

A Survey of Web 2.0 Technologies for Classroom Learning

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Abstract: Web 2.0 technologies including cloud computing promise new and valuable capabilities for computer users. This paper examines its relevance for the instructor within both the online and face-to-face teaching environments. Five tools based on these technologies were implemented in a graduate level class at the University of Maryland University College (UMUC). These tools included the use of an online collaborative office suite, a wiki, a blog, a social network, and a video sharing website. All of these tools were found to have a positive effect in promoting and enhancing student learning. This paper describes the experience of applying these tools in a UMUC classroom, identifies other ways these tools can be used by both students and instructors for educational purposes, reviews the advantages and disadvantages of each tool, and presents best practices that would ensure the effective application of these tools in the classroom. Links showing how these tools have been used are provided to serve as examples to instructors. The conclusion covers Web 3.0, the next generation of these technologies, and presents an outlook on its potential impact in the classroom.

Keywords: Web 2.0, Cloud Computing, Teaching Environments

Introduction

What are Web 2.0 and Cloud Computing Technologies?

THE WEB 1.0 era was characterized by the initial building of the web infrastructure, the posting of mostly static web sites such as personal web pages, and initial efforts by companies to commercialize the Internet such as Yahoo and Amazon.

Web 2.0 is a term technology publisher Tim O'Reilly coined in 2004 to describe the current wave of innovation that let users publish, collaborate and share information and content (O'Reilly, 2005). Instead of the desktop, it leverages the Internet as the new application platform (Graham, 2005). O'Reilly (2006) defined the term as the following:

“Web 2.0 is the business revolution in the computer industry caused by the move to the internet as platform, and an attempt to understand the rules for success on that new platform. Chief among those rules is this: Build applications that harness network effects to get better the more people use them.”

Web 2.0 technologies examined in this paper include wikis, blogs, social networks, and video-sharing sites. Other technologies considered under this concept include collaborative tagging, audio and video podcasting, social bookmarking, AJAX, RSS feeds and XML.

As a subset of Web 2.0 technology, cloud computing is an approach to “increase capacity or add capabilities on the fly without investing in new infrastructure, training new personnel, or licensing new software. Cloud computing encompasses any subscription-based or pay-

per-use service that, in real time over the Internet, extends IT's existing capabilities" (Gruman, 2007). Gartner further defines cloud computing as "as a style of computing where massively scalable IT-enabled capabilities are delivered as a service to external customers using Internet technologies." (Desisto, 2008) The reference to a cloud is actually a metaphor for the Internet.

It does this by using *remote* IT resources such as servers and storage to provide services to users which in the past were delivered using *local* resources. This "off premises" computing approach involves services residing on hardware not owned by the user. The user has individual access to the services unless he or she decides to work collaboratively and share the services (Natis, et al, 2008).

Clearly, cloud computing involves a new way of thinking when it comes to managing computing resources. Traditionally, computing resources such as software or storage are considered physical products than can be acquired at a store. Instead, cloud computing views computing resources as being provided as a fully online service. In addition, the data generated or acquired by the user also resides online and has sole access to that data unless the user decides to share it. This approach represents part of the evolution of the client-server model.

One of the first implementations was cloud computing was Salesforce.com. It used the concept of "software-as-a-service" to provide customer relationship management functionalities to clients using the Internet and without the use of on-site applications.

An online collaborative suite, one type of cloud computing tool, is discussed in this paper. There are various other examples of cloud computing applications including storage applications, spam filters, and mapping services.

Literature Review

Educators have been integrating Web 2.0 technologies such as blogs, wikis, podcasts and social networking into their classrooms. As a result, students have gained writing skills, collaboration capabilities, appreciation of security issues and other key concepts (Hargardon, 2007). A Hong Kong university found that blogs in particular were very useful for students in publishing and distributing their writings, reviewing group assignments and performing peer reviews of their fellow students' work. Students felt that they were part of the learning community, they received individualized attention by faculty, and their class contributions were worthwhile and appreciated (Churchill, 2009). Student satisfaction with their education was improved (Ajjan, 2008) since many of the students already knew how to use these Web 2.0 applications in their personal lives and had an opportunity to leverage this knowledge in school.

