Open Social Learning Communities

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ABSTRACT

With the advent of open education resources, social networking technologies and new pedagogies for online and blended learning, we are in the early stages of a significant disruption in current models of education. The disruption is fueled by a staggering growth in demand. Open Social Learning systems open a new venue for self-motivated learners to access high quality learning materials. In this paper, we describe our vision of open social learning and introduce a cyber-infrastructure that supports a large-scale open social learning community in order to facilitate self-guided learning.

Categories and Subject Descriptors

K.3 [**Computers and Education**]: Collaborative Learning, Computer-assisted instruction

General Terms

Design, Measurement, Human Factors

Keywords

Social Learning

1. INTRODUCTION

It is estimated that there will be 100 million students qualified to enter universities over the next decade [1]. To educate them, a major university would need to be created every week. Universities have responded to this need with Open Education Resources – thousands of free, high quality online courses, developed by hundreds of faculty, used by millions worldwide. Unfortunately, online courseware does not offer a supporting learning experience or the engagement needed to keep students motivated. Students read less when using e-textbooks; video lectures are boring; and retention and course completion rates are low [2][3].

However, students today care deeply about their education. 4 out of 5 stress about their grades [4]. Yet only about half the students who begin higher education finish [5]. The success rate is even lower for low-income students, part-time learners, and minorities who face a number of socioeconomic constraints [6]. Recently, a new trend of online learning opens up a new venue for all types of learners with the promise of flexible schedules and low costs. 5.6 million college students already take online courses in the US [7]. To create a successful online learning experience for these students, there are two main issues that need to be addressed: creation of online study materials (content) and an engaging online interaction experience (community).

The Open Education movement is addressing the first issue. The OpenCourseWare (OCW) Consortium, spearheaded by MIT, offers thousands of free and high-quality learning materials. OCW is attractive to students (42%), self-learners (43%), and educators, with large numbers (46%) of users from the US [8]. Unfortunately, online courseware typically does not offer a supportive learning experience or the engagement and motivation needed to keep students in schools and colleges. In the Silent Epidemic study funded by the Gates Foundation, 47% of dropouts said a major reason for dropping out was that "classes were not interesting" and they were "bored". Remarkably, 88% of dropouts had passing grades [9]. These students are not failing out of school; they are simply disengaging.

The core problem lies around the second issue: how to engage a generation of learners who live on the Internet yet tune out of school, who seek interaction on Facebook yet find none on iTunes U, who need community yet are only offered content. We propose a new approach to this problem: open social learning communities anchored with open content, providing an interactive online study group experience akin to sitting with study buddies on a world-wide campus quad.

This solution is enabled by state-of-the-art web technologies: really real-time collaboration technologies for a highly interactive experience; intelligent recommender systems to help learners connect with relevant content and other learners; mining and analytics to assess learner outcomes; and reputation techniques to establish social capital. We will discuss these technologies and how they can be combined to address the problem of education in a manner that is highly scalable yet interactive and engaging.

2. SOCIAL LEARNING COMMUNITY

The idea of social learning community grows out of the success of social communities powered by today's web 2.0 technology and social network services. Facebook and Twitter are two examples of the most well known social networking websites. On such websites, users are represented by individual profiles and are connected to other users for production and consumption of content. Users can establish links with each other, attend user groups, send and receive messages, update their own profiles or statuses, get automatic notification about other users' updates, comments or rank other users' behaviors and so on. Essentially, social networking services provide a means for users with shared interests to interact over the Internet on a variety of topics, ranging from personal lives to business. The users who are linked to each other both explicitly and implicitly (through secondary links) form a social community.

Online forums can also be viewed as an initial form of online social communities. For example, WebMD (http://www.webmd.com/) holds a medical information forum that allows people to ask health related questions and to get advice. While these forums provide basic services for people to communicate with each other, they often do not support social navigation and activities such as following another similar user's interests or establishing social links with others. As a result, these forums do not provide a social infrastructure, often vital for supporting and sustaining longitudinal participation and engagement in the community. Also, social engagement provides an effective means to assess and analyze a user's reputation, expertise and other social capital metrics.

Intelligent question answering systems also make use of online social communities. For example, Aardvark (http://vark.com) is a website that allows a user to ask a question and get answered by another user in the user's extended network (including a user's friends' friends) by analyzing user profiles and past activities. This service is convenient for someone who is looking for an opinion from a person instead of a search engine. While this service benefits from information derived from the social network, it does not foster an organic growth of the community by sharing and leveraging from the information and connections created by users over time.

