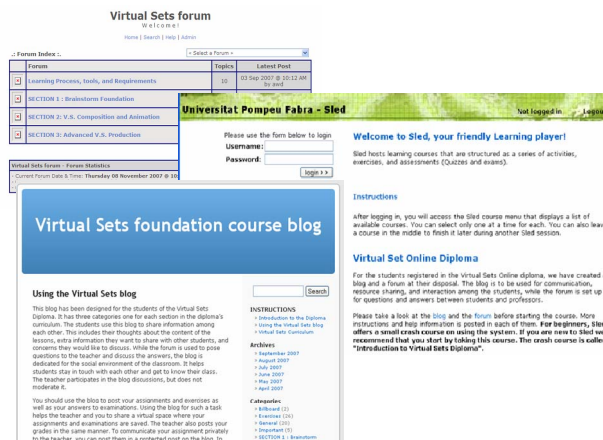


Figure 1 Screenshots of the system

The course's tutor assists the learners to overcome any difficulties that they might encounter in assuming the learning resources published in SLeD. If the learners have questions, they can either solicit the tutor's help by posting a question on the forum, or discuss the matters on the blog with their peers. In order to study the influence that socially outgoing learners can have on the activity of others, we install a human agent that we labeled "informer in the environment". The agent's job is to play a learner's

profile with a socially outgoing personality and to accompany the other learners throughout the course. The characteristics of the informer's profile are based upon the findings of D. Fisher, et al. The informer hence encourages learners to utilize the system's features by using ignored tools and services. The informer does not offer any academic help in order to avoid interfering with the role of the tutor and secure better evaluation results for both roles.

2.2. Evaluation methodology

The mixed evaluation method applied in this case study values several aspects of system implementation and deployment by combining quantitative and qualitative data [11]. Since the focus of evaluation is a community with a small number of participants, the quantitative data are considered useful for showing trends. Besides qualitative results are used to confirm or reject those trends, to understand them, and to identify emergent features in this particular experience.

In general, the ability of the integrated system to instigate and support learner activity and interaction among them is the focus of the evaluation. Identifying factors that influence learner activity is a task that iteratively accompanied the development process of the case study. According to our studies, four aspects can influence learner activities and interaction being as indicated in Table 1: The role of the tutor, the role of socially outgoing learners, the influence of adopted educational approach, and the system's design and components.

Table 1. Categories of evaluation, their foci and methods of evaluation

Category	Focal points	Data Sources
1	Role of tutor Assistance in assimilating learning resources	Discussions with tutor, learners' activity and progress, learners-tutor forum discussions
2	Role of socially active learners Empowering socially active learners to instigate interaction	Pre-test questionnaires, blog and forum discussions involving the informer
3	Evaluation of the adopted educational approach Penetrability of academic resources, and adequacy of media utilized	Feedback from learners, discussions with tutor, server activity, assessment results.
4	Evaluation of the developed system architecture Server performance, client-side installations, usability of components	Time spent on system components, feedback on installations, use of system components

Quantitative data are mined from all available sources of interest as summarized in Table 2. We enlisted the help of Statcounter [10] to track activities of learners on the blog and forum, and collect data on the visits made. The activities are grouped by IP

address and subsequently the learners are identified from the IP addresses they use to access the system's different components. SLeD also maintains a log file that can be consulted for the frequency of visits and the interaction with the resources. The server logs and Statcounter's data are analyzed to measure the time learners spend interacting with the system.

Table 2. Quantitative measures and their corresponding tools/methods

Factor	Tool/method
Number of blog & forum posts	Analysis of blog and forum DB
Time spent on server	Statcounter
Time spent on blog	Statcounter
Time spent on forum	Statcounter
Results of learner assessment	Compilation of exercises and quizzes
Learner progress in SLeD	Analysis of SLeD DB

The qualitative data collected are queried from all the people involved in the case study (see Table 3). We anonymously inspect the messages that learners posted on the forum about the difficulties that they encountered, such as the installation of software for virtual sets (Brainstorm [2]) and its licence acquisition, and issues related to academic matters and system usability. Several interviews are later conducted with two participating learners once they finished the course. The learners are asked about their participation in the case study considering the evaluation categories shown in Table 1. This is also accompanied by an open discussion with the tutor that helps the learners through the case study's academic resources. The talks with the tutor focused on his experience with the case study and the impression he gathered on learner awareness, participation, and progress. Qualitative and quantitative data are aggregated and analysed in next section.

