WIKI ENVIRONMENT FOR VIRTUAL CLASSES: AN EXPERIENCE WITH PRIMARY SCHOOLS

F.A. Farrelly[1], L. Pitolli[1], C. Ceccarelli[2], N. Dilecce[3]

[1]CNR - ISC (ITALY)
[2]CNR - ISM (ITALY)
[3]Capgemini Italia S.p.A. (ITALY)
francis.farrelly@isc.cnr.it, luca.pitolli@isc.cnr.it, claudia.ceccarelli@ism.cnr.it, nunzia.dilecce@capgemini.com

Abstract

Wiki-based collaboration has become evermore popular means of producing structured content in the Web 2.0 era. Growing on the previous experience central to the EDEN (*Educazione Didattica per la E-Navigation*) [1] European project promoted by the authors, the impact of this form of e-learning system has been analyzed for a set of Italian state primary schools.

In the EDEN project a wiki-based collaboration system was chosen as our implementation of a "Virtual Class" environment in which web-based class "discussions" could be held. The peer-to-peer nature of a wiki platform places each member on an equal footing thus promoting contributions structured around one or more topics, unlike blogs which share similarities with a teacher in a physical classroom, or a forum which resembles a Q&A session.

A notable feature developed specifically for the EDEN project wiki platform is a highly scalable hierarchical registration-key procedure used to establish that wiki users are truly members of the project while ensuring at the same time the protection of their identity. In this system retracing user's actual identity, requires combining information held in part on the server and in part delegated to people physically in charge of class management. In this way personal id information does not reside on severs while the person in charge of managing users is already familiar with their identities. This strict policy on data protection is integrated as part of the learning experience.

Furthermore a peer based assessment tool has been implemented and integrated together with a moderation system for content evaluation and user "karma" enhancement.

The focus of this paper is centred on the experience of classes in Italian state primary schools, encompassing the ages of 9-10 and occurring in the period between 2006 and 2008. The cases under study are differentiated principally by working methodology specifically in regard to the tutoring model chosen. In particular one case developed around a "direct tutoring" model in which it is the role of the tutor to strongly define the initial structure and limits of the wiki content thus effectively enacting something similar to a tightly confined class discussion.

The second case can be defined as a "loose tutoring" model and is characterized by a far less invasive approach on the part of the tutor figure, in which topics are allowed to follow their natural pattern of development.

The comparison of these two case studies shows some differences in the resulting content structure which can most likely be attributed to this difference in tutoring methodology. Notably, the direct tutoring model tends to produce the largest quantity of content which is structured in well interconnected wiki pages. The loose tutoring model tends to produce content which is more spontaneous and may indicate a more fulfilling overall experience.

Keywords: Wiki, virtual classes, tutoring, e-learning.

1 INTRODUCTION

The EDEN project was developed as part of the SAFERINTERNET European program [2]. Specifically, EDEN was an Italian awareness node with strong ties with state schools. The consortium behind this project is formed by institutes of the Italian national research council (CNR), Postal Police and a network of schools.

"Kids 4 Kids" is the general philosophy of the EDEN project, so a peer-to-peer learning environment was chosen. A principle innovation introduced by the EDEN project was to extend the concept of class discussion to the virtual on-line realm, arranged around a wiki-wiki groupware infrastructure implementing a Virtual Class (VC) environment, thus resulting in a peer-to-peer learning environment. These Virtual Classes are made up of students in homogeneous age-groups along with their teachers. Furthermore, a major aspect of this project was to implement a scalable system for vetting users so as to ensure that only rightful participants take part in these on-line discussions.

The content production and resulting topology of the wiki pages is analyzed in this paper. A comparison of loose and direct tutoring in Virtual Classes is made finding evidence supporting the hypothesis that the type of tutoring strongly affects these key aspects of a Virtual Class. Although the structure of the resulting wiki of a Virtual Class is important, the overall learning experience had by the primary school students participating in the project is of major importance. Hence, a qualitative indication of this aspect is also considered in this paper.

