Collaborating Towards Learning: Using Web 2.0 for Educational Idea Development

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Abstract
The rise of Web 2.0 technologies has vastly changed the field of collaborative work and collaborative learning. This paper introduces the design goals and features of the ScalableC project which is being implemented by SEETA (Software for Educational, Entertainment and Training Activities). ScalableC is a novel attempt based in India to develop trust and collaboration among the community through the use of social software. It aims to interest the community in the development of projects from the stage of ideas. It is designed for use by general users who wish to develop and receive feedback on innovative ideas as well as by organizations desirous of community involvement in idea development. It can also be used as an educational tool for facilitating learning through collaborative projects. Some of the key features of ScalableC are the use of multiple forms of media, apart from text, for effective collaboration, and simplicity in order to avoid overloading the user with information.

1. Introduction

Collaboration, projects and learning have long been interlinked. "Constructionist" ideas consider that knowledge or understanding is built especially well when learners are "consciously engaged in constructing a public entity" [1]. Even outside of such approaches, the importance of learning through projects that involve group work and collaboration is recognized. The nature of what is often called "Web 2.0" makes it, ideally, suited for use as a platform for such projects that aim at collaboration.

The term "Web 2.0" refers to a range of concepts, technologies or "practices" [2] [3] on the World Wide Web that usually involve more user-created content, and more freedom by the user to edit other content. Instead of remaining passive consumers of information, users can become publishers themselves. Users of Web 2.0 also associate tags with the content they upload, creating a form of metadata known as "folksonomies" which contrast with traditional metadata that is structured, hierarchical and predetermined [2]. More recently microcontent sites like Twitter have challenged the popularity and influence of blogs [4].From the point of view of collaboration, the most remarkable Web 2.0 tools are social software: platforms that connect people, through shared interests, knowledge or social needs, over the medium of the Web. Thus the Web is no longer a vast library of information, or even a network of resources, but may be

viewed as a network of individuals. For a generation that is used to Facebook and Twitter, there is nothing new in this view of the web. Surveys indicate that the greatest users of Web 2.0 technologies are young people below 18 and those in the age group of 18-24 [5]. As this is also the time when learning is of the greatest interest, it is worth harnessing social software and Web 2.0 as collaborative learning tools.

Section 2 of this paper elaborates on the definitions of Web 2.0 and social software, and compares the latter to collaborative software. Section 3 then reviews some applications of social software to the field of education. While social networks such as Classroom 2.0 (http://www.classroom20.com/) as well as other Web 2.0 - based tools have attempted to exploit its ease of access, editing features and connectivity with peers for educational purposes, the term "social software" still remains attached, in general, with informal modes of interaction and not with serious cooperative work or projects.

In section 4 of this paper the ScalableC initiative (http://www.scalablec.com/) that attempts to resolve this issue is described. ScalableC is conceived of as a platform that can be used both by individual learners or groups of learners for project-based learning, as well as by organizations that may use it in order to nurture and develop innovative ideas for educational initiatives, and to receive inputs from a wider community of experts on the same. The basic design goals that guide the development of ScalableC are described in this section, and some early case studies reviewed. . SEETA has developed and deployed various activities for the Sugar environment, through collaboration with OLPC (One Laptop Per Child) and Sugar Labs. These have been developed by our organization using strong community feedback and inputs. The projects discussed here are outcomes of the work done at SEETA through its association with the above organizations and with the community. Finally in section 5 the challenges faced in implementing the ideas behind this initiative are discussed.

2. The Participatory Web

2.1 Definitions of Web 2.0

 "Web 2.0", rather than embodying a single technological shift, is viewed as the gradual shift away from regarding the Web as a source for information (a library) to a platform for creating content. Technological developments such as AJAX have of course been the factors making this possible. The massive implications of this new capability have led to the "participatory web" description of Web 2.0 [6], and a great deal of hype has been generated over the way the Web has been "democratized". Still, precise definitions of Web 2.0 are either unavailable or do not encompass all the platforms generally accepted as belonging to it.