Cognitive anthropologists Jean Lave and Etienne Wenger coined the term Community of Practice to describe a group of "people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" [10]. Lave and Wenger define three elements critical for the success of communities: (i) a domain identity, defined by shared interests, (ii) community with joint activities, discussions, helping one other, sharing of information, and (iii) practice, a shared resource of experience and expertise. These consist of fundamentals of our social learning community: a community of learners who seek online resources to support their learning.

We introduce OpenStudy, a social learning community where the platform offers tools to sustain a social community, while at the same time focusing attention on learning related exchanges, usually between peers. In this sense it is very much a learning community. Scholars note that learning communities affect the flow of ideas and knowledge across people and allow for highly creative group and collaborative work. Learning science research attests to the positive effects of collaborative and cooperative practices of learning communities, including improved engagement, academic achievement, communications skills, awareness of others needs, and so on [11]. We have observed these effects in our own work on collaborative problem-based learning, especially with remedial and disadvantaged students [12][13][14]. The informal interactions in our studies, while not measured rigorously, highlighted the importance of personal connections with peers.

It is well established that learning occurs in social context. Social learning theories describe how learning occurs in communities [15]. Social learning is the acquisition of knowledge that happens within a social group – the process by which individuals observe the behavior of others and modify their own behavior accordingly. It is noted that individuals learn best by observing others, and are tremendously influenced by the role models they observe. Communities succeed through social learning because they provide opportunities for its members to observe others, to pay attention to role models, and to be motivated by the group to succeed. Additional support for positive outcomes in learning communities also comes from the work on peer-assisted tutoring [16], which shows peer-tutors benefit as much from tutoring as their tutees because the tutors structure their own knowledge during tutoring.

In sum, the effectiveness of social learning communities is implied by social learning sciences and can be supported by today's technology. Next, we will take a closer look at how an online social learning community is built and supported.

3. OPENSTUDY

OpenStudy is a large-scale open social learning community (SLC) that promotes effective social presence, cognitive presence and teaching presence online through state-of-the-art Web 2.0 technologies. It was designed based on research by the authors [12][17][18][19][20] and exemplifies the principles of best practices for e-learning software systems articulated by Terry Anderson [21] that include:

1. *Presence*: Learners can make their presence known both synchronously and asynchronously, who is learning what and their online status.

2. *Notification*: In OpenStudy, users are notified when new content is available and acknowledged when they have made a contribution.

3. *Filtering*: OpenStudy offers advanced filtering technology with a combination of its recommendation engine and the use of information gathered in profiles of users and learning units. In this way, users can navigate through an ever-growing deluge of information more easily.

4. *Referring*: This concept is related to filtering. OpenStudy tracks usage, evaluations and indicators of satisfaction. This data provides the "trail" that can guide other learners to study groups that will provide more satisfying learning experiences for each user.

5. *Collaborative and cooperative learning*: OpenStudy provides the opportunity for users to collaborate or cooperate on shared learning tasks and benefit from social learning and peer tutoring.

6. *User models*: User models are used to link learners with content they have not yet seen, authors with content that is needed, and users with like-minded users. OpenStudy maintains user profiles to facilitate referring, filtering and user modeling.

7. *Documentation and sharing of constructed objects*: Educational authors [22][23] have argued that students should not only be consumers of learning, they should be empowered to create learning. The power of peer-to-peer learning is in that students
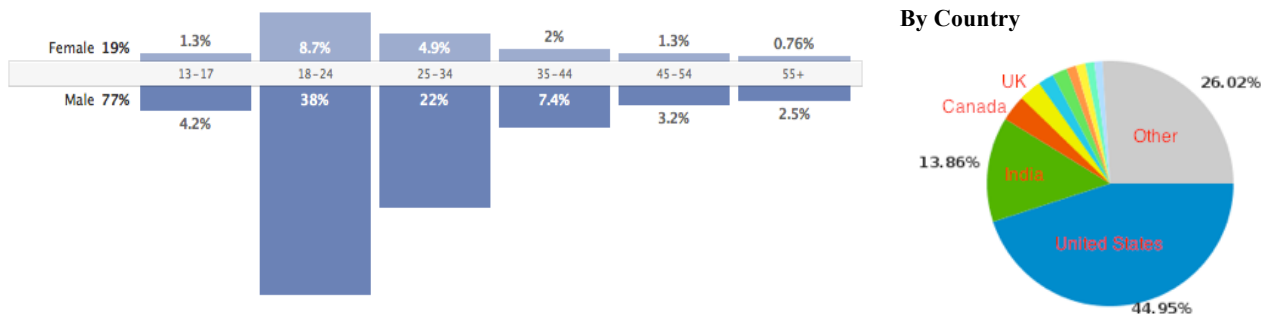
By Country

	13–17	18–24	25–34	35–44	45–54	55+
Female 19%	1.3%	8.7%	4.9%	2%	1.3%	0.76%
Male 77%	4.2%	38%	22%	7.4%	3.2%	2.5%

Figure 2. OpenStudy User Demographics: Gender and Age.

may find a short explanation by a peer student more effective. And in providing such an explanation, both peers learn.