2 VIRTUAL CLASSES IN A WIKI ENVIRONMENT

The term Virtual Class is used in our project to denote a group of teachers and students who interact and contribute content in a wiki groupware environment suitably modified to be private and reserved for their use. A wikiwiki platform was chosen so as to promote a structured type of presentation; the ease with which it is possible to create hyperlinked wiki pages, can induce one to decompose an argument into its basic elements in smaller, more accessible pages. An excellent example of this type of structure is to be found in the WIKIPEDIA [3]. Other web publishing environments present specific analogues of physical classrooms: a blog can be likened to the traditional lesson with the blog author presenting a series of contributions with an occasional comment being made by others. A forum is much like a Q&A session: questions are posed by users and answers are given by those more knowledgeable. A wiki structure is far more similar to a traditional class discussion and, in our project, the role of a tutor was introduced as a promotional agent with discretional leeway on influencing the classroom activity: Web seminars and classroom discussions were also part of the teaching strategy. Tutors were principally teachers and were allowed to decide the extent of freedom to encourage in the VC activity.

Poor behaviour (interrupting others, voice raising, off-topic remarks) are the ruin of class discussions: in their equivalent virtual form as VC's, class discussions have headaches of their own and thus several steps are taken to avoid these issues:

1. a good "door" with a "key" to ensure that no strangers sneak in;
2. peer-to-peer feedback so that proper participation can be promoted and poor behaviour maybe subdued;
3. behind–the-scenes computer guided moderation further improves content monitoring;
4. ultimately everyone is identifiable and therefore accountable for their actions.

As Virtual Classes may also be tutored in the sense of providing a guiding figure much as a teacher might introduce and promote a class discussion. In this project two levels of tutoring were tried out: one in which most of the activity in the Virtual Class was coordinated by a teacher on one or more central topics. This type of tutoring we refer to as direct tutoring. The second level was characterized by a less focused tutoring allowing students a greater degree of discretion in the topics they chose to develop. In this paper we refer to this as loose tutoring.

2.1 Keys and Security

In order to ensure a protected environment in which a Virtual Class can safely grow, a customized authentication system has been implemented. Particular care has been taken with regard to handling of sensitive information: every user is ultimately traceable and therefore accountable, thus encouraging responsible behaviour. However, nicknames used on the system are not directly coupled to the user's real name but can nonetheless be retraced, if need be.

In our implementation, the coupling link between nicknames and real names is the key-code [4]. This is a unique code composed of eight randomly selected letters generated by the platform and issued to each supervisor. These in turn furnish each user with a personal key code. It is the supervisor who is in charge of associating each key-code with its user by filling out a printed copy of the key-code list. Supervisors are organized in a hierarchical fashion, as shown in Fig. 1, so that a large user base can be handled in an efficient manner.

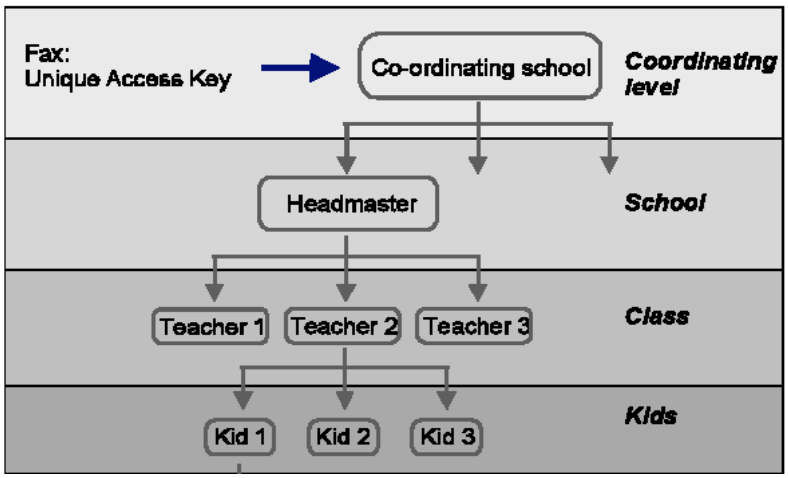

Fig. 1 Hierarchical key-code dispatch system

Typically, the role of supervisors is delegated to teachers. They keep track of the each key-code associate to each student while the system keeps track of the association of key-codes to nicknames. This is clearly explained to students so they learn to regard their personal information as precious.