It is argued [3] that the definition of Web 2.0 can be most usefully spelt out in terms of its "practice logics", that is in terms of certain types of uses of Web technology. Thus, according to this view, an activity (carried out through the medium of the Web) belongs to the Web 2.0 framework if it satisfies most or all of the following conditions: collaboration or distributed authorship, "bottom up" participation, distributed ownership or open content, use and reuse of material and lack of finality about the end results of the activity [3].

In general one is led to the conclusion that "Web 2.0" activities, platforms or tools involve greater community participation, more user-created content, and the production of material through peer collaboration. Thus a different attitude to information building is involved here: instead of static content imposed on the user, who merely "reads" it, there is creation of content

by the user, for the use of others of his peer group, and for potential editing by other users. The "publisher" in one instance can be the "reader" in another instance. For example, Wikipedia, the first port of call for many seekers of information, may be edited by those very users.

Another aspect is the logic of the "wisdom of the crowds" as opposed to a hierarchical, top-down approach to information management. This is exemplified by the use of tags or labels as metadata, by the users themselves, to make finding information easier. With easier generation of content by users and the portability of this content across platforms, it has become imperative to tag content, which in turn has led to the evolution of "folksonomies", a new-form of user-generated metadata. Unlike traditional metadata, which is usually structured and predetermined "from the top", this involves a "wisdom of the crowds" approach [2].

The "practice logic" of Web 2.0 and the explosion in information on the Web as a result of user-generated content have their own applications as well as challenges when the Web is viewed as a source or platform for learning. Meanwhile, the most visible aspect of today's Web has been the increased use of social software, with its attendant rich possibilities for collaboration.

2.2 Social software and collaborative software

The idea that computer networks could be used to increase people's learning dates back to the 1960s [2]. Collaborative software is closely related to CSCW (Computer Supported Cooperative Work). It was used in corporate networks. Lotus Notes was an early example of software designed to promote remote collaboration.

Social software continues to be applied as a term to describe more informal ways of interacting, communicating and sharing information over the Internet. Generally these platforms are easy to use, which accounts for their popularity. The tendency to associate "social software" with informal activities and CSCW or CSCL (Computer Supported Collaborative Learning) with "serious" work has been remarked upon by previous researchers in the field [7].
Nevertheless, social software has potential for use as a platform for collaborative work and learning. As opposed to traditional CSCW approaches, it relinquishes a top-down approach in favor of active participation from the individual user's side. It is the user who can post content, create, join or leave groups, and comment on other's contribution. Past CSCW approaches have seen a lack of user initiative, which may be tackled through the use of social software because of the above characteristics [7].

Specifically from a learning perspective, what are the implications of the nature of social software? Because any user can upload or create content, the amount of information available to the user may become too much to effectively aid in learning, if it is not somehow streamlined. Secondly, the lack of a final authority on information can make dependence on social software (and in fact, Web 2.0 approaches in general) problematical for students in a formal educational set up. Because of the peer-review approach, the student may find it hard to find a "responsible" source to which she can refer in examinations for example [3]. On the other hand the same quality makes it suitable for use in project-based situations, where the focus is more on learning through interaction with one's peers [7].

3. Applications of social software to education

It is instructive to examine the different "types" of learning before exploring the use of social software for that purpose. Traditional learning, of the type that is practiced in formal educational

institutions, considers knowledge as a "substance" and education or learning as the process of transfer of this knowledge [8]. This process is usually defined as one-way (from the teacher to the student). It reinforces competition, as students compete with each other in the race to acquire knowledge. Testing is done to gauge the quantity of knowledge acquired by the student. John Seely Brown [8] describes this as the Cartesian model of learning, whose motto is "I think, therefore I am".

Collaborative learning is based on the idea that people create understanding (learn) through collaboration and participation. Although it is a wide field, there are some key assumptions about learning that it makes. Learners are responsible for one another's learning as well as their own; thus a sense of "positive interdependence" is created [9]. Learning is seen as an active, constructive process. Learners are diverse, and they react to the learning process in diverse ways, bringing different perspectives to the same process depending on their backgrounds, aspirations and experiences. [10]

The importance of group participation and involvement as a support to learning is being recognized. While there may be tensions between the basic concepts or assumptions underlying Web 2.0 and those of formal educational systems [3], social software can offer a platform for project-based learning that utilizes the ideas of collaborative learning, either as individual efforts to supplement formal education, or as a part of the traditional education system. As pointed out in [7], social software may not be applicable in the context of learning engineering equations, but it can certainly be used to support collaborative projects.

