

Flipping the Biology Class with Wikis

Ravindra Malik and Keith Hamon

Albany State University, Department of Natural Sciences, 504 College Dr, Albany GA 31705 USA
(rmalik@asurams.edu; keith.hamon@gmail.com)

Wikis provide several advantages for the biology classroom. As an online space, a biology class wiki helps students engage each other, the class content, and the instructor in a medium that they are comfortable with. Wikis also help flip a classroom by shifting the transfer of course content from the classroom to the Internet. Wikis organize a classroom, promote student collaborations, brainstorming, note taking, and project-based learning, and encourage students to create multimedia documents that use text, image, sound, video, and hyperlinks to communicate. Finally, wikis are easy.

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Introduction

In a May 14, 2011, article, the *Ottawa Citizen* reported on a study at the University of British Columbia that compared traditional lecture courses to interactive courses based on the “teaching techniques being promoted by Nobel Prize [winning physicist] Carl Wieman.” The study compared two, very large introductory physics courses: one taught lecture-style by a charismatic UBC professor with more than thirty years of teaching experience and one taught interactive style by a post-doctoral researcher and a graduate student, both with limited teaching experience. Both classes had more than 200 students. The students in the interactive class “were asked to do readings and put the new knowledge to work when they got to class, where they brainstormed in small groups...There was no formal lecture in the hour-long classes, but [the instructors] provided guidance and answered questions.”

Finally, all students were given the same exam, and the interactive group had an average score of 74% while the lecture group scored 41%. Attendance in the interactive class increased by 20%. UBC is convinced of the efficacy of the interactive methods and is working to transition all its first-year physics courses to the new style.

As the University of British Columbia has discovered, we are in a technological revolution that is changing the roles and habits of professors, students, and universities. Our students connect differently, talk differently, and learn differently. Consequently, we must teach differently, or we risk that most grievous fate for any instructor, irrelevance, as students go elsewhere to find educational experiences that speak to them in a way they can understand.

In her study of using wikis in the college classroom, Cole (2009:141) notes “an increasing awareness that students are

now entering Higher Education (HE) with a different range of backgrounds and skills sets to ‘traditional’ university students.” In his essay *Teaching Generation NeXt: A Pedagogy for Today’s Learners*, Taylor (2010) notes that today’s students “are different, and different kinds of learners, than anyone [in] higher education has experienced in the past, and there is ample evidence of a growing divide and mismatch between faculty and students in teaching and learning”. According to Taylor, these students have very different preparation for higher education and different expectations of higher education than did students before them. Their “consumer orientation, esteem and importance issues, and use of technology are challenging traditional educational practices.”

But we professors hardly need research to tell us that our students are changing. We need only note the number of students busily texting and tweeting during our most important lectures to know that something is amiss, and we may agree with Taylor that “if the traditional methods are not bringing about the traditional results with these [new] learners, [then] better approaches must be considered.”

In this paper, we propose a couple of changes that any professor can make that will turn the most content-centered science course into a student-centered learning experience that can appeal to even the most hard-core Gen NeXt student. Everything used in this article is open and free, aside from your time, and it has all been tested and proven to work. We know that you can do it, because we did it. We know that it works, because it worked for us.

Our Experience

Located in Albany, GA, Albany State University is a regionally accredited, historically black university that serves the needs of rural, southwest Georgia for higher education.

Albany State has developed a Quality Enhancement Plan (QEP) to improve a specific aspect of our students' learning environment. Our QEP focuses on our students' abilities to write well in a technological environment. This past year, ten of my colleagues and I completed a yearlong study of how we might use online writing as a tool to enhance our students' learning. Much of this paper follows from that study and in-class experimentation.

Each of our QEP courses used an online wiki to facilitate student writing and learning. A wiki is a collaborative website that invites participation, creation, and editing by multiple people; thus, an instructor can open a wiki and invite students in to collaborate. A number of open, usually free wiki services are available on the Web, including Wikidot, PBWorks, and Wikispaces; however, we chose to use Google Sites. It is free, and a Google account gives users access to lots of free Google tools that complement and support a wiki site.