2.2 Content Rating and Moderation

Rating content provides a means of promoting content quality. Users are given the opportunity to rate each page attributing a score to it. The average score for each page is clearly indicated providing author satisfaction. One characteristic aspect specific to wiki systems is that a single page potentially has a whole history of changes to it which may affect a portion or the entirety of its content. Hence the rating system is actually enacted for each specific version of a wiki page.

Abuse management in EDEN's Virtual Classes relies, at its most transparent level, on a peer-to-peer moderation scheme promoting a friendly approach giving each member a single vote to signal content as inappropriate. This method gives members a unique feeling of being amongst equals. Behind the scenes a human moderator can override or force these indications. Unsuitable pages are "banned" and their content is made unavailable to normal users. As a backup measure an exhaustive search of wiki content is performed automatically so as to determine the complete vocabulary used, search for use of vulgar terms, as a fundamental aid for a human moderator [5].

3 RESULTS AND DISCUSSION

In the period between 2006 and 2008 Virtual Classes were set up involving some Italian state primary schools. Here we analyze two specific VC cases in which students in the last two years (ages 9-10) worked in similar conditions but under differing tutoring methods: loose and direct as described above. The latter VC worked intensely on a focused single topic, whereas the former VC was essentially allowed to develop autonomously with the tutoring acting as a guide available for help.

The analysis of the resulting wiki structure was conducted by parsing each wiki page, searching for hyper-links to other wikipages in the same VC, so as to form a Network. This is composed of a set of Nodes (i.e. wikipages themselves) and Directed Links, specifying the source and target Nodes (i.e. the hyper-link itself). Repetitions and self-referrals were removed. This data was then converted to the correct file format.

An open source toolkit, Network Workbench [6], develop by a group of US Universities, was used to complete the analysis as well as to plot the results. In Fig. 2 below, the leftmost graph shows the case of the VC with loose tutoring. Each dot represents a single node, and each arrow represents a link (source to target pair). While some nodes are indeed linked to other nodes, most of the nodes are unconnected. These represent orphan wiki pages which cannot be reached just by navigating in the wiki page structure. In most cases these are personal pages in which each user chose to express his or herself independently of others.