The advantages of the tools include no or low cost, easy to use and requires minimal setup effort. They expand the global reach beyond the confines of the classroom. (Soule, 2008; Yan, 2008) Students are now expected to be content providers rather than just content receivers and most are willing to accept that new role. (Mills, 2007) Students with disabilities in particular have benefited from the greater accessibility to learning and interaction offered by these tools. (Grabinger, 2008) These technologies support student engagement, higher order thinking, and give students the capability of synthesizing concepts from a wide range of online sources. (Hedburg, 2008)

There is some reluctance by some instructors in applying these emerging technologies (Ajjan, 2008) probably due to technophobia. To address this situation, educators need a "technology playground" where instructors can explore Web 2.0 technologies and then create

a common vision on how these technologies can be used (Hargardon, 2007; Kynaslahti, 2008). There should be a well-paced approach at incorporating these technologies. (Thompson) Online sources such as Classroom 2.0 (<http://www.classroom20.com/>), Teachertube (for example, a Google Docs video tutorial appears at: http://www.teachertube.com/view_video.php?viewkey=17d89c147afbf5ef2cb3), and Edublogs (<http://edublogs.org/>) are useful for instructors looking into incorporating Web 2.0 tools into their classrooms.

Based on “cloud computing” concepts, Google Docs have been used in high schools to support Advanced Placement program students. Those students with no access to Microsoft Office applications and/or cannot install free open source office suites from the Internet found the online office collaborative suite meets their needs. For one project, geographically dispersed students used Google Doc’s collaborative features to produce a 12-page document in less than 24 hours. Students found its high accessibility and the ability to storage files online to be very positive features. (Adams, 2008)

Instructors found the posting of read-only versions of project instructions and rubrics in the suite to be very handy. They discovered that it is very easy to move files among the classroom, their academic office and their home office. It allows instructors to collaborate with colleagues on projects such as scholarly papers. (Young, 2008)

A podcasting exercise promoted collaborative knowledge building among the student-producers and simulated social processes of negotiation and gathering diverse perspectives as part of the learning process. (Lee, 2008)

This literature review reveals that the focus on Web 2.0 applications in education has been at the K-12 and occasionally at the undergraduate college levels. There is minimal information of its application in graduate level classes involving adult learners such as those in the Graduate School of Management and Technology in UMUC. Also, each source generally looks at just one type of Web 2.0 tool application but not as a collection of tools. Furthermore, the research primarily looked at benefits for the students and not the instructor. This research paper addresses these voids.

Application Environment

Web 2.0 and cloud computing application tools were used in a 3-credit UMUC graduate course called ITEC 610 – Information Technology Foundations. It is one of the initial courses a graduate student takes in embarking on an information technology curriculum. The course description is as follows:

“A fundamental study of technology and its applications, as well as the economic and social issues they have raised. Topics include computers, peripherals, databases, and networks; operations (of business, government, and other enterprises), decision support systems, and acquisition of information technology resources; and information security, productivity, equitable access by users, intellectual property rights, and global reach. Discussion also covers current and future developments in the field and their implications.” (University of Maryland University College, 2009)

The use of the tools was very relevant to the course because it illustrated many of the concepts discussed in class. Also it was an opportunity to maintain an engaging and interactive learning environment for the students -- key attributes of quality distance education.

The findings from this research were gathered from 2007 to 2009 in both face-to-face and online classes. Online classes typically averaged 25 students while face-to-face students averaged about 16. Students were adults often with full time jobs; about half in the military; about one third in the government; and roughly 15-20 percent outside of the United States.

Organization of this Paper

This paper is divided into four parts with each representing one tool which was investigated:

- Online collaborative office suite
- Wiki
- Blog
- Video-sharing site

For each part, the following descriptions were provided:

- Background of the tool
- Classroom experience using the tool in an UMUC classroom, including links to actual illustrative sites used in the class
- Potential classroom applications for both the student and the faculty member
- Advantages and disadvantages associated with the tool
- Lessons learned based on classroom experiences and research findings

The paper concludes with a discussion on the next generation of these technologies and its potential impact within the classroom.

Online Collaborative Office Suite

Background

One type of cloud computing application, online collaborative office suites, typically include word processor, spreadsheet, and presentation functionalities which users can create and edit documents completely online. In addition, it has collaboration capabilities which would allow multiple users to review and edit each others' online documents. This software is completely online but documents can be downloaded to be printed or converted to another format such as DOC or XLS in order to be read by another application. Examples of these types of online application suites include Google Docs, Microsoft Office Live Workspace, and Zoho Office Suite.

