USE OF WIKIS TO SUPPORT COLLABORATION AMONG ONLINE STUDENTS

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October 24, 2008

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ABSTRACT

The emergence of Web 2.0 technologies with its emphasis on social networking has presented an opportunity for academic institutions to take advantage of new tools to support educational courses. One of these tools is a *wiki*. This chapter discusses the merits and challenges of using a wiki to support the activities of students during group projects. It shows the importance of student collaboration in online courses by fostering deeper learning, producing higher quality team products, and preparing students for today's collaborative workplace. The chapter focuses on the best practices of faculty from setting up the wiki at the onset through the final phase of evaluating the group product and the individual contribution of individual team members. It also discusses a number of ways in which wiki-supported collaborative activities can be introduced into online courses and the criteria for selecting particular wiki products for an institution.

Keywords: Wiki, Collaboration, Online Learning, Team Projects, Group Projects

INTRODUCTION

Since its inception, online education has been a solitary endeavor for students working on course assignments. Their link to classmates distributed around the country and the world has often been limited to discussion forums, a useful but somewhat awkward device for working collaboratively. Online discussion forums by themselves seem a poor substitute for in-residence students working interactively across a table constructing a team response to a group assignment on flip-chart paper. The distinction between collaboration in the classroom and collaboration online has been narrowing with the recent advent of social networking software. The purpose of this chapter is to show how one of these social networking software applications – a *wiki* – can be introduced into an online course in order to better support collaboration among geographically dispersed students. More specifically, its objective is to enable faculty and administrators to understand how student collaboration can facilitate deep learning into an online course and to decide if and how a wiki can support collaboration among distributed students.

ISSUES, CONTROVERSIES, PROBLEMS

Why Student Collaboration?

Some, maybe even many, students express an intense dislike for working collaboratively on class assignments, especially in online courses (Payne and Monk-Turner, 2006). "It takes more time than doing it alone" they say, and they loathe having to make up for the burden of *slackers* on the team. "It is just not fair" they claim "that we all get the same grade even though our individual contributions are quite unequal." In spite of these misgivings, several good reasons exist for requiring collaboration among students in online classes. In fact, in graduate-level education, collaborative activities appear virtually required.

First and foremost, collaborative activities tend to foster *deep* learning. That is, the drive towards the consensus necessary to produce a single collective response to the group assignment demands multifaceted exploration and interaction among students. According to Houghton, (2004)

> "…deep learning involves the critical analysis of new ideas, linking them to already known concepts and principles, and leads to understanding and long-term retention of concepts so that they can be used for problem solving in unfamiliar contexts. Deep learning promotes understanding and application for life. In contrast, surface learning is the tacit acceptance of information and memorization as isolated and unlinked facts. It leads to superficial retention of material for examinations and does not promote understanding or long-term retention of knowledge and information." (p.9)

Experience suggests that superficial and uncritical acceptance of information does not typically occur in a group activity. New ideas are challenged for their underlying meanings and are perhaps modified to fit better into the cognitive structure of collective understandings. The dialog in group activities aids students in investigating the underlying causal factors explaining phenomena rather than merely reporting the surface issues of who did what to whom. It should be noted that deep learning does not automatically happen merely when students are assigned to groups (Johnson, Johnson, and Rogers, 1998, p.31). A study by Vaughan (2008) determined that collaborative tools support deep approaches to learning "… only when the teaching strategies and assignments for a course are intentionally designed to facilitate and assess peer collaboration and self-reflection" (p.2863). Moreover, the students must be motivated both internally and externally to want more than just a passing grade from the course and to have access to a well structured base of knowledge related to the assignment. With these tenets of effective course design in place, the components of "activity" and especially "interactivity" with peers inherent in collaborative group assignments greatly facilitate deep learning.

A second benefit for collaboration among students online is that the group response to the assignment is usually better than any of the individual student responses. Collaboration taps into the notion of the "Wisdom of Crowds." According to Surowiecki (2004), for certain types of problems, the solution posed by a group of reasonably informed and engaged people is almost invariably better than any single expert's answer. Think back to the *Who Wants to be a Millionaire* game show that was so popular on television several years ago. When the contestant was stymied by a question, he or she could call on any of three lifelines – reducing the four choices to just two, calling on an expert by telephone, or asking for a poll of the audience. The first lifeline tends to produce the correct answer fifty percent of the time (sort of a flip of the coin); the expert provided the correct answer a respectable two-thirds of the time; while the majority response of the audience - composed of a variety of people with diverse knowledge on the topic - was correct over ninety percent of the time. Of course, groups in online courses are not typically assigned the task of solving a problem where there is a single

correct answer (i.e., a *cognition* problem) as in the Millionaire game. But, the concept of the wisdom of crowds has been shown to apply equally to problems that require aspects of *coordination* and *cooperation*. That is, the concept applies to problems where individuals have to figure out how to take a shared course of action and to do so in a way that yields mutual advantage among individual team members.   These requirements precisely fit the type assignment that is the norm for group projects in online courses.

