Low Cost Collaborative Tools to Support Student Teams
Parthiv Malani and Catherine Dwyer
(pm70978n@pace.edu) (cdwyer@pace.edu)

Abstract
The Gartner group has predicted that by 2010 60% of an individual’s work product will depend on group input from team members, many working in different countries and time zones [1]. Working in a virtual team will become the norm for most students when they graduate. How are universities preparing students for this future? What experience do students have working with virtual teams in their classes? What technology exists to support collaborative group work that is low cost so that it can be widely used by an academic institution?

This paper explores low and no cost collaborative work tools that are available for use in student team projects. They include open source products, such as Wikis, Blogs, Collaborative Virtual Workspaces, group support from course management tools such as Blackboard, and a commercial product, SharePoint, available at low cost through an academic subscription from Microsoft.

Introduction
Even in “traditional” brick and mortar companies, more and more communication between colleagues is moving to virtual mode. Managing e-mail is a daily and time consuming task. Employees also turn to instant messenger to coordinate activities. The strong trend towards team based projects that span organizational and national boundaries adds in even more complexity. Although e-mail is the default means of virtual collaboration, it is by no means an ideal choice. It is slow and disorganized. It does not enable a public archive of a project, so if a team member is added later they cannot see earlier messages describing past work.

Although we have gotten used to using e-mail for everything, there are low and no cost options that offer better support for collaborative work. Each of the options described in this paper are available for a small fee or as open source tools. Each of these has different characteristics or “personalities,” that facilitate one mode of group interaction over another. Many virtual teams end up using multiple tools to coordinate their interaction.

Basic requirements of group work
Research has shown that group work contributes to deeper and more effective learning [2]. A basic requirement for groups to function effectively is “collaboration,” defined as communication and cooperative processes that enable groups to complete a task. Effective communication is a basic element for collaboration, may it be verbal, textual or visual. When it comes to collaboration over the internet the medium used for communication should be capable of providing a common platform to share ideas and resources and a common medium to discuss different issues in synchronous or asynchronous mode with maximum interaction and with minimum technical efforts. Less cost is always a welcome and boosting factor when considering the deployment of such tools or mediums.

The tools we will describe in this paper include Wikis, Blogs, Microsoft SharePoint, and the open source product Collaborative Virtual Workspaces.
Wiki:
Wiki is server software that allows users to freely create and edit the content of a Wiki Web pages using any Web browser. Wiki supports hyperlinks and has simple text syntax for creating new pages and cross links between internal pages on the fly. Wiki is optimized for fast shared rather than individual knowledge creation [3].

There are two main components that make up Wiki. The front looks are provided by various web pages, and there is software to manages the web pages. The Wiki web pages can be created and edited by anyone who uses it and all the web pages are built using contributions from various users updating and editing them. Wiki was created by Ward Cunningham in the year 1995 to support the software pattern community [3].

One of the most successful Wiki portal is www.Wikipedia.org, an exhaustive online encyclopedia of thousands of topics created and maintained by hundreds of volunteers. Although it seems that letting “anyone” add anything would lead to chaos, WikiPedia is considered one of the most reliable sources of information on the web. This is due to the “many eyes” principle, a component of open source, where mistakes are quickly found. Wiki software also implements version control, that keep a history of changes and allow rollback if necessary. And many Wikis, especially those supporting developing projects, require a login that tracks the identity of those who access the site and make changes. [3]

Even though there are plenty of portals available based on Wiki, there exist many dialects of Wiki that vary slightly in the markup language used to create pages. Some examples include TWiki, and QuickiWiki. A site that offers free hosting of Wikis with a simplified Wiki language is www.seedWiki.com. All Wiki pages have these key characteristics:

- Web pages and documents can be authored collectively
- Previous versions of edited pages are saved and can be restored
- The pages are created using simple markup language which is a simplified version of HTML. HTML content is also accepted usually.
- The content is not reviewed by anyone before its publication.
- Whenever a user creates a hyperlink using the markup language a new page is created when they click it.

The software that manages the Wiki pages and provides all the functionalities is known as “Wiki engine”. There is no common or universal Wiki page. Anyone can create their own Wiki engine in whatever language they prefer implementing the basic principles. There are currently many Wiki engines available written in different languages like Perl, PHP, CGI, Python etc.

A Wiki page from WikiPedia is shown in figure 1. There is usually an option to “edit this page,” except for certain pages where security and administrative issues restrict edit access.
A new Wiki page is created when a user clicks a link for which there exists no page, or by creating a page using camel case (i.e. CamelCase). After this the user can edit the newly formed page using the markup language for that particular engine. Details of changes made on existing pages are stored in “history” section of the portal. Wikis keep all previous versions of the pages along with any changes. Orphan pages section keeps track of all the pages that are without links to them. Open tasks or open links are those links for which there exist no pages.