OpenStudy's key features are focused on providing this interaction: who's online, ask question, join discussion, study together, thank a user for help, "really real-time" chat. Figure 1 shows a screenshot of an OpenStudy mathematics group. When a student logs in, she can see the number of students online (A in Figure 1). She can start a new topic (B), view existing topics (C), or join the current discussion (E). When she clicks on an existing topic, past discussions are displayed (D).
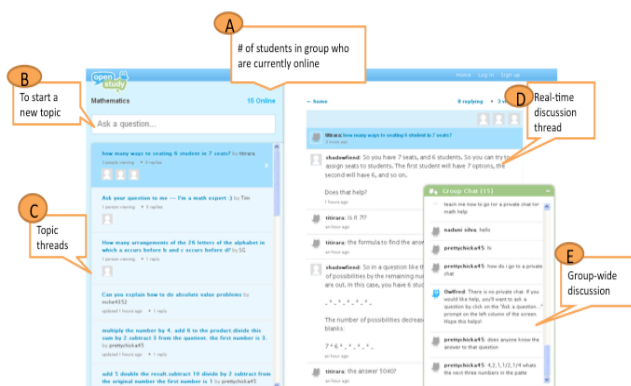
Figure 1. OpenStudy Interface.

3.1 User Growth
Since its launch in September 2010, OpenStudy has attracted about 400 new users each week. Its current growth rate is 20-25% each month, with about 15,000 unique visitors in January. About 60% of these visitors find OpenStudy through organic searches and about 40% come to OpenStudy from our partners. There were about 817 questions asked during the month of January, 2011. There are on average 52.2% students between the ages of 13 and 24 with a significantly higher proportion of males across all the ages. Overall, OpenStudy has over 25,000 students from 2,778 institutions in 151 countries, with about 45% of the users coming from the US.

3.2 Usage Scenarios
In a survey conducted in December 2010, when users were asked, on MIT's OpenCourseWare site, what they hoped to gain from OpenStudy, the results were overwhelmingly clear and indicated that users were looking to study together.

Table 1. Report on user's main goal in using OpenStudy.

Total Users surveyed	569
I want to study now with others	47.63%
I want to get my question answered	27.77%
I want to meet others to study with	23.37%

We summarized three main usage scenarios:

1. Self Learners – high school and college students who want to get ahead and prepare for an exam, pace themselves through the MIT Open CourseWare courses. These students can be found on both OCW and non-OCW course related study groups. Some of the non-OCW study groups are associated with a faculty and a specific course and the students in the course post questions and seek help as needed. The faculty also uses OpenStudy to hold online office hours.
2. Preparing for an Exam: Usually these are AP exams, but frequently there are studygroups for other exams (LSAT, GMAT etc.)
3. Advice: Users seek advice on several topics, mostly college entry, essays, career advice, course advice, and seek mentoring

4. TECHNICAL SOLUTIONS
4.1 Real-time Conversation
OpenStudy supports real-time conversation through group chats and topic threads. The chat function is for users to socialize with each other and get familiarized with the website. The topic thread is the main place where questions are posted and answered. It is contributed by all users in the discussion in real time. When a user starts a new topic, she can invite friends from her social network to join the discussion. If the topic is posted in a study group, all group members are notified.

4.2 Conversation Routing
OpenStudy sends out messages to users who are outside the study group or user's social network, but are potentially interested in the topic. We are building socio-semantic user knowledge profiles captured from logged user interactions. The knowledge profile contains a user's short-term and long-term interests along with various facets such as geo-location, occupation, friends and followers, and areas of expertise. These knowledge profiles drive the socio-semantic navigation through the network and help in matching users together for different conversations and topics. In this way, collaborative and cooperative learning is encouraged to benefit all participants of the discussion. In addition, by

encouraging the participants to contribute, we can keep the learning community alive and growing. To acknowledge that different users follow different activity patterns, we create three engagement models for enthusiastic users, casual users, and passive users. We route conversations to these users based on their actual and expected activity levels, thereby reducing information load on topic experts and preventing community dropouts.