The idea that the group response to a problem will be better than any of the individual team member solutions also depends upon the characteristics of the team and the way it functions. Surowiecki (p.10) suggests that the following criteria distinguish the wise crowd from the irrational mob:

- Diversity: Team members are not all cut from the same mold. They have different opinions and perspectives.

- Independence: Team members are not easily intimidated by the opinions of their teammates. They can voice their disagreement.

- Decentralization: Team members can draw upon different sources of specialized information.

- Aggregation: A mechanism exists for individual team members to share their local knowledge and come to a collective decision.

Collaborative projects in online courses tend to satisfy these conditions so that the team response should lead to a product superior to one than if the members of the teams were to work totally independent of each other. By being exposed to the *wisdom* of the group, they learn more than if they had been assigned to work on the task individually.

Lastly, collaborative projects prepare students for the Information Age workplace. The world of work has changed radically in the last decade or two.   Rigid hierarchical organizational structures and an attitude of "if you want something done right, do it yourself" do not seem to fit today's business environment. There may actually be more activity going on in the white space between boxes in the organizational chart than in the vertical connecting lines (Rummler & Basche, 1995). After all, so much more information is available now than there used to be, the information is a great deal more complex, and it is distributed among many more people. It is a rare occurrence in the workplace where bosses know more about the units' business specialization than the people working for them. Business activities typically require major contributions from technical specialists in a variety of organizational departments (Tapscott & Williams, 2007). Also, great pressure exists nowadays to obtain firsthand input from customers and users and maybe even involve them in decision making. Suppliers as well are often tied tightly into the organization's knowledge base and are frequently consulted in planning activities. Further complicating the Information Age environment are the many partnerships that organizations enter into in order to gain competitive advantage. No, this

is not your father's workplace. Collaboration is now the name of the game. *Committees, project teams, cross-functional teams,* and *communities of practice* are all part of today's business lexicon. And, they are often accomplished, at least in part, with online tools.

Whatever the particular content of the course and whether or not students perceive the value of group projects at the onset, collaboration in online courses helps prepare them to succeed in the Information Age workplace. And, the process of collaboration leads to deeper learning by online students as well as team products that are a cut above the work of any one individual.

What is a Wiki?

A *wiki* is a type of social networking software that has evolved over the last several years. It has the potential for being an excellent tool to support the collaboration activities during student group projects in online courses. A wiki offers a shared online workspace where team members can contribute their individual pieces to a common document: editing, removing, or adding to what is already there. Even though each member can modify the document, all previous unedited versions are available and can be restored if deemed necessary. And, the direct contributions by each team member are clearly visible. The final agreed-upon product in the wiki is the collective response of the online team to the assigned task.

As an example, suppose five graduate students in an online business class are assigned the task of creating a set of five strategic goals for a hypothetical organization whose strategic direction (i.e., *mission* and *vision*) and competitive situation have been defined. Their final submission should offer the statement of these five goals and the justification for their inclusion in the organization's strategic plan.

Phase 1 – Brainstorming Goals: Working under the guidance of a designated student team leader, each team member begins populating the shared workspace in the wiki with a variety of potential strategic goals. This phase of the task is comparable to brainstorming. The team collectively produces a total of twenty plus goals with some apparent duplication.

Phase 2 – Eliminating Duplication: Using a separate discussion forum as a messaging medium, the team leader assigns individual team members the responsibility of combining particular overlapping goals to eliminate the duplication. The students revise the shared wiki page individually to reflect the combining of the goals assigned to them, resulting in 14 unique goals. Since the team members are working on separate goals, there is little chance for any conflicts arising in this phase.

Phase 3 – Editing Goal Statements: The team leader then asks the team members to review all the goals against the given standards for effectively written strategic goals (e.g., *broad in scope and dealing with high-level issues relevant to the organization's strategy for success*) and to assure that a critical goal has not been

inadvertently eliminated. They are asked to rewrite any deficient goals directly on the wiki page and to post comments with their rational for change. Although such a review and rewrite activity typically leads to a better product in a harmonious manner, there is potential for two or more students to disagree strongly as to the optimum wording of a goal. The disagreement may manifest itself as a series of alternate revisions or dueling comments. Matt Marshall (2006) coined the term "wiki war" to describe situations of this sort. The group should have prepared a team work plan in advance that would spell out how such conflicts would be resolved. For example, perhaps the designated team leader will choose the final wording of the goal as he or she sees fit after reading the comments posted. Or the team leader might ask the team members not involved in the conflict to comment or to vote. One way or another, the activity should result in a set of complete goals that are well stated. We'll assume that the team now has a set of 14 unique and well-stated strategic goals for the hypothetical organization displayed on the wiki page.