Classroom Experience

Google Docs was used in a face-to-face class for online document creating and editing as well as collaboration, sharing and displaying of documents. The class was conducted in a computer lab with each student having their own computer. All students were required to

create Google accounts and all assignments were to be shared by everyone in class. Student documents were also made visible to the entire class by having the instructor gain access to the document and displaying it via the instructor's podium computer and the overhead projection system. This arrangement facilitated student presentations and classroom discussions of the documents.

This is a sample list of the class assignments using Google Docs:

- Post your choices for research topics in Google Doc's Spreadsheet application (which is similar to Excel). If there is an identical choice, contact the other person and negotiate a change. Feedback will be posted in the spreadsheet and approved topics will be highlighted in yellow.
- List the competencies needed for the position of Information Systems Manager within the following three categories: technical, business and behavioral. Use Google Docs' Documents application (similar to Word).
- Select a particular business sector (financial, health, automotive, government, military, etc.) Next, imagine that we are 20 years into the future. Your team is required to prepare a short 10-minute management briefing on the then-current emerging technologies that will help your business sector and explain why. Use Google Docs' Presentation application which is similar to PowerPoint.

Students found that the suite was highly accessible for someone who had an Internet connection. There was no need for flash drives, e-mail nor network drives to move files among each student and to the instructor's computing podium. They appreciated the collaborative nature of the applications. However, several students were not familiar with the Google interface because of its subtle differences with Microsoft Office. For example, students experienced difficulty in loading images into the Presentation application because its differences with PowerPoint.

The instructor found that the use of Google Docs was useful as an illustrative example of cloud computing -- a key concept covered in the class. He found other uses for the program such using the spreadsheet application in collecting notes about student performance gathered at various times and locations away from the instructor's personal computer. Other advantages and disadvantages are discussed in a later section.

The following link shows an example of the use of Google Docs in ITEC 610 for collecting, approving and managing research topics <http://spreadsheets.google.com/ccc?key=phmY-AW8MrkIvbJojPzP0bw>

Potential Classroom Applications

Possible student applications of online collaborative office include the following:

- Creating signup lists
- Group research projects
- Group essays
- Group presentations
- Peer editing
- Publish announcements about upcoming assignments

- Brainstorming

Faculty applications of the suite include the following:

- Course development among multiple instructors
- Gathering data from faculty members
- Recording grades and student feedback anytime, any place and anywhere as long as an Internet connection was available

Advantages and Disadvantages

The following advantages were noted:

- Easy to access and collaborate
- Less computing resources required
- Low learning curve (interface somewhat similar to Microsoft Office)
- Can be used to teach technology using technology
- Can access via any machine that is linked to the Internet
- Revision history - the ability to revert to a previous version and determine ownership of past revisions

The disadvantages are as follows:

- Software lacks advanced capabilities (some online applications such as Zoho appear to have features than others)
- Resolving editing conflicts among different collaborators
- Security - unauthorized visitors and vandals
- Formatting difficulties
- Multiple instances of same document may create concurrency problems
- Some student found it difficult to navigate since buttons and links were placed in unfamiliar locations.
- Certain shared applications are more conducive on paper such as a detailed sketch

Lessons Learned

- Establish ground rules for entry and editing in order to avoid editing conflicts
- Provide for basic training and note its differences with Microsoft Office products
- May need locking mechanism to prevent concurrency problems
- Use teams to filter and reduce the output

Based on recent trends, online software collaborative tools will be the standard in the future. Major technology companies such as Microsoft (with its Office Live Workspace product) appear to be moving in that direction. It is imperative that an instructor gets proficient in such tools as the industry transitions toward this new cloud computing platform.

Wikis

Background

A wiki is type of web site that allows the visitors to easily add, remove, edit and change content. It has been used as a single virtual document for a group of people to work together on a particular task asynchronously (“same place, different time”). A well-known example of a wiki is Wikipedia where visitors can add or revise articles that cover a wide range of topics. Anyone can go to popular wiki hosting sites such as Wikispaces, Wetpaint, PBWiki and Google Sites (formerly JotSpot) to build their own wiki.