Table 3 Qualitative information compiled

Factor	Tool/method
Feedback from learner	Logs of messages/emails
Feedback from tutor	Discussion with tutor
Interviews	Face to face discussions with 2 learners

3. Results

In total, 12 learners participate fully in the case study. Information regarding the participants' characteristics and background was collected at the beginning of the course in questionnaires. All participants are of an average age of 29.17 years (the youngest 24 and the oldest 38 years old). Most of them come from Spain but there are a participant from Argentina and another from Portugal. In general the participants have high technical skills related to digital cinema. All have good or medium-quality computers and Internet connections at home as well as at work. The following subsections present the evaluation

results organized according to the different evaluation categories (see Table 1).

3.1. Tutor's role and its influence

Posing questions to the tutor is a constant phenomenon throughout the course. Questions are divergent in their subjects, sometimes beyond the course's scope. In total, 28 different issues are treated on the forum and 21 by email. Questions by email are generally received at the early beginning of the course as learners shifted to using the forum, but two learners keep using the email later to ask questions. Only 18% of the questions posed on the forums are repeated by other learners whereas most of those addressed to the tutor by email are repeated by more than one learner (67%). In contrast to the emails, almost half of the forum discussions incorporated more than one learner besides the tutor.

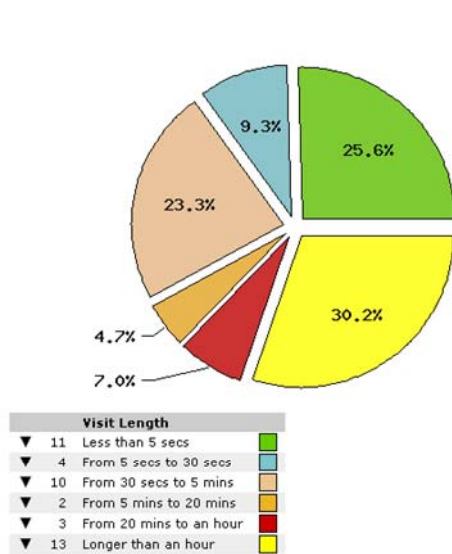
The discussion with the tutor helps to characterize the relationships between the learner and the tutor, receive his feedback on the progress of the learners, and evaluate the whole experience. Whereas learners have the freedom of personalizing their learning experience, they all synchronized their progress in the course to a certain extent. This shows that the presence of the tutor and its central role create order in the learning network. Learners have shown good levels of autonomy throughout the course, but they always appreciated the tutor's attention providing guidance and advice. This relationship trend is magnified by the repetitive assessment activities and exercises, all of which are submitted to the tutor for evaluation.

3.2. The impact of socially outgoing learners

To study the effect of the "informer" (as a socially outgoing learner [3]) we identify and isolated his individual posts and the derived discussions from the blog and the forum. This set of information is analyzed and the findings show that the informer is the second most active learner on the system by number of posts, and 26% of his posts have more than one reply. In total, 5 conversations are initiated by the informer with other learners. Discussions include problems about operating the Brainstorm interface used in design virtual set, and about the tutor's exercises. The informer's participation has encouraged the use of several features on the system, in particular: posting password-protected answers to exercises, discussing learning resources on the blog specialized sections, and regularly updating his profile to reflect progress. Of these three actions, the first two are later used by all learners, while three other learners show their progress in their profiles, imitating the informer's action.

3.3. Academic resources

In this case, the academic resources (IMS LD compliant [6]) published in SLeD do not contain any group-based activity and can therefore be followed entirely by a single learner without interacting with others. Thus any interaction between learners over the resources is socially innate. The resources can trigger interaction whenever two or more learners identify



similar or related interests while interacting with the resources. Hence we compare the discussions started on the forum with those started on the blog in order to examine the learners' reliance on communication. In general, as shown in Figure 2, the activity in the forum starts high and sharply declined later in comparison with the activity on the blog that grew in a logarithmic manner before declining at the end of the course.