Phase 4 - Choosing Final Goals: The original task assignment was to create a set of *five* strategic goals, so it is now necessary for the team to reduce the 14 goals it had developed to a set of only the five highest priority goals. The team leader creates a new wiki page for each of the 14 proposed goals and, using the discussion forum, asks the team members to choose the five strategic goals they would prefer to retain and to post their rationale for assigning high priority to those particular goals. Let us say six goals are eliminated for further consideration since they were not promoted by any team member. The team leader polls the team on the remaining eight goals; a list of the five strategic goals with the highest number of votes is the result (the team leader breaks any ties).

Phase 5 – Justifying Selected Goals: The last requirement of the group task is to prepare the justification for the five selected strategic goals. The team leader assigns each team member to one of the five goals for the purpose of combining the statements of rationale offered by the team members in the previous phase into a single coherent justification for inclusion of that goal in the strategic plan. The team members are then requested to visit the page of each goal and either indicate their acceptance of the statement of justification as a comment or make revisions. The team member assigned to each particular goal, who receives an email notification when his or her goal justification statement has been modified, has the final say so as to the final wording of the statement of justification and may choose to re-edit the statement or to revert to the previous wording.

Phase 6 – Submitting the Final Response: The team leader then collects all five strategic goals and justifications from the five wiki pages and posts them as the final submission to the assigned group task.

This team project might have been completed more quickly by simply having each team member create and justify a single strategic goal that is combined into the final submission. But, by developing the response in a collaborative way using a wiki, the

final submission is likely to be a much higher quality product with a deeper understanding of the concept of "strategic goals" by the students. And, they will be better prepared for the kind of work they will be doing in the Information Age workplace.

To accommodate collaboration of this type among students, a wiki software application typically offers the capabilities described in Table 1.

Table 1: Wiki Capabilities

Online Shared Workspace	Members of the student teams can each access the online pages and modify them. If one team member is in the process of editing a page, other team members may be blocked from opening the same page or a second version of the modified page is generated.
Automatic Index Creation	Each time a new page is created by the team leader or team member, the wiki automatically adds the title of the page to the index used to navigate around the workspace.
Workspace History	A view of all previous pages showing their date of creation, the author, and the specific highlighted changes is available to all team members via an historical index page.
Page Restoration	Designated members of the team have the ability to restore a previous page version in order to eliminate what is believed to be an inappropriate page modification.
Commenting	Team members can insert viewable comments and, perhaps, ratings on information posted by other team members.
Posting Notification	Team members may subscribe to a service that notifies them by email when a page they've identified has been modified by another team member.
Administrative Control	The faculty member can assign the level of authorization to different users as to their ability to edit, remove content or pages, or to restore previous versions of edited pages

The best known wiki is Wikipedia (http://en.wikipedia.org/wiki/Main_Page). This site serves as an encyclopedia that is created, updated and self-managed by users. Wikipedia exemplifies all of the wiki capabilities listed above, but because of the immense volume of content, untold numbers of users, and the public nature of the site, some of these capabilities are not self-evident from a casual visit. A wiki used in support of a class collaboration project in an online course, on the other hand, embodies most if not all of these capabilities in a highly transparent fashion.

SOLUTIONS AND RECOMMENDATIONS

To What Kinds of Student Collaboration Might a Wiki be Applied?

A wiki can be applied to a variety of group activities in online courses to enhance learning. Some involve collaboration among the entire class and others among small teams of students:

Student Team Projects: A wiki can support the collaboration activities during student team project assignments - projects in which small groups of students collaborate to produce a product, conduct a case study, or answer open-ended questions posed by the instructor. The wiki can be used as a tool for both planning for the team and the creation of the final project product.

Discussion Summary: A team of students may be directed to summarize a weekly discussion conducted in an online forum for use by the remainder of the class. Each week a different team is assigned the task of summarizing the weekly online discussion. The wiki could be used to make draft notes and reflections by individual team members, and to collaboratively construct the final summary document. The summary is then made available to all other students in the class for their review and comments.

Course FAQ: A wiki can be used to create a "Frequently Asked Questions" page for the course. In this case, students would post questions concerning the conduct of the course and both students and the instructor can furnish and edit answers.

Course Glossary: Borrowing the approach used with *Wikipedia*, students in a class can collectively construct a glossary of technical terms associated with a course. That is, students can offer definitions, examples, explanations, links to relevant research and references for a set of technical terms suggested by the faculty or the students.

Knowledge Repository: An annotated bibliography of online resources for the course can be maintained in a wiki with both students and faculty able to add to and revise the contents. The posted information might include the title, an active link to the website containing the reference material, and a brief description of the contents of the document or website. Students might then be asked to post ratings and evaluative comments of the material.

What are the Role Responsibilities of the Instructor?