Educational blogging, wikis, photo sharing and learning management systems have been developed for use by learners. Moodle (http://moodle.org/) is a learning management system that is fairly popular and is used for curriculum management. Curriki (http://www.curriki.org) concentrates on community sharing and editing of course material, while Classroom 2.0 (http://www.classroom20.com/) is a social network for educators, where they can share resources and connect, with a focus on using Web 2.0 in education. These are just a few examples from the many tools available on the Web to assist education. However, the mere use of a certain technology does not make the resulting learning process collaborative or "Web 2.0"; for example, a teacher using wikis as a one-way information source, editing all the entries herself [3]. Along with course management systems, project based collaboration tools like Launchpad, Trac, Project Wikis and mailing lists exist. Most of these are oriented towards software development, which makes them difficult to use for nontechnical users. It is also observed across Web 2.0 platforms that most of them have user interfaces that promote browsing through pages rather than in-depth reading. An excessive availability of links to tools and resources can create confusion and distraction. While this may be permissible for general-purpose social software, it cannot be conducive to working or learning. Even the general social networking site Facebook owes its popularity to a relatively clean interface [11].

4. The ScalableC platform

An initiative by Software for Education, Entertainment and Training Activities (SEETA), ScalableC has been started with the aim of building community around ideas. Many platforms exist for managing projects. ScalableC concentrates more on collaboration over innovative ideas for developing learning. Social software and the connective nature of the Web can be harnessed to build community around issues of importance. Learners of all groups and not just students of a formal education system should be able to benefit from the platform as well, by collaborating on

projects that are oriented towards these issues. Open-source software development was an inspiration, as it encourages groups of dedicated individuals to come together and collaborate on projects. However, ScalableC will not merely look at software projects. Rather it will concentrate on using technology in learning. It will try to serve as a base on which ideas about this concept, still relatively under-utilized in developing countries, can be formed and taken up to the blueprint stage.

4.1 Design principles of ScalableC

A few of the basic principles of ScalableC are:
- Collaboration

Currently ScalableC supports asynchronous and synchronous collaboration, the former through messaging systems, blogs, audios and videos, the latter by a chat facility. One of the issues with CSCW, as outlined in the section titled "Social software and collaborative software" is the problem of having participants take the initiative. On ScalableC, individual members can create organizations, groups and blogs. Secondly, the user interface design tries to encourage doing things rather than merely browsing through the site. Third, we plan to include an extensive guidelines section that tries to make collaboration easier.

- Community and inclusiveness

ScalableC aims to involve the community – non-technical people, experts in the fields of education, and interested and dedicated individuals. It is felt that a collaborative project, if it aims to make a large impact and not remain restricted to a niche group, should involve organizations, civil society, members of the formal educational systems and individual volunteers. As described in [12], attempts at reform have sociological and institutional components which we cannot neglect if we are serious about change.
This translates into the necessity for a user interface and a general design which should be easy to use and comprehensible, not only to technology experts but to people from other fields –education, schools, NGOs. This necessity has been felt for some time and ScalableC aims to fulfill it.

- Context

 Even though an estimated 500 million to 1.8 billion of the world's population [13] –and a large percentage of that of India – understands English, there are still subtle difficulties that emerge when two people from different environments and cultures try to communicate with each other. This can lead to miscommunication and difficulties in collaboration and learning together. Sometimes a need is felt for using a medium other than text. This necessitates the functionality in ScalableC by which videos and audios can be used for collaboration and responses. The audio function is especially useful as videos require higher broadband speeds, not yet available everywhere in developing countries such as India.

Figure 1: Design principles of ScalableC

4.2 Community guidelines

The basis of the ScalableC project lies in harmonious collaboration. To this end, it is planned to include some basic guidelines that, if followed, will enable healthy collaboration and group interaction.