Classroom Experience

The wiki hosting site, WikiSpaces, was used in the online ITEC 610 classes. A wiki was created for each semester of ITEC and several class assignments were posted on each. An illustrative assignment using this tool is described below:

“You are part of a team in charge of hiring a CIO for your organization and must develop a job announcement for the position. Define the skills, knowledges and abilities that a CIO should have. Identify other attributes you would look for in a qualified candidate. You **MUST** frame your response in terms of language contained in a typical job announcement. This is a *****class collaborative project***** utilizing our wiki at: <http://itec610spring2008.wikispaces.com/CIO+Job+Vacancy+Announcement> No length requirements. Be sure to *****INTEGRATE***** your submission with the body of the job announcement or you will not receive credit. Also, duplicate entries do not receive credit. This is an unsupervised project (no input from me). It is not necessary to tell me here if you posted something. I can tell if you contributed within the wiki.”

One of the class wikis created by the author can be found at:

<http://itec610spring2008.wikispaces.com/>

Students found the collaborative experience to be very enlightening. Some mentioned that there was synergy in the use of wikis, that is, one posted idea often spurred another. They felt that the final work was a truly collective effort. Also, they better understood the utility of wikis. Some indicated their interest in using wiki for future collaborative efforts in other classes and at work.

On the other hand, some students discovered that their earlier submissions were revised or deleted completely. This disturbed them very much. The instructor assured that their contributions were noted using the wiki’s history feature and they received credit for them. Other students were hesitant in making changes to wikis to avoid possible confrontation with other students. There were some technical issues when large objects such as pictures were posted in the wiki such as slow uploads and object placement. Additional advantages and disadvantage are noted later.

Potential Classroom Applications

Within an educational environment, students may use wikis for the following group-oriented purposes:

- Group research reports and other group writing assignments
- Student portfolios
- Literature circles
- Science projects
- Proposal development

Instructors may also leverage wikis to perform the following activities.

- Collaboration on teaching techniques
- Collaborative understanding
- Collaborative textbooks
- Grant requests
- Task management among various instructors and administrators

Advantages and Disadvantages

The benefits of wikis include the following:

- Collaboration – synergy can lead to innovation
- Avoid having multiple versions of the same document or project
- Global exchange of ideas – wiki visitors can be from any part of the world
- Ability to easily revert to a previous version

However, there are drawbacks with wikis. These include the following:

- Arguments over content – with multiple visitors, there are sometimes difference of opinions regarding the content of the wiki.
- Learning curve – it may take a while to learn how to use a wiki particularly among those who are not technically oriented.
- Not the right format for presentation slides, project management purposes, graphics, and others. – most wikis are text-oriented with editing tools similar to those found in Microsoft Word.
- Authentication – only authorized users should be allowed to review and/or edit a wiki so authentication measures need to be utilized.
- Vandals – there is the possibility that a visitor might delete or edit the wiki with the intent of mischief or harm. Although a wiki has a reversion feature (revert back to a previous version), there is the sensitive exposure period between when the wiki is vandalized and when the wiki is restored.

Lessons Learned

There are a number of lessons learned that might prove valuable to anyone who is contemplating establishing a wiki.

- A moderator/facilitator is needed – this role is important to define the ground rules for wiki entries, monitor the wiki to detect negative behavior and to take police action accordingly.
- Do not allow unauthorized individuals into the wiki – it is important to prevent vandalism and other mischief to the wiki.
- Some training is required – provide as a minimum a users guide and how to navigate and edit a wiki.
- Establish rules of conduct - these rules ensure that only quality input is provided into the wiki and makes it clear if what the penalties are for vandalism and other mischief.

Wikis offer collaborative capabilities often not found in the core of learning management systems. This tool might serve as a useful supplement if not a replacement for sequentially based discussion threads found in these systems.

Blogs

Background

A blog (formerly, weblog) is a type of web page made up of usually short, frequently updated posts that are arranged in reverse chronological order. Popular blogging publishing sites include Blogger, WordPress, Blog.com and LiveJournal. These sites serve as hosts to a vast variety of different types of blogs. Examples of contents contained in blogs include:

- Opinions
- News
- Ideas
- Photos
- Poetry
- Mini-essays
- Project updates
- Fiction

Classroom Experience

Within the UMUC online classroom, blogs were used to serve as reflective learning journals. A reflective journal is a piece of writing which allows students to record thoughts and insights about their own learning experience. This journal encourages students to review and consolidate learning, to evaluate performance, to plan future learning based on past learning experience. Students become capable of taking charge of their own learning, and eventually to develop into independent life long learners.