One of the first benefits of a wiki is the sense of collaboration that it creates. This is also one of the most difficult instructional aspects for instructors to master when they begin using a wiki, because instructors usually think of collaboration as something students do with each other, but not with teachers. This is unfortunate, because on a wiki, students can build, or at least help build, the class calendar, class announcements, class notes, links to outside resources such as blog posts, scholarly essays, topical news items, videos, images, and data. Students can create vocabulary lists, tutorials, discussion forums, and more. They can provide peer reviews for each other's written work. Students can add their important dates to the class calendar.

This collaboration between instructor and students has two immediate benefits:

First, it reduces the instructor's burden for creating all the content on the wiki. Instructors should turn over the bulk of the work to the students. After all, they are the ones doing the learning. Remember, learning is more a result of actively creating content rather than passively reading the content the instructor supplies. The instructor provides a focus and a framework. Most of the content can and should come from the students, and they will enjoy it.

Second, collaboration changes the relationship of the instructor to the student. No longer is the instructor the sole source of all knowledge in the classroom; rather, the instructor becomes the expert collaborator and guide, and the student is forced to assume a more active role in his/her own learning, a welcome pedagogical shift.

A wiki quickly becomes the nerve center for a class, pulling together the class policies, procedures, communications, material, and work. Most of the class wikis we created had a section for the syllabus, class announcements, assignments, class calendar, and class resources. The instructor supplies much of this material, but even here, students can contribute. A wiki, then, is a wonderful way to shift the focus of a class from the teacher's content to the students' learning.

It is also an easy way to start flipping a class. A flipped class is built on the simple idea that instructors should transmit new

information to students outside of class, primarily over the Internet, and then apply that information in the classroom or lab, where the instructor can help students having problems with the new information. Pink (2010) says that "flipped-thinking [is] the new buzz word sweeping the US," and Taylor (2010) insists that flipping a classroom is one of the key strategies for working with Gen NeXt students. He explains:

"Too much time in most classes is spent delivering content; time that can be better spent helping students actively identify the uses of the content, learn skills, or identify why the learning matters to them. This model moves faculty from the traditional pedagogy of delivering content in class and expecting students to apply it out of class, to moving the content out of class and facilitating the application of content under the guidance of the professor during class." (2010:193)

Traditionally, instructors have transmitted new information to students in the classroom, primarily through lectures and demonstrations, and then asked students to apply the new information in homework outside the classroom. In this traditional model of instruction, however, the instructor is not available when the student needs help. In contrast, the flipped model of instruction leverages the power of the Internet – the most powerful communication tool humanity has yet invented – to deliver instruction, and reserves the classroom for active application of the new information under the watchful eye of the instructor, who functions more as a concierge or curator than as the sole source of knowledge and wisdom.

Our experience, then, suggests that wikis are an excellent mechanism for shifting from a content centered class to a student centered class that engages students and that helps instructors to transition from being the sage on the stage to becoming the guide on the side.

Problems with Wikis

You may be wondering about intentional or accidental damage to your syllabus in particular and your class wiki site in general. Fortunately, this seldom happens as most wikis have built-in safeguards. First, wikis have varying levels of privileges. For instance, Google Sites has three levels of users:

1. *Owner*: only this user can invite and approve new users to the site, modify the overall structure of the site, and review the history of the site. Most instructors will reserve owner status for themselves alone.
2. *Editor*: these users can add, delete, and edit material on the site.
3. *Viewers*: these users can only view the site.

Next, wikis have different levels of visibility on the Web. A Google Sites wiki can be publicly available for anyone to

edit or merely to view, or it can be restricted so that only registered users can view or edit. The owner of the wiki controls these features, determining not only who can edit the site, but also who can even see the site.

Third, wikis track everything done on the site and stamp each modification with the user name, the date, and the time. Only the owner of the site has access to this information; thus, the owner can immediately identify the source of any erroneous or malicious material. Knowing that everything they do is made radically explicit on the class wiki deters most students from any wayward behavior. None of the eleven faculty members in our cohort this past year reported problems with student graffiti or sabotage.

Finally, wikis maintain a complete history of all edits and allow the owner to immediately revert any edit to a previous state. Knowing that all errors and malicious edits can be returned to an earlier state gives most instructors the confidence they need to work online with students. In short, then, while a determined and knowledgeable student can wreak havoc on a wiki – just as they can in a classroom – an attentive instructor can always mitigate the damage and identify the perpetrator for corrective action.