Wiki has become a very popular tool for teams developing and maintaining software projects. It allows developers and testers to quickly post issues, problems, and bugs, and remove them from the list as they are resolved. An example is a Wiki dedicated to supporting UPortal can be found at, http://jasigch.princeton.edu:9000/display/U Portal/Home. UPortal is an open source product providing portal functionality to colleges and universities. (See figure 2)
How can student teams take advantage of Wikis?

Wikis are appropriate for teams developing software. Many open source projects maintain a development Wiki for posting bugs, project milestones, status and resolution reports. Wiki is also very useful for quickly collecting and categorizing areas of knowledge, similar to what is done with WikiPedia. IS World (www.isworld.org) has recently added a section for research Wikis, including a Wiki for IS Scholarship, http://ic.bz/, that posts reviews and commentary on current IS research papers and topics.

Blogs:

Blogs, short for web logs, are online journals. They provide an opportunity for individuals to express their opinion on a wide variety of topics. A blog is an easily created, updatable website that an author can create with little knowledge of HTML, FTP or any web designing tools. A blog can literally be an online journal, a filing cabinet, a discussion forum, a photo album, a collaborative space between teacher and students of a class and so on depending upon author’s requirements and intentions.

Blogs share the following characteristics:

- Content is managed in reverse chronological order. Contents of a blog mainly represent postings by authors and comments by various users on the particular postings. They are marked with date and time.
- A blog is mainly public. Anyone can see it and post comments on it. Of course most blogs allow the author of the blog to manage malicious postings.
• The main entries on a particular blog come from the author of the blog. Others can post comments on them.
• Old postings are accessible through archives.

**How schools are using Blogs?**

These features of blogs make them a suitable choice in the field of education to provide a common interactive platform between student and faculty, both for face to face classes and those that are geographically dispersed. Educators all over the world have found blogs very useful and more and more educators are using blogs as a medium of communication and collaboration for their courses.

Figure 3: Web blog managed by Will Richardson of American High School for journalism class

Figure 3 shows a blog managed by a teacher for the class. As can be seen there are links for homework, class notes, discussion, reference readings and other resources. Also there are links to other blogs as well. Blogs for classes are often hosted on free services such as blogger.com. However, this does create some administrative problems, since course work is located on machines that do not belong to the university. This can lead to thorny management problems: are students required to conform to appropriate used standards for their blogs hosted at blogger.com?

As an alternative is the use of a blog hosting service that includes tools for authenticating users and administrative management.
Companies such as 21 Publish (www.21publish.com) offer a web hosting service that gives administrative control to the school or teacher setting up the web site. It also allows schools to create a standard blog format or template that components of the university, such as clubs, departments, and student organizations, can use to create their sites. This allows very easy web publishing with the same look and feel for an organization, while allowing departments and sections editorial control over their blogs. 21 Publish also supports private collaboration within a closed community, such as a university or committee structure.

For example, Dresdner Kleinwort Wasserstein, the German investment bank, has set up about 120 internal blogs to promote discussion and distribute information. "We think of it as the open-source marketplace for ideas," says JP Rangaswami, chief information officer. "It lets us expose concepts or issues to a wide audience and discuss them dispassionately." [4]. Blogs also have the additional benefit of allowing authors to be identified with their ideas. This gives credit to those who participate and contribute to a discussion.

Many schools are also maintaining their customized blogs as an interactive web site so as to facilitate better communication. As shown in figure 4 the Harvard Law School has its own web blog used for various announcements and discussions.

Figure 4: Weblog maintained by Harvard Law School

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Microsoft SharePoint:
Microsoft SharePoint Products and Technologies provide a common collaborative platform to facilitate integration within an organization and with partners and customers. SharePoint is a much more robust tool than blogs or Wiki. It has functionality for document management, can serve as a development tool for private and public portals, and handles user administration and role management [5]. Although SharePoint is not available for free, it is included along with many other Microsoft products in the Microsoft Developers Network Academic Alliance subscription, available to schools for $799 a year (http://msdn.microsoft.com/academic/).

Windows SharePoint Services is a collection of services that you can use to share information, collaborate with other users on documents, and create lists and Web Part pages. You can also use Windows SharePoint Services as a development platform to create collaboration application and information-sharing applications. SharePoint includes these key features:
- Document check in/check out, versioning
- Shared calendars, discussions, surveys
- Templated sites
- Integration with Office 2003, which allows users to edit documents directly on the SharePoint server
- Granular security roles and access control

How schools are using SharePoint
SharePoint is used to support the curriculum of the Eugene M. Isenberg School of Management at the University of Massachusetts-Amherst. All the school’s core courses are using SharePoint. Students have one-click access to information resources and faculty members can identify curriculum assignments from the thousands of journals in the UMass Amherst Libraries. SharePoint also supports workspaces for individual student teams. These can used to post and collaborate on documents and project requirements. All material posted either in group workspaces or anywhere in the SharePoint portal is searchable [6].