The Wikipedia project has a detailed category of articles on etiquette, courtesy, conflict of interest situations and other potential sources of conflict or dissatisfaction among its member contributors [14]. A basic code of etiquette is necessary for collaboration. Human group dynamics are complex. Differences in culture and context may change the definition of what is considered courteous and what is not. As the Wikipedia project puts it, "treating others with respect is the key to collaborating effectively". It must be remembered that the people who are working together can come from different countries and cultures. What may be acceptable in one culture may not in another. A conflict of interests may happen if a person is put in a position where he has to write (in the case of Wikipedia) or judge objectively on issues in which he has a personal stake. This too will need to be avoided. Being courteous towards new members of the group is essential.

Apart from the above, content guidelines are needed to help maintain the relevance of the information that is shared on the site. These include labeling of content and verifiability of claims. This is, of course, not a complete list of all the kinds of behavior that contribute positively to collaboration and clarity between members. Since ScalableC is aimed specifically at supporting collaborative projects, especially for education, we have currently kept membership on an invitation-only basis. Members can send invitations to their associates, or an organization with an account at ScalableC can invite its employees to join. A person wishing to join and contribute can request an invitation directly by clicking "Register" on the main page of the website (http://www.scalablec.com).

4.3 Case studies

Two of the projects currently associated with ScalableC are directly related to children's education, and involve the XO laptop developed by OLPC (One Laptop Per Child). The Digital Literacy Project (formerly 'Hello Laptop, Hello World') is a non-profit Harvard student organization whose aim is to promote the integration of the XO laptop into classrooms [15]. It seeks to do this by developing training material and curricula around it. Among its current

projects is a pilot project in Nicaragua, in which they seek to improve accessibility to hearing-impaired children by developing course materials aimed at them. This project, a combined initiative with SEETA, is trying to harness the fact that technology can give hearing-impaired children access to newer modes of communication. Working with the InterAmerican Development Bank and the Nicaragua Deaf Association (ANSNIC) [16] [17], it is trying to set up an XO laptop lab for such children. The members of this group are using ScalableC to develop and test videos in sign language through collaborative methods [18].

Figure 2: Developing course material for hearing-impaired children (Digital Literacy pilot project)

Another current use of the ScalableC platform which has seen contributions and efforts across international borders is a collaborative effort at developing and improving an educational software product. SocialCalc on Sugar is a spreadsheet activity developed for functioning in the Sugar environment, which is OLPC's software paradigm [19]. One of its key features is the support of collaboration over the mesh network. SEETA is collaborating with OLPC and Sugar Labs over this activity. The community initiatives aspect is currently being carried out by this organization. The SocialCalc on Sugar community too is using ScalableC currently.
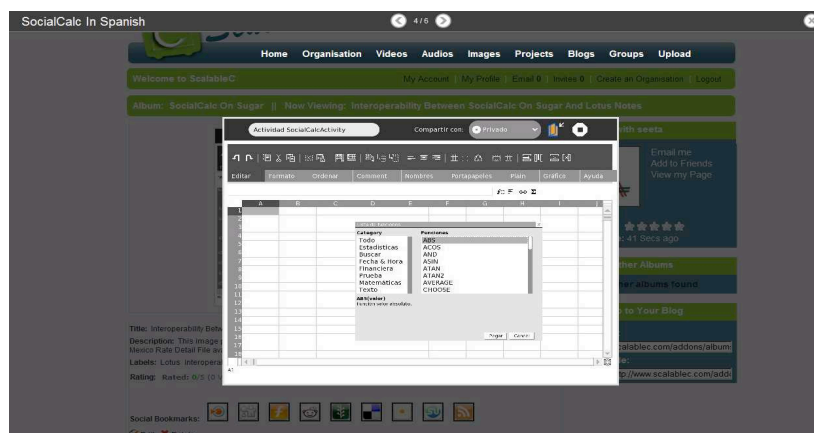

Figure 3: SocialCalc in Spanish at ScalableC

A group has been started on ScalableC about SocialCalc on Sugar for educators, content engineers, translators and other professionals to develop case studies on using this software in schools, and also to collaborate on ideas related to developing curricula. Videos on using the charting tool have been uploaded on the ScalableC site. The significance of context is highlighted by this project, as some of the contributors do not have English as their first language. This underlines the importance of laying stress on videos.