A second troubling question you may have is: what if I build it and no one comes? In her early explorations with a class wiki, Cole (2009:144) found that many of her students would not voluntarily engage a class wiki by participating in online discussions. She notes that there are several reasons why:

“First, although students possess the easy familiarity with Internet technology that characterizes them as “digital natives” (Prensky, 2001), some form of instructional scaffolding is required. ... A second point of interest is the significant number of students that were reluctant to publish Web-based material for peer-group review. ... [Finally,] there must be a balance between the cost (time invested learning and using the new technology) and the benefits (engagement, interest and improved learning). ... It is not enough to simply add a Wiki into a course with a traditionally designed content and expect students to automatically participate. Rather, course content needs to be explicitly redesigned around Wiki use.”

Cole notes several issues with student engagement that are fortunately all addressable – first, and foremost, by the instructor’s use of the wiki. In our own classes this past year, the class wiki was where students found the syllabus, the class assignments, the class calendar, class announcements,

and other housekeeping resources. If a student wanted to know what was going on in the class, then they went to the wiki. Thus, the wiki began to perform a role once occupied solely by the syllabus. The wiki became the place where students submitted their work: lab reports, research papers, and other documents. In short, if the student wanted to participate in the class, then they had to visit the class wiki.

However, what about participation in online discussions? Students are busy people who will prioritize their engagements with a class depending on their specific goals. For most students, earning a satisfactory grade is goal number one; thus, they are not likely to do anything that does not directly contribute to earning a good grade. As did Prof. Cole, some of my colleagues last year learned that students are reluctant to engage open, ungraded discussions. They don’t see enough benefit in it. Those of us who gave credit for participation found that students would show up and participate, often exceeding our expectations.

But for some students, online discussions carry too much risk, especially if they are not confident of their knowledge or their writing. They do not want to be evaluated publicly. This is a genuine concern; therefore, we graded online discussions on the basis of participation, not content. However, we did more than change grading practices; we also changed the way we engaged student conversation. Rather, than acting as the ever-present, rigorous evaluator of student ideas and writing, we talked to the students about their ideas, helping them explore their thoughts and their take on the class content and suggesting new directions or connections when necessary. Wiki discussions are more relaxed and open, more conversational, and nothing destroys a conversation quicker than a strict schoolmarm ready to whack a student’s knuckles every time he/she makes a mistake. Under that public censure, few students will talk.

Another benefit of participation grades is that it reduces our grading burden. A successful online discussion can generate a great deal of writing, and none of us instructors have time to formally grade all of that writing. A participation grade tells the student that the instructor knows that they showed up, engaged the conversation, and earned class credit without burdening either the student with public embarrassment or the instructor with too much grading. It’s a win-win.

But the student engagement problem was equally well addressed by the instructor’s participation in the conversation. In other words, a successful online discussion requires more of the instructor than a clever discussion prompt. The instructor must engage in the conversation.

Notes for the Instructor

How to Build a Wiki

The following instructions take you step-by-step through creating a wiki using Google Sites. As we mentioned above, there are other wiki sites available on the Net, and while each wiki service has slightly different commands and keystrokes, the setup procedures will be similar.

Google Sites is a wiki service, and a wiki is, as Wikipedia says, “a website that allows the easy creation and editing of any number of interlinked web pages via a web browser.” If you have a Google account (for instance, Gmail), then you already have access to Google Sites. If you don’t have a Google account, then you must get one. It is free and easy to attain.

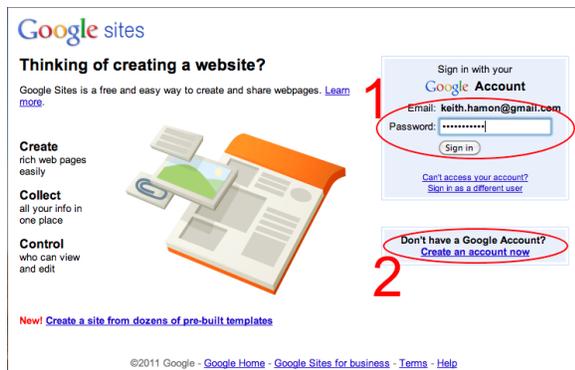


Figure 1. The Google Sites sign in window.