Here is an example of one posting in reflective journal. Note the boldfaced text where information can be valuable as feedback to the instructor:

Watched a video entitled “Interviewing Do’s and Don’ts” in class today. I was **amazed** at what the data showed in terms of how few people really follow the basic principles of interviewing. Like other students in the class, **I didn’t know** that 9 out of 10 people are not prepared properly when they go for a job interview. This certainly gives the person who does prepare well a definite competitive advantage by being in the 10 percent who are prepared. The book “Sweaty Palms” that Dr. Seilheimer referred to **sounds interesting**. I think **I’ll ask him** if I can take a look at it.

Although the people in the video seemed corny and camp **it did illustrate** the basic sequence of events that take place in interviews and humorously pointed out some of the important do’s and don’ts of interviewing. **I see more value** now than I did at the beginning of class for the assignment to interview a working professional to get a few tips on how to compete for jobs in their field. The class discussion was very lively today. I think the **subject challenged** some of our deep fears about rejection and it made many of us a little uncomfortable. **I enjoyed class** though and I think I will **keep some of the ideas** Dr. Seilheimer put out on how to confront, accept and manage fear in mind as I prepare for interviews someday. (Seilheimer, n.d.)

Blogs enhances the learning experience of an online or face-to-face student through this reflective approach. Because of its presence on the web, global reach is achieved. A blog is typically text-based but can be enhanced by including graphics and videos, links, and formatting via templates.

Students were asked to use the Blogger hosting site to create their own personal blogs for various assignments. During the first week of class, students are given the assignment of building the blog (which incidentally is easier than building a web page) and introducing themselves as a blog posting. During subsequent weeks, students submit weekly class reflections in their blogs where they address the following three questions:

1. What did you learn in the preceding week? (Not a list of facts, but rather, what can you take from the lesson, what has value to you?)
2. How do you connect what you learned this week with your personal experience or what you already knew?
3. How could/would you apply your new knowledge?

During the final week, the student is asked to look back on entire semester, provide an overall reflection of the class, and share their outlook for the future.

Blogs created by ITEC 610 students can be found at:

- <http://mikesgreymatter.blogspot.com/2006/09/this-is-going-to-be-long-semester-0.html>
- <http://ingudam-csmn601.blogspot.com/>
- <http://dettegirl01.blogspot.com/>
- <http://daebutler-csmn601.blogspot.com>

The instructor’s blog is located at <http://itec610summer08.blogspot.com/>. Students had full access to this blog.

Advantages and Disadvantages

The benefits of blogs are summarized below.

- Provides an opportunity for an instructor to gain rapport with the students and understand their needs and backgrounds.
- Allows for monitoring student progress so that the instructor can step in if the student is falling behind. A blog provides for continuous student feedback as opposed to waiting until the end of the semester for student feedback -- which may be too late for corrective action.
- Identify issues and challenges faced by students by reading about their experiences with the assignments.
- For an information technology course, students can learn and understand about blogs itself – both the concept and the technology.
- Students modify their behavior in reaction to the content contained in the instructor’s blog.

Unfortunately, there are drawbacks associated with blogs:

- Getting buy-in from the students on the concept may not be easy. Some students may not understand the purpose and value of reflective journals.
- Some students are technically challenged and experience difficulty in creating and maintaining a blog.
- Certain students do a minimal effort because of other priorities or interest.
- Some students get carried away with their blogs and include non-academic related writings, videos, graphics, and other objects.
- Instructors may find it difficult to grade blogs – these journals are very subjective to grade unless precise rubrics are defined.
- Instructors may find that it takes excessive time to read and respond to all of the student blogs.
- The contents of the student blogs may include disputes with other students, politically sensitive information, personal data and other sensitive information.
- The instructor may find that adding a weekly blogging assignment is difficult if the course already has a full slate of requirements.

Lessons Learned

Here is a list of lessons learned based on the author’s experience with blogs:

- The instructor should maintain his or her own blog in order to share the instructor’s reflection of the course. Students read and respond to the instructor’s blog often in a positive manner. The blog can also be used to reinforce key learning concepts.
- Create an index of instructor and student blogs to improve accessibility. This author believes in the philosophy of allowing students to view each other’s blogs.
- Require weekly blog postings and have the instructor assess them and provide feedback via the blog’s “post comment” feature.