Collaborative Virtual Workspace
Collaborative Virtual Workspace (CVW), an open source tool available at http://cvw.sourceforge.net/, provides a common platform through which geographically dispersed team members can collaborate with each other using video, audio, and text. CVW was developed beginning in 1993 for the military by the Mitre Corporation. [7]. At the end of the cold war, military planners realized that responsive and flexible communication by globally dispersed actors was critical. The complexities of dynamic global upheavals required a shortening of timelines for decision making, a heightened demand for sharing assets, and an increase in coordination within the intelligence community. They have also focused new attention on the importance of team building and the flexible use of appropriately skilled personnel. The need for a powerful, flexible communication platform was the primary motivation for the development of CVW. [8]. The Mitre Corporation made the tool available as open source in October, 2000.

CVW provides the metaphor of “rooms” to describe the workspaces where information can persist, and team members can “enter,” similar to ones provided by chatting applications. Rooms are the places where users join and exchange information as well as documents. A user can put any document in the room and all the users signed into that particular room can read as well as view details of the document (author, date created, last change etc). The most exciting feature of the room is “Persistence”. Persistence means that a particular room and all information associated with it will exist on the server even when all the users have signed out of the room. Documents in the room will remain there until some authorized user moves or deletes it.
CVW supports various documents types, such as word processor, spreadsheet as well as notes, URLs and whiteboards. All the documents are managed by a document server within CVW. This server keeps all the documents on a separate file space different from user’s file space and also enforces single user editing by check-in check-out facility. Track of all the changes made to a particular document is also maintained and a summary is provided to the user at the end of saving after editing.

Although CVW seems pretty much similar to a chatting application there are many salient features of CVW that enhances its potential as a tool that can be used by a group of people having common interests such as students of a class or a group of faculty. Focusing on such groups of geographically dispersed members the potential features of CVW can be exploited.

Rooms allow people to share documents of various types. Students can share their notes and materials through this medium. An author can set a lock on his documents so as to restrict other members from editing them or set access in such a manner so as to share them with his group members only. This provides privacy and security for documents. Also a faculty member can put a lock on student submissions so that no one can copy them or view them.

Messages from many to many, one to one, one to a selected few are facilitated. This enables a particular student to student, student to faculty, faculty to faculty, student to group members communication during a meeting or discussion.

There is a facility called “room recorder” that allows students and faculty to keep track of the points and agendas discussed in a particular meeting or discussion since they are saved automatically by this recorder in a file.

The feature known as the “shared whiteboard” allows multiple users to view and annotate an image (a map, process diagram, blueprint etc.) in real time. Whiteboard is persistent and remains even after the discussion ends. Annotations from different users are marked so as to facilitate the contributor’s identification. Also the contents of the white board can be printed and exported to a file so that it can be included in a file or report. This facility can be exploited by student doing a project in a group to discuss various issues and later include them in the report. In addition, students located in different places can work simultaneously on a particular places can work simultaneously on a particular diagram or a process plan.

CVW provides multipoint audio and video conferencing capabilities. The audio and video conferencing is self-configuring on a per room basis, providing conferencing capabilities with other team members. Users do not have to establish conference sessions or know other users' locations to use audio and video; they need only enter a room. CVW also provides a phone capability for private audio discussions between two users. This facility along with whiteboard makes multi location meetings and conferencing a real fruitful experience.

A search capability allowing search of different users as well as documents make it easy to determine a particular student or faculty’s availability and search of a document based on its description.

Figure 5 shows various windows and features of CVW. The look and feel resembles that of instant messenger but the functionalities are having a much wider spectrum in case of CVW.
Tools like Wiki, Web Blogs, SharePoint and Collaborative Virtual Workspace (CVW) contribute towards the purpose of virtual collaboration, although achieved differently by each of them with some specific additional features and capabilities.

Wiki’s open editing feature makes them suitable to use as a common whiteboard for serious and knowledgeable brainstorming. Blogs, where posts are identified by author, can be used to discuss openly topics of similar interests as well as to make announcements. SharePoint is an enterprise level document management tool, which can also be used as a knowledge management portal that delivers information regarding courses, contents, faculties and other offerings from a particular institution in a very organized manner. SharePoint supports both public and private view of the contents as well as authentication and role management. CVW is like a virtual classroom or boardroom where participants have the facilities of audio and video conference, whiteboard, public recorder and personal or public conversation. Sharing and exchanging documents of different types is also an integrated feature that makes CVW an exciting tool to work with.

It is hard to imagine finding a job today where collaboration is not an integral part of work. The continued growth and dependence on virtual collaboration also seems inevitable. Ten years ago software such as Mitre’s CVW cost millions of dollars and was only available to military and intelligent experts. Today CVW as well as other tools of collaboration are available for free or little cost.

Colleges and universities need to explore these low cost options and work to integrate collaborative tools into all parts of their curricula. Virtual collaborative skills are a necessity for the modern information...
worker. This pressing need along with the existence of inexpensive solutions makes a compelling argument for the deployment of low cost collaborative tools in higher education.

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