The faculty member plays a vital role in assuring that the group project using a wiki runs smoothly and, in fact, leads to deep learning. Without the planning, ongoing monitoring, and occasional prompting by the instructor, the student group project can easily change from the initial promise of an exciting learning adventure using a wiki to a forlorn burden (Webber, 2005). The role of the faculty member can be organized into seven critical responsibilities:

Set-up Wiki Software: The wiki software has to be configured so that the teams of students have the appropriate access and authority to use the wiki for its intended purpose. Typically, this involves naming the wiki page, providing a description that will appear next to the name, choosing the options by which it will operate (e.g., will it automatically link to the course's online grade book), assigning the particular students who can access the wiki pages, and defining what

responsibilities each or all students will have (e.g., editing pages, commenting on postings by others, creating new pages, purging existing pages, reverting to previous pages and thereby eliminating edited pages considered inappropriate). Of course, different software products employ different means for setting up the wiki, but they invariably use a simple-to-use interactive worksheet where the instructors make their selections by checking off boxes and entering titles into formatted workspaces. In cases where the wiki has been institutionalized into academic programs, much of the set-up may be accomplished by the technology support group when the online course is initially created.

Create Framework for Wiki Pages: It would be tempting to create a wiki composed of a blank page and turn it over to the students to use as they will. Perhaps, when the use of a wiki is as familiar to students as preparing a document on a word processor, this would be possible and maybe even advantageous. But, that time seems quite a ways off. A blank wiki page represents a formidable challenge to most students at this time. Instead, it is strongly recommended that the instructor prepare an initial welcoming page for students to view when accessing the Wiki and any templates (i.e., formatted task pages) deemed necessary for student teams to complete the assigned task.

Here is an example from one of the online courses conducted by the author – the course deals with measuring organizational performance. One of the weekly units involving a team project covers the topic of *sampling*. More specifically, the case requires that a sampling plan be developed to allow the military commissary system to demonstrate their ability save their customers money on a "selected market basket of food items when compared to prices at supermarkets in the private sector." The team assignment at the completion of the unit's instruction is shown in Figure 1.

Team Assignments:

As with the previous team activities, the class has been divided into three teams, each being assigned the following need for sampling in this exercise. One member of the team has been assigned the role of "Team Leader" for this exercise.

RED TEAM	BLUE TEAM	GREEN TEAM
Which of the hundreds of commissaries around the world will be checked in the price comparison?	Which of the many private sector supermarkets in the vicinity of the selected commissaries will be used for comparison?	Which of the thousands of commissary products will form the "market basket" for price comparison?

Each team is assigned the task of describing and justifying a sampling methodology for one of the sampling requirements above, including the selection of the appropriate sample size.

Figure 1. Sampling Team Assignment

To help facilitate the use of the wiki, a template for the response was provided on the team's wiki page as shown in Figure 2.

<div style="border:1px solid black; padding:10px;">

WEEK 7 TEAM PROJECT
Commissary Price Comparison Case

Red Team

Which of the hundreds of commissaries around the world will be checked?

ACCESSIBLE POPULATION	SAMPLING TECHNIQUE	RATIONALE FOR SAMPLING TECHNIQUE
	[ ] Cluster [ ] Convenient [ ] Judgment [ ] Random [ ] Stratified [ ] Systematic	

SELECTION OF SAMPLE SIZE	DESCRIPTION OF SAMPLING METHODOLOGY

</div>

Figure 2. Pre-prepared Template for Wiki Page

In this way, the teams would merely submit their responses by checking off boxes and entering text into the form. They could then concentrate their deliberations on the week's content on sampling, rather than on formatting a wiki page.

Develop Instructions for Students: Written instructions should be provided to the students the first time they are directed to use a wiki in a team project. The instructions can indicate such information as how the wiki will be used in the course, how they can access it, and what kinds of activities they are expected to perform using the wiki. Figure 3 shows sample instructions used in one of the author's courses. These instructions exclude directions for operations such as accessing the wiki, logging in, posting comments, and editing pages which also must be provided to students.

<div style="border:1px solid black; padding:10px;">

Here is how the Wiki is expected to be used in the class for team projects:

1. Each team will have a workspace for each project that only team members (and I) can access. Teams cannot access each other's team's workspace - they are private. You can access your team's workspace by clicking on "Group Wiki" in the course menu and choosing "View" under your team's name.

</div>

2. I will set up a template for the deliverable product in each workspace.

3. Each team will also have the usual *Group Discussion Board* capability that is part of the Group section of the online learning system. This discussion board should be used for communication among team members including such messages as the assignment of tasks by the designated team leader, the schedule of activities during the week, and suggestions for how the team project should be conducted.

4. The wiki workspace is used for the actual construction of the team's final deliverable. As part of the team leader's task instructions to the team, he or she will describe what elements of the template should be completed by each team member (different team members may have responsibility for different elements or all team members may be expected to contribute to the same element).

5. The team leader and each team member have the ability to add to, remove, or modify any of the content existing in the workspace. New sub-pages can also be added to each project workspace if that capability can help in the development of the final project deliverable. Any person with access to the workspace can also restore (revert to) an earlier version of the workspace page from the history file if a newer version is deemed inappropriate.

6. From a project management perspective, the responsibility for removing content and reverting to previous versions of a page should lie solely with the designated team leader. However, any team leader for a particular project may delegate that capability to team members if he or she deems such action appropriate.