- Establish minimum requirements regarding structure, length, what to include and what not to include.
- Emphasize the need to add visual elements and allow creativity and fun.

Blogs offer a way for a student to express his or herself individually and maintain a one-to-one relationship with his or her instructor. This important vehicle for self expression allows one to have closure and reflection after each lesson and at the end of each course. The value of this reflective tool should not be underestimated.

Social Networking Sites

Background

A social network service site serves an online community of internet users. These community members often share a common interest or activity such as hobbies, religion, or politics. Examples of popular social networks include:

- FaceBook
- MySpace
- Linked In

Social networks offer a wide range of capabilities including personal profile information, e-mail, instant messaging, customized interface, newsfeeds from friends, photo repository, virtual gifts, external applications (such as Scrabble), and many others.

Classroom Experience

Each ITEC 610 student was assigned to create their own social network site using a tool called Ning. This tool provides a group website, a photo, music and video library, a blog, and other features. The assignment is described below:

“We will create a social network using Ning at: <http://www.ning.com>

Please make it available to everyone (not by invitation). If you are uncomfortable about its openness, post only fictional information about you. (Sorry, you cannot use your existing MySpace and/or FaceBook site for this assignment.)

An example I created is at: <http://edtech100.ning.com/>

Also, comment on this experience and/or discuss the implications of social networks.

NOTE: You can keep in touch with your classmates forever using your Ning Site!”

The learning objective of this assignment was for the student to understand the nature and impact of social networks by forming an online community. Students selected their own theme for their social network. Sometimes it was based on their military affiliations, their hobbies and interest or the past associations such as their universities. Students found the experience to be very stimulating and several students have used these sites to keep in touch with the instructor and their fellow students.

The instructor discovered that his site introduced him to numerous colleagues world wide with identical interests. These sites are self-sustaining and require minimal amount of maintenance.

Examples of students' social network sites are as follows. Unfortunately most of the students stopped maintaining these webs after they completed the course.

- <http://aroundtheworldtraveler.ning.com/photo>
- <http://translvaniannerds.ning.com/>
- <http://photographerlifeforme.ning.com/>

The instructor's social network site focuses on educational technology and can be found at: <http://edtech100.ning.com/>

Advantages and Disadvantages

The benefits of social networks are summarized below.

- Establish and maintain new relationships with like-minded individuals
- Outlet for creativity
- Offers a wide range of activities

Unfortunately, there are drawbacks associated with social networking site:

- Some consider these sites as a time-consuming diversion
- Privacy issues
- Stalkers and bullies
- Hackers (such as the propagation of cross-site script and worms)

Lessons Learned

Here is a list of lessons learned based on the author's experience with social networks and recent literature (Lee, 2008):

- Pre-approval of the theme for the social network by the instructor to avoid topics irrelevant to the course
- Select a "sticky" topic so visitors can return but it should not be too narrow
- Do not fear failure because the social network is free
- Impress your early adopters so they will spread the word as well as return

Social networks are the heart of Web 2.0 technology and can be leveraged in order to bring together a global collective intelligence that will add rich value to a learning environment.

Shared Video Sites

Background

Shared video sites are web sites where people can view, upload and share video clips. These sites contain a wide variety of video clips including user creations, TV, movie, and music videos. Visitors are encouraged to upload their own videos. There is no charge for viewing or downloading these videos. Examples of shared video sites include:

- YouTube
- Google Video
- Yahoo! Video

Videos from these sites can be displayed in most learning management systems such as WebTycho (UMUC's system) and BlackBoard. First, the user (instructor or student) locates one he or she wishes to include. The user copies the embedded code associated with the video. This is one example of the embedded code:

```
<object width="480" height="295"><param name="movie" value="http://www.youtube.com/v/9hIQjrMHTv4&hl=en&fs=1"></param><param name="allowFullScreen" value="true"></param><param name="allowscriptaccess" value="always"></param><embed src="http://www.youtube.com/v/9hIQjrMHTv4&hl=en&fs=1" type="application/x-shockwave-flash" allowscriptaccess="always" allowfullscreen="true" width="480" height="295"></embed></object>
```

The code is pasted into the learning management system, namely, a posting in a discussion thread. The HTML setting must be selected to render the video clip.