4.3 Socio-semantic Recommender

In addition to supporting real time discussions, we are developing a social-semantic recommender system to enable easy discovery of existing relevant content per user query. This system ingests the user query, processes it using natural language processing algorithms, extract concepts and semantic relationships between concepts, identify intentions based on linguistic theory of Verbal Response Modes (See Figure 3) [24], and reformulate user queries to match existing discussions and web contents. Candidate recommendations go through an evaluation pipeline for semantic scoring and topmost matching content is shown to the users without inundating the users. Furthermore, we use a case-based reasoning approach to leverage past user feedbacks on content and conversations [25]. This social filter re-ranks the recommendations so that the results that are most likely related to the learned preferences of the community are promoted [26][27][28].
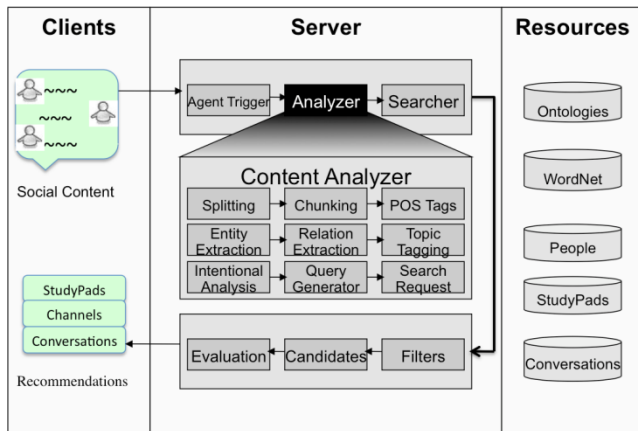

Figure 3. NLP Components.

4.4 Learning Analytics

Learning analytics are important to the evaluation and improvement of OpenStudy. We are interested in measuring user engagement and retention, learning outcomes, learning behaviors, and user satisfaction. These analytics can also be provided to students and educators for self-assessment. We are currently developing a comprehensive set of evaluation measures that can be easily implemented in the run-time system. We track user activities which can be extract form OpenStudy logs, such as user login frequency, duration of login, number of user contributions, click history, frequency of posts, average length of posts, number of connections, number of approvals (thumbs up). These features can be used to analyze the change of user behaviors while using OpenStudy. Some of the features can also be used to build predictive models of user engagement and learning efficiency.

In addition, we will adapt some widely used self-report instruments to measure students' motivational orientations and use of learning strategies (MSLQ) [29], engagement in good educational practices (NSSE) [30], and learning gains (SALG) [31]. We will also use standard user satisfaction surveys and social well-being questionnaires [32] to assess user satisfaction in the social learning environment.

4.5 Social capital

Social capital in general refers to features of social organizations such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit. Reciprocity is a key mechanism for explaining how social capital functions among individuals [33]. In the context of online social community, reciprocity means people benefit from the community and also give back to the community. In this sense, establishing social capital aligns with the goal of a social community, which is to serve its members while growing by members' supports. Moreover, social capital gained from online communities can also be transferred to offline contexts [34]. For example, Facebook is used by people to maintain weak social ties, such as staying in touch with acquaintances from high school, or to bond close ties, such as emotional support for family members. Although different types of social capital created from online communities are not equally convertible into economic, symbolic, or cultural capital offline, researchers suggest that positive social capital outcomes can include career advancement, better public health, and organizational success. We believe social capital gained from an online social learning community can be very valuable since this type of social capital represents one's education, professional skills, and expertise. We are currently developing a social capital control system to help our users to accumulate social capital while being involved in OpenStudy community activities.

5. CONCLUSION

We introduce OpenStudy, an online social learning community that provides students with a critical resource missing in online learning: access to other students studying the same things at the same time. OpenStudy is a social media tool, familiar to today's students, that connects learners and engages them in deep interactions. Both cognitive scientists and learning scientists have attested to the positive effects of collaborative and cooperative practices of learning communities, including improved engagement and academic achievement. We have performed several preliminary evaluations on different user groups. In the OCW pilots with students studying MIT content, there were on average 5.3 students in each discussion, engaged in learning activities such as answering questions and working on problem sets, a significant improvement over watching video lectures alone. In a study of an introductory college biology course, we observe strong correlation between student grades and student engagement metrics on OpenStudy. We found that students who spent more time on our system received better grades. Moreover, the average grade of OpenStudy users was higher than the average of the entire class and of the non-OpenStudy users.

Moving forward, we are interested in redesigning OpenStudy user interface to better support social interactions, utilizing learning analytics to provide user feedbacks, and establishing a social capital control system to benefit users both online and offline. Peer tutoring and peer supported learning are the vision of OpenStudy. Blended with self-paced OCW courses, OpenStudy puts the power of the social community to work for OCW institutions.

6. ACKNOWLEDGMENTS

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