7. It is hoped that everyone will adopt an experimental perspective on the use of the wiki and attempt innovative actions permitted by the software even though they are not covered in these instructions.

8. It is recommended that the *Group Wiki* be used directly for submission and improvement of the responses to the assignment and that the *Group Discussion Board* in the "Groups" area be used for messaging concerning project administration.

9. When the project deliverable has reached what is believed to be its final version as determined by the team leader, he or she should request comments from the team members that indicate their agreement or disagreement with the final draft response. Team member comments can be made either in the *Group's Discussion Board* or using the "Comment" feature of the *Group Wiki*, at the discretion of the team leader.

10. Based on the team member's comments, the team leader can modify the draft as he or she sees fit, copy it from the Group Wiki, and post it as the team's submission to the *Posting Assignment* area of the Discussion Board for all class members to view.

Figure 3. Written Instructions on use of the Wiki

Encourage Editing of Other Students' Entries: Some students are reluctant to modify a classmate's submission to the Wiki even if they believe the modification would improve the product being developed. They are apparently concerned about alienating the feelings of the originator's writing or cultural influencers might make some students uncomfortable deleting the works by others (Pfeil, Zaphiris, and Ang, 2006). The alternatives to rewriting a section are to post the suggested change as either (1) an addition to the section on the wiki beneath the original material, or (2) a suggestion for change in the Comment section of the wiki pointing out the item to which the suggestion applies. Both these approaches are more awkward than merely rewriting the original item by incorporating the suggested improvements directly into the wiki and replacing the previous submission. The instructor should post an announcement or send personal email messages encouraging students to overwrite previous postings if they believe that the project deliverable would benefit by doing so. Schweitzer (2008) believes that incentives such as extra grading points ought to be offered for students to edit each other's work. One way or another, the idea should be promoted that everyone in the team develop a "thick skin" and not be defensive if a classmate modifies a section that he or she submitted. All team members must recognize that the shared goal is to produce a superior final product using a collaborative effort - everyone owns the team's final submission. Students should be reminded that if their submissions are changed by teammates and they believe that the modifications made the team's product worse, they may again rewrite the material, building on the teammates' apparent concerns and perhaps posting comments to help explain the change they feel necessary. In the unlikely event that a point of disagreement between two or more classmates deteriorates into a wiki war among the parties, the team leader has the responsibility to mediate or make the final decision.

Plan in Advance for Dispute Resolution: Online team projects share some challenges with face-to-face team projects and add some opportunities for additional disputes. According to Millis (2006), team projects often involve "hitchhikers" (i.e., students who fail to carry their weight and have to be prodded for contributions of any kind) and "workhorses" (i.e., overachievers who contribute frequently and voluminously, more than is requested and perhaps even more than is desired). Such different and opposing working styles often come into conflict with each other and with the more moderate members of the team. Working in a virtual environment offers other challenges for communication during academic team projects. Without having eye contact with the originator of a proposal, it is easy to be candid, less civil, and maybe even rude, when expressing an opinion of someone else's contribution (Follett, 2008). Other opportunities for disputes arise in online team projects involving wikis, especially in the case where one student overwrites the contribution of another.

        Student teams should be made to face the possibility of clashes arising in their teams before the group projects even begin. At the very least, they should be

directed to references that offer guidance on preventing disputes and resolving them if they should occur. Northeastern University's College of Business Administration offers such a reference in their "Surviving the Group Project: A Note on Working in Teams" (Wertheim, n.d.). The instructor can offer his or her own tips on managing team projects and perhaps open a discussion forum or even a wiki on eliciting student suggestions for preventing and resolving disputes. Some universities require that student teams prepare a plan for working as a group including their own process for conflict management. Figure 4 shows the plan developed by one team in a course taught by the author. Incidentally, a wiki is a useful tool for the development of such working plans.

Team Conflict Management Plan

As conflicts are inevitable in the team development process, we, as members of Team APEX shall resort to the following guidelines and procedures to provide resolution when conflicts arise:

Any conflict shall be handled in a constructive way and the project leader shall assist and direct the disputing parties to:

1. Identify the key issues and their position without making any accusations;
2. Lay out the advantages and disadvantages of each party's position on the issue;
3. Look for other alternative options that will satisfy both parties interest and fulfillment the team's needs;
4. Request other member's opinions and views; and
5. Find the point of balance and work out a mutual decision between parties.

However, if a mutual decision cannot be reached, the team leader shall seek assistance from faculty members to act as mediator to help the parties to reach an agreement.

Every member should keep in mind that the purpose of team assignments is to give us the chance of learning and developing management skills in a cooperative and reciprocal setting while achieving a common team goal. Therefore, we should refrain ourselves from and to avoid unnecessary conflicts and disputes that would hinder or delay the team's progress. The followings are some suggestions and rules that have been provided by members of Team APEX to assist the team in the avoidance of unnecessary conflicts and disputes:

1. Be certain that any suggestions and solutions are practical and achievable;
2. Encourage and welcome different ideas and opinions;
3. Be positive and sincere with your words;
4. Be conscious about your own part of problem; and
5. Before giving your own point of view, try to listen and understand others first.