Classroom Experience

Online students were encouraged to include YouTube videos in any classroom assignment including online discussion boards, current event classroom discussion and threads, and class presentations.

YouTube was used by the instructor to locate and insert videos into online discussion threads and other content areas. It was useful to use video clips to explain complex concepts, add more visual impact, and, by including current news videos, make the class material relevant to today's world.

These are samples of YouTube videos used in the ITEC 610 class:

- History of the Internet - <http://www.youtube.com/watch?v=9hIQjrMHTv4>
- Amazon Kindle 2 – A First Look - <http://www.youtube.com/watch?v=wMHLHxvJmZU>
- Communication Evolution - <http://www.youtube.com/watch?v=GWfWJGSTY94>
- Social Networking in Plain English - http://www.youtube.com/watch?v=6a_KF7TYKVC
- Randy Pausch's Last Lecture - http://www.youtube.com/watch?v=ji5_MqicxSo
- Steve Jobs Commencement Speech - <http://www.youtube.com/watch?v=D1R-jKKp3NA>

Advantages and Disadvantages

The benefits of online videos are summarized below.

- Able to visualize complex ideas and processes
- High impact and attention-grabbing
- Richer information delivery than pure text from a sensory perspective
- Adds a taste of reality and authenticity
- Connects the class to the real world via the use of news videos

Unfortunately, there are drawbacks associated with videos:

- Bandwidth issues (student posted large hour-long videos)
- Security problems
- Poor quality of videos (lack of resolution, poor audio quality)
- Offensive material
- Technical issues (e.g., sometimes videos would not render)
- Intellectual property issues (e.g., uploading proprietary content from DVD)
- Handicapped might not be able to see and/or hear the video

Lessons Learned

Here is a list of lessons learned based on the author's experience with online video sites:

- Provide clear and simple instructions to students on how to embed video clips in their applications
- Establish ground rules for the use of videos (no pornography and other offensive material; avoid breaking intellectual property rules; do not post videos that are longer than 5 minutes)
- Provide alternative content for the handicapped such as description of the video and/or its transcription
- Ensure that the video quality needs acceptable standards for use (grainy or shaky videos and those with audio problems should not be used)

Use of information-rich online videos will grow as a key part of the educational content that is delivered to either the online or face-to-face student. These videos have and will continue to play a critical role in an instructor's arsenal of tools particularly as broadband reaches greater audiences over time.

Conclusions

Cloud computing and Web 2.0 technologies were found to provide effective means for actively engaging with students. This conclusion is based on positive student evaluations and feedback. Also, they provided valuable tools for instructors such as for group collaboration with colleagues and administrators. While it does mean additional work on the part of the instructor, the investment is deemed worthwhile.

The question comes up -- what's next for the classroom? One possibility is a combination of these technologies such as a class blog contained in a wiki. This would be an opportunity for the entire class to work together in order to summarize the key points at the end of teaching session. Another idea would be to have a weekly course evaluation in a wiki-blog in order to gain class consensus on feedback to the instructor. Still another idea is to incorporate the concept of social networking (such as Ning) to a blog and wiki in order to expand the number of people involved beyond the classroom.

Another question is what is beyond Web 2.0? Futurists such as Spivak (2006) say that Web 3.0 will be more connected, open, and intelligent. This will be accomplished using the Semantic Web, distributed databases, natural language processing, machine learning, machine reasoning, and autonomous agents. Others say that we are now beyond Web 2.0 because of its financial non-viability and they say we are currently in Web 3.0 (Hemple, 2009).

Experts also state that each institution will have its own unique corporate "cloud" which accessible through their enterprise portal (Gootzit, et al, 2008). This will help address security concerns and ensure consistent quality of the content. One can foresee a cloud for each university and college accessible through its portal and/or learning management system.

One can expect that there will be new innovative and useful ways to utilize the Internet in order to provide a rich educational experience and improve the quality of learning for the student. Learning using this Web 3.0 platform will translate to greater levels of interaction and engagement, higher level of accessibility such as via mobile devices, improved visualizations using avatars and other agents, and much more efficient search capabilities through the Semantic Web. The future looks very promising and exciting to the instructor as the latest technologies evolve.

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