A third project currently using the ScalableC platform is aimed specifically at young children who are just learning the alphabet. The Wellness, Inc has developed the concept of integrating alphabet learning into physical fitness exercises. This approach to alphabet literacy involves, according to the organization, better physical fitness as well as better learning of the alphabet, based on the claim that people's bodies move in rhythm with their speech [20]. The aims of the project are to improve the following in young children:

- Physical, mental and emotional well being
- Creativity
- Team work
- Socialization

SEETA is collaborating with Wellness, Inc over the development of a software activity with a similar emphasis on alphabet literacy through team learning, oriented towards the OLPC laptop (XO-1 and XO-1.5).The community outreach and feedback on ideas and project development will be carried out over ScalableC.

Figure 4: Alphabet Fitness Program at ScalableC

Another recently-concluded event that used ScalableC was especially tailored for university-level students with an interest in software and game development. The Global Game Jam is a collaborative game development event. The year 2010 marked the first time that it was held in India, the venue for the event being the Netaji Subhas Institute of Technology (NSIT), New Delhi, India. The theme for this year's event in India was the development of games that are focused towards social good [21]. ScalableC was used as an organizational forum for

collaborative game development efforts in this event. The platform was used to report the event as well as for collaborative discussions among the developers (for example, through the chat facility).

An upcoming initiative on ScalableC is aimed at developing an open source tool for ABA (Applied Behaviour Analysis) for helping children with autism. Three organizations – SEETA, Solution Grove and Sugar Labs will be collaborating over it. It is planned to use ScalableC as a platform to develop the specifications document for the tool, with feedback from the community.

4.4 Roles of the co-authors

In order to develop community projects at ScalableC, strategic collaborations with the Digital Literacy project at Harvard University and Wellness Inc were built by Manu Sheel Gupta. He was also responsible for managing the financial budget of ScalableC Web 2.0 development and processes, for developing the vision statement and roadmap and for managing the project development and software engineering at ScalableC. Krittika Adhikary is carrying out research on Web 2.0 practices, community guidelines, educational models, tools and frameworks. She also researched and developed the design goals and community guidelines of the ScalableC project. The study of the best software engineering practices for Web 2.0 platforms was carried out by Ekansh Preet Singh. He conceptualized and implemented the software design of ScalableC and initiated the idea of building a simple and elegant user interface. The introductory flash video for ScalableC was developed by him. Swarandeep Singh is responsible for community outreach initiatives. He organized the Global Game Jam 2010, India at ScalableC and is also responsible for organizing feature requests for ScalableC.

5. Conclusion and challenges ahead

The idea of learning through actively building projects and interacting over them has received wide acceptance lately, and atleast to some extent even formal education systems have tried to incorporate project-based learning. The development of tools for community collaboration over ideas for wide-ranging issues, of which education and learning is a prime example, is one area of current interest. Though collaborative tools like Launchpad already exist, most of them provide text-based collaboration and document management services. A need has been felt to have collaborative platforms that can handle multiple types of media, so that they could be used effectively by people from various fields (such as educators, designers and content developers) which require collaboration over non-textual content. The collaboration platform should be simple in design and so designed that the community and not just those already familiar with technology can use it constructively. Also, a more light and clean user interface design was required which would support the process of learning through doing projects and thinking about them, rather than browsing through content which is the case with most social software applications at present. In this paper we described ScalableC which uses Web 2.0 ideas to enable collaboration through video and audio as well as text. Synchronous and asynchronous modes of communication are supported.

The impact of such a project will only be clear after a period of time. As in many typical Web 2.0 applications user feedback and reports will form an essential part of the continual improvements and development that we are planning. Some of the challenges we have already identified are related to keeping the content relevant and weeding out of irrelevant content, which we would like to do in an automated manner. To this end, one of the ideas that we are

thinking of exploring is that of the Semantic Web, in which machines are envisaged as understanding knowledge and processing "knowledge" instead of merely text; this area is in a very nascent stage and requires further research. User interface design too is something that we would like to constantly keep improving.

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