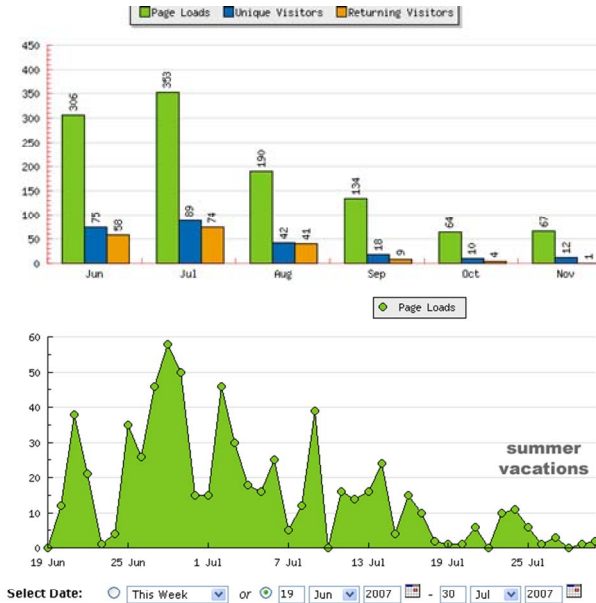


Figure 2 Overall activity in the system

The effort required to assimilate the resources was estimated to be around 100 hours in total. The time spent on the server is followed and aggregated by saving each visit made with its date and duration. This information reveals that it took learners less than three months to finish the course. The learners' activity is averaged to 33 visits to the system each month. About 30% of these visits are longer than an hour and 55% of them take less than a minute. Hence, each learner makes at least an average of 11 visits per month to conduct learning activities on the system. The effort dedicated to assume the materials thus is around 8 hours weekly, or 96 hours for the whole period of three months. This is almost equal to the original estimate, proving that the learners do engage the published resources satisfactorily.

contexts and segregated between them, we search for activities in each site unrelated to its own context and compare them with the related ones. Since SLeD does not host any contribution from learners this analysis was restricted to the forum and the blog. Of the 28 discussions on the forum, 7 contain messages exchanged between learners which should conceptually develop on the blog since they are part of the social interaction. The blog on the other hand has only 3 messages directed to the tutor out of the 38 posted. These three should have been posted in the forum. This shows that the learners are able to distinguish between the blog and forum affordances as two different interaction contexts and use each one in accordance with its mission.

3.4. The system's affordances

The system's composition of three separate sites creates three different interaction contexts dedicated to formal communication with tutor, informal interaction among learners, and pursuit of learning resources. To check the extent to which the learners understand these

4. Discussion and future work

The case study presented in this paper represents an initial effort to understand the integration of Web 2.0 services and learning activity systems. The emphasis of the resulting preliminary findings is focused on two main issues: the different types of roles participating in

the experience (such as the tutor and the socially outgoing learners) and the design of the loosely integrated system combining Web 2.0 services and IMS-LD activities.

The tutor's mission can potentially become overwhelmed in large learning networks when the number of learners to attend to challenges the tutor's capacity. Alternatives such as adopting peer to peer learning and installing a hierarchy of rights that group learners according to their competence profile [9,12] are planned to be considered in future case studies in the same domain. In the absence of a centralized authority like the tutor's profile, the decision making process and the assessment activities have to be regulated in a distributed or cooperative manner. The mechanisms for supporting this change can benefit from scientific experience built upon research in online societies that resemble learning networks to a certain extent.

The experience gathered with the informer role shows that individual learners have the capacity to influence their learning networks easily by helping peers to progress on their learning paths and forge social relations upon which the exchange or transfer of knowledge can take place. In order to empower these learners, it's essential to provide the right environment with the favorable protocols for social interaction around learning. Blogs can be exploited in this sense since they facilitate contact between learners participating in the same learning network. Future research can concentrate on developing prediction models for learners' reactions to certain actions performed by peer learners. This can help develop responsive agents that understand the properties of the learning networks where they are deployed and consequently support moderation and support efforts, especially for large-scale networks.

The system developed for this case study is genuine to a certain extent although its components are known and have been used before in a learning context. Loosely integrating blogs, forums, and SLed can be positioned between the bulk of standalone web applications and composite learning environments such as LMSs (Learning Management Systems). The loose integration of learning-related web applications is inspired by the usage of Web 2.0 services. With the rise of Web 2.0 services and their diversification, it became possible to simultaneously use several services for the same goal, like integrating YouTube videos, del.icio.us bookmarks, and Google maps into a topic oriented blog.

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