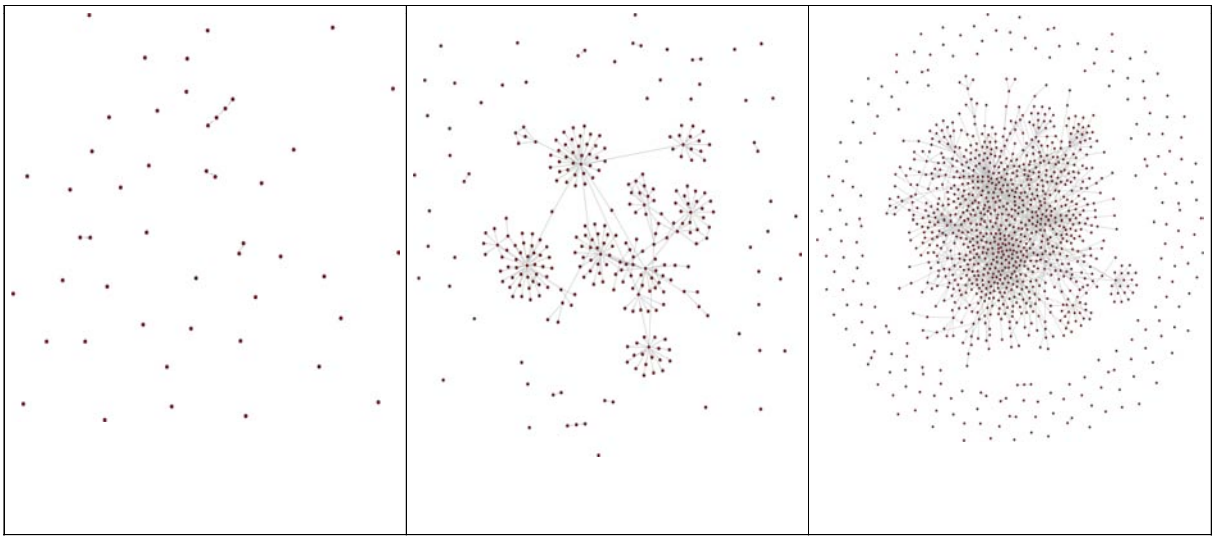

Fig. 2 Network of wikipages and hyper-links in Virtual Classes (VC). Loose (left) and Direct (right) tutoring cases. In the center a multitopic VC is show

The rightmost graph of this figure portrays the direct tutoring VC case. The most evident aspect is that of the considerable difference in number of nodes (1540 in this case) and the well defined “core” of strongly interconnected nodes. The outer “shell” consists of mostly unconnected nodes while a handful of nodes connected to one or two others are also present. Again these nodes are essentially those of personal pages created by single users which in a few cases are linked to other personal pages.

The central graph shows a third VC which has undergone several phases of direct tutoring on a series of topics. In this case the central core exhibits several nuclei of tightly coupled groups of nodes. For all graphs, the Physics Layout mode was chosen (available as part of the GUESS package); in this layout, to each node, a mass and electrical charge is given and each link acts as a spring. In our case these parameters are identical for all nodes and links.

The effectiveness of this form of analysis is readily shown in our comparison and could be used in a wider range of situations as a measure of wiki content structural properties.

Kids involved in the EDEN projected showed a general enthusiasm and tutors reported broad participation in class discussions. This would seam to imply that on the whole the overall learning experience was positive. In particular the VC which followed a loose tutoring methodology stimulated the students creativity by asking them to make drawings on the topic of “My virtual class” and “My nickname”. Teachers reported a surprising level of involvement and effectiveness in representing these concepts with great imagination. Example drawings are shown in Fig. 3.

Fig. 3 Example drawings

4 CONCLUSIONS

The complexity of the network structure of wiki pages and their internal links in Virtual Classes has been analyzed using the Network Workbench Toolkit. This method offers an effective means for comparing the structural properties of wiki based content and has been used to compare VCs with differing in tutoring methodologies. A large impact in the resulting structures has been observed. Direct tutoring effectively produces a strongly interconnected collection of wiki pages and promotes a strong level of contributions as compared to the loose tutoring case.

As an instrument for teaching, Virtual Classes appear to be effective even when a loose form of tutoring is used, although this is not evident in the content produced on-line. Support for this claim comes directly from teachers who report a qualitative improvement in the involvement of the children. Stimulating kids results in imaginative way of seeing this new and abstract environment.

ACKNOWLEDGEMENTS

Part of the work done was supported by the European Commission's Safer Internet Programme (contract SIAP2004AN36). We would like to thank the network of schools which took part in the experimental phase of the EDEN project and Alberto Petri for the useful discussions on the techniques for comparing network systems.

REFERENCES

[1] EDEN project: www.eden.saferinternet.it

[2] Safer internet programme (http://ec.europa.eu/information_society/activities/sip/index_en.htm)

[3] www.wikipedia.org

[4] EDEN project internal report: Ref. P-2006-T3.001.

[5] EDEN project internal report: Social Network Environment: Audience Feedback and Abuse Management.

[6] NWB Team. (2006). Network Workbench Tool. Indiana University, Northeastern University, and University of Michigan, http://nwb.slis.indiana.edu