Figure 4. Team Conflict Management Plan

Monitor Use of Wiki during the Course: Experience indicates that in the vast majority of cases, a student team's use of a wiki is smooth and effective. The teams are self-governing and require little or no intervention by the instructor. The instructor gives the team assignment at the start of the project and reviews the final team product when it is completed. The team leaders have things in hand during the project. But of course there are exceptions, especially during the initial team projects in a course. Some of these problems are common to student team projects in general, independent of whether or not a wiki is used:

- Time is getting short and the team is struggling with the assignment and does not seem to have any idea what to do.

- Right from the onset, the team has embarked on a path that is likely to be unfulfilling.

- A heated argument breaks out among members of the team, and the team leader is either unable to deal with the issue or is a participant in the dispute.

Other potential team problems may be directly related to the required use of a wiki. For example, the lack of fluency with a wiki or the fear of having to rewrite a colleague's contribution might result in the wiki workspace remaining bare of content. All the team's contributions may occur within the confines of the more familiar threaded discussion forum, as clumsy as that might be. In some cases, team leaders might reserve the right to themselves to post content to the wiki, with other team members restricted to merely suggesting content and posting comments in the discussion forum. And, occasionally, a wiki war might break out among two or more team members that is unresolved by the self-governance capability of the team.

At the very least, the instructor should regularly monitor each team's wiki workspace for signs of potential problems. If some are found, the tough question to answer is whether or not to intercede. Sometimes the best reaction to a problem is no reaction; let the team handle it themselves (Follett, 2008). Often, all that is necessary is a personal email message or telephone call to the team leader, noting the potential problem and asking if assistance is required. If help is requested, then appropriate guidance should be offered to help steer team activities towards the fruitful use of the wiki for collaboration. If the team leader is at the heart of the problem or a party to a dispute, more assertive action may be required to defuse the situation. Intervention into team projects is a touchy issue and instructors have to learn to step back without stepping out of the picture entirely.

Evaluate Collaborative Effort: Since group projects typically represent an extensive amount of effort by students in a class, general agreement exists among faculty that the team effort should be assessed, graded, and feedback provided. With some exceptions (Cohen, 1994), there is further accord that grading ought to

represent both (1) the quality of the product developed jointly by the team as well as (2) the degree of participation and quality of contribution by each individual student involved in the group process. Different faculty and institutions might stress the relative weight of the common product and the individual contribution dissimilarly in the assessment, but both components are typically factored into each student's grade. The assessment of the team's final product tends to fall within the typical task requirements of most faculty. In virtually all ways related to assessment, a paper produced by a group is indistinguishable from a paper authored by an individual student. Faculty members are quite experienced in the application of stated project requirements or criteria and the use of grading rubrics to assign a score to the final group product. On the other hand, the assessment of each team member's contribution to the final group product poses special challenges to the course instructor.

The individual members of student teams typically contribute to the group project in a variety of ways. They post comments to discussion boards, send email messages, submit documents they've created, and take part in team chat sessions. They might participate in telephone conversations or teleconferences or even meet face-to-face with team members who are located in the same general vicinity. It is arduous for the faculty member to track down the sum total of contributions by individual students in order to assign a grade to their involvement in team deliberations. Possibly because of this difficulty, many faculty members rely on "peer assessment" to provide the portion of the group project grade relating to individual contribution. In peer assessment, each student team member is asked to evaluate the contribution of the other team members to the final group product (McCoy, 2006). The assessment, often anonymous, may be in the form of a ranking or graded score on such factors as taking responsibility, contributing ideas, and completing tasks, accompanied by justifying comments. The composite score from all team members for each student is factored into the group project grade for each individual member of the team. Some faculty members have qualms with the fairness of peer assessment. They feel that students are not trained to rate people's performance and that the grades they assign may consider factors irrelevant to team contribution and might even be determined by collusion among some team members (Ohland, Layton, Loughry, and Yuhasz, 2005).

The historical index feature of all wiki applications may enable a lower weighting of peer evaluation or possibly its elimination in the assessment of an individual's contribution to the group effort. This feature allows the instructor to view exactly what each team member contributed to the group project. The history file provides access to each version of the wiki page with the modification highlighted in color and the name of the person listed who made the change as well as the day and time that the revision took place. The faculty member can conveniently determine the quantity and quality of contributions by each team member and rate that performance accordingly. Most faculty members are adept at rating student performance fairly and accurately, given direct access to their

contributions. Moreover, just the knowledge that faculty will have easy access to their contributions may serve as an incentive for students to participate more actively and with higher quality contributions

By What Criteria Should the Wiki Software Product be Chosen?

Currently one hundred or so software products are available on the market that have the term "wiki" in their names or can serve the functions of a wiki. Which one is best for a particular institution? Several criteria might be used in the selection process.

Technical Performance Features and Cost: If the choice is to be made purely on the basis of *features* and *cost*, the decision is not exceptionally difficult. Virtually all wiki software products offer common wiki functions that enable the basic essence of online collaboration:

- *Page Creation & Revision*: The ability to enter or revise textual content on a shared workspace using a typical text editor.

- *Page Index*: Automatic creation of an index of page titles that have been created with built-in links to those pages.

- *Page History*: A means of viewing previous versions of the pages with indications of when the edits took place, the user who made the change, the specific changes that were made, and the ability to restore that previous page as the visible page on the wiki.

Higher-end wiki products offer some additional features that may not be found on the lower cost offerings:

- *Hyperlinking*: The ability to easily insert links to other Wiki pages and pages available on the Web.

- *Multimedia*: The ability to insert graphical images, video clips, and audio files into the page.

- Attachments: The ability to upload and insert existing documents into a page.

- *Email Notification*: A subscription service in which users are notified by email when a wiki page they have identified has been modified by another user.

- *Access Control*: The assignment of different levels of authorization to different users as to the ability to edit or remove content or pages or to restore previous versions of edited pages.

- *Commenting*: The ability to insert viewable comments by users on information posted by other users.

The institution must first decide on the wiki features it deems critical for its application and the available budget for purchasing the software product. Several online tools are available to help shrink the number of potential wiki software offerings to a manageable set based on available features and cost. These tools include Wikipedia's *Comparison of wiki software* (n.d.) and WikiMatrix's *Compare them all* (n.d.). Wikipedia offers a large updated table listing differences among approximately 50 wiki software products on factors such as *owner, release dates, cost, technical parameters, target audience, features,* and *installation requirements*. It should be noted that Wikipedia's tool is the creation of users so that the authenticity of the data is likely but not assured. WikiMatrix is an interactive website that enables users to choose or compare Wikis from among approximately 100 Wiki software products. Users can make use of a built-in wizard as an aid in the selection of a specific wiki software product that meets their particular needs. Or, users can choose two of the available wiki software products for a side-by-side comparison on *features, hosting and system requirements, security arrangements, usability*, and other technical parameters. The website also offers a link to a discussion forum devoted to wikis where questions can be asked and comments made within a community of people interested in this collaborative software capability.

Institutional Integration Issues: The choice of a particular wiki software product may very well involve factors beyond it purchase price and features. Two different institutions might have the same budget and need for the same wiki features for its collaborative application, but one product might suit one institution better than the other institution and offer significantly lower life-cycle costs than another product. The ease of integration of the wiki functionality into the culture and technology infrastructure of the institution ought to be of critical concern in the choice of software.

- *Usability for Target Audience and Available Support Services*: Because of the programmatic thrust of its academic offerings, students in some institutions or departments might have more experience or greater aptitude with new software products. They therefore could be more skillful at some advanced wiki features and require less technical support. The WikiMatrix tool described above gives some indication of the ease of use of the various products based on available features (e.g., *WYSIWYG Editing*), but an actual trial of a product with targeted users would be worthwhile. The availability and cost of technical support services such as a 24/7 toll-free number call assistance should also be considered, especially if the student body or faculty of the institution tend to be hesitant in adopting technology innovations.

- *Integration with Existing Course Management System*: The course management system used to deliver online courses at the institution might be home grown or purchased from a commercial software vendor (e.g.,

BlackBoard). In either case, a wiki capability may or may not be embedded in the course management system. And, even if a wiki is available as part of the course management system, its array of features might not be as rich as a wiki software product acquired as a stand-alone application. In spite of this drawback, heavy weight in the decision process might be awarded the criterion of *course management system integration*. That is, a wiki that has a similar look and feel to the software used to deliver the online courses greatly assists adoption of its collaborative features. A wiki with these characteristics gives the appearance of being merely an extension of the course management system rather an entirely new software product to learn. If the course management system does not incorporate a wiki, then consideration should be given to commercial software applications that can be readily customized to offer colors, layout, button shapes, and branding similar to the appearance of the current online course displays.

- *Hosting*: Most commercial suppliers of wiki software offer institutions the option of hosting the application on either the vendor's servers or those of the institution. For some institutions, hosting is a critical criterion in the decision process. Hosting by the vendor probably has a higher lifecycle cost of ownership than the outright purchase of a software license by the institution that will host the software itself; however, vendor hosting may offer benefits that institutions with relatively small and unsophisticated information technology support units are unable to provide. These benefits include assurances for secure and private interactions during collaborative activities as well as the systematic and frequent back-up of data files. Because hosted services specialize in this line of business, they tend to offer fewer and less lengthy outages and may have the ability to switch to a back-up server if the primary server shuts down for any reason. The extra cost associated with remote hosting of the wiki might also lead to more timely updates of the software and more reliable support services for users. Each institution has to consider the cost-benefits of outright purchase of the wiki software versus paying the vendor to host the service.

FUTURE TRENDS

According to Bill Venners (2003), Ward Cunningham created the first modern wiki, named *WikiWikiWeb*, in 1995. After more than a decade, wikis are just beginning to appear in academia, typically in support of student team projects. Using Gartner's Hype Cycle curve (Linden and Fenn, 2003), wikis are probably located on the upward slope approaching the "Peak of Inflated Expectations" (see Figure 5). That is, wikis are currently receiving positive hype from articles dealing with a limited number of first-generation applications that need extensive customization to work effectively. The use of wikis in education has yet to receive much negative press describing the likely failures by the second round of adaptors. But, criticism will almost certainly occur as faculty lacking the enthusiasm and technical aptitude of the early adaptors attempt to implement wikis in

their online classrooms. They will find putting the current generation of wikis into practice challenging.
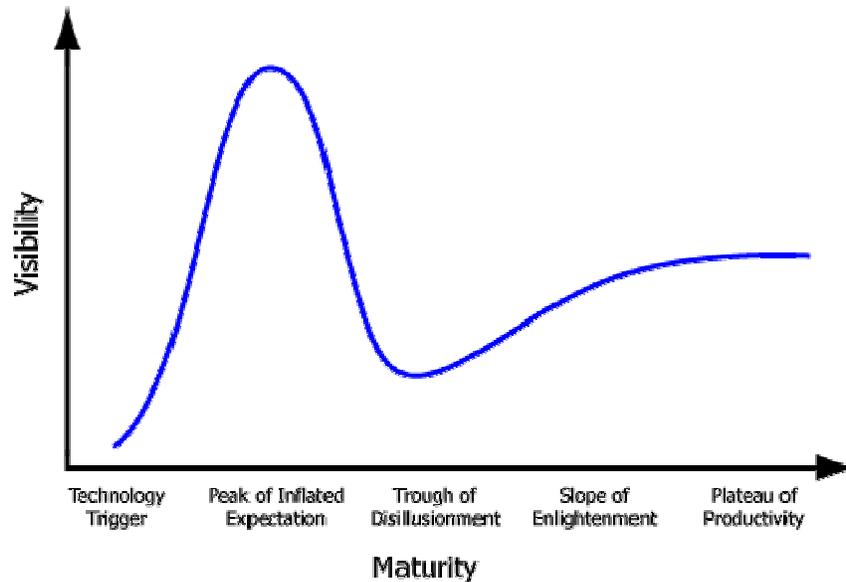

Figure 5. Gartner Group's Hype Cycle

Passing through the "Trough of Disillusionment" phase of the Hype Cycle to begin rising on the "Slope of Enlightenment" will require a number of modifications to the wiki software. First and foremost, a wiki must become an integral component of each institution's course management system. A stand-alone wiki capability with a different look and feel than the standard online learning application and separated from administrative functions like the course address book and class assignment utilities is daunting to both students and faculty. A wiki should become the primary *collaboration* module of the course management system and seem as common to users as the course discussion board. Second, the built-in facilities for editing, commenting on, and viewing previous page versions need to become integrated and make use of a more user-friendly graphical interface. In most current wiki configurations, these three functions tend to be accomplished in entirely different ways, complicating the mastery by users. Last, to speed up the collaborative efforts among multiple users, it would be helpful if changes to the common workspace were made immediately available on students' mobile display devices such as cell phones and personal digital assistants so that they could respond quickly if they wish. All of these modifications are quite likely to occur within the next few years as social networking tools becomes more universal.

CONCLUSIONS

Current wiki software exists as stand-alone applications having some features similar to a word processor and other features offering unique capabilities for collaboration among distributed users. As such, it now represents a challenge for

academic institutions to choose a particular wiki product and configure it for use in their online courses. Tight resources would have to be diverted to this particular emerging technology. Early adopters on the faculty must be willing to share their experiences and enthusiasm with their colleagues. It is tempting to just wait the few years necessary for this software capability to evolve further and become more integrated with the institution's course management system. Yet, besides offering a challenge, the current standing of wiki software also offers an opportunity for far-thinking academic institutions. These institutions are embracing the quickly evolving world of Web 2.0 with its emphasis on social networking. They see how such new capabilities as offered by a wiki can transform their online programs in ways unheard of just a few years ago. Their students, no matter how far removed from each other, can more readily collaborate on joint efforts. Yes, they still cannot read body language and facial expressions as can residential student teams sitting around a conference table (at least until video conferences or animated avatars are added to the mix), but they have the benefit of collaborating in group projects on their own schedule from any location while contributing relevant dynamic media resources that exist on the Web. These insightful institutions are taking advantage of state-of-the-art wiki software to build more opportunities for student collaboration into their courses. By doing so, their students acquire deeper learning of the subject matter, produce a higher quality product that they can be proud of, and are being prepared to work effectively in today's collaborative-based workplace. By not waiting for the next generation of wiki software to emerge, these far-thinking institutions are working their way through the "trough of disillusionment" in the Hype Cycle into the "slope of enlightenment" so that they can be the leaders in the "plateau of productivity" when the time comes in the next few years.

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