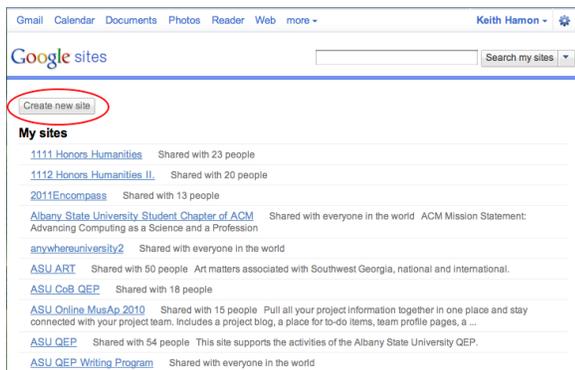


Figure 2. The Google Sites window.

1. Sign in to Google Sites

- Point your web browser to: sites.google.com & log-in with your Google account username & password.
- After you log in, Google Sites lists all the wikis that you own or to which you have access. On your first visit, you will likely have none listed.

2. Create a New Site

- Creating a new website is very easy; thus, it is tempting to jump right in. However, we find that the process usually goes better with a bit of planning. Our favorite method is to use a blank sheet of paper or some 4x6 notecards and a pencil to sketch the various pages and how they relate to each other. Of course, Google Sites is so easy to work with and so forgiving a tool that you can design as you create.

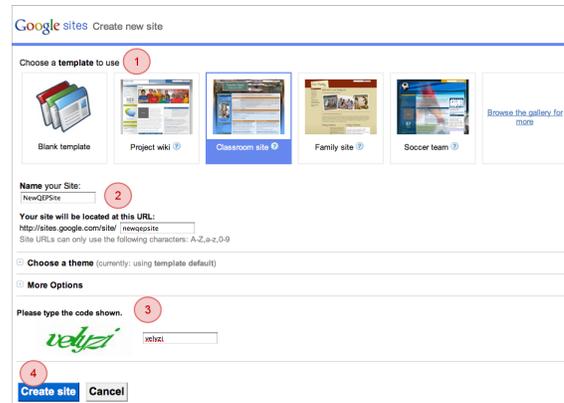


Figure 3. The Google Sites Create new site window.

- On the Sites home page, click the Create new site button at the top left hand side of the page.
- On the Create new site page, add the information about your new class site (see Figure 3):
 - Select a template for your wiki—for instance, the Classroom site. Google Sites has thousands of templates to choose from, and you can change your template later if your first choice doesn’t meet your needs.
 - Name your site something unique using ONLY alphanumeric characters. Remember, you are creating a Web URL, which must be unique. For instance, you might name your new site after your class: Malik BIO 999.
 - Enter the captcha to prove to Google that you are a real human being.
 - Press the Create site button.
- Google Sites will create your new wiki site and display it for you.

3. Edit Your New Site’s Pages

- Depending on the template that you chose, Sites will create a new site with a variety of different pages already linked together to form a coherent website and populated with placeholder text, images, and video. Your first job is to navigate to each page and replace the placeholder text and images with your own text and images.



Figure 4. A new Google Sites wiki.

- To edit the text on the page, click the Edit page button in the upper right hand corner of the site window to enter Edit mode.
- In Edit mode, Sites' displays an Edit bar with standard editing tools that should be mostly familiar to you.
- In Edit mode, you can add, delete, and edit text, add images and videos, and create links to other wiki pages or to other pages on the Web.
- Be sure to click the Save button when you finish editing a page.

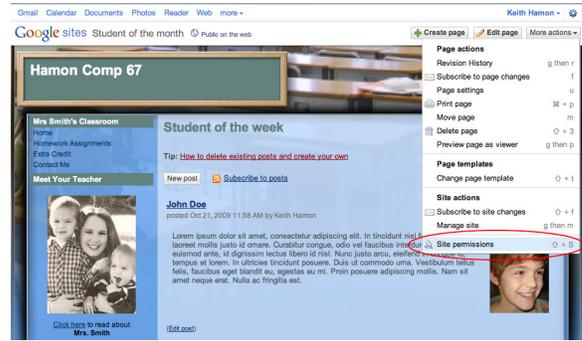


Figure 7. The Google Sites Site permissions menu item.

- Sites will display a second window where you can create an email message to explain your new site. You might, for instance, remind people that they will need to log into your new site with a valid Google account.
- After Sites has sent the invitation, it will add the new names to the list of collaborators on your site.
- Also note, that by default, your wiki site is Public on the web. If you wish to change access to your site, then click the Change button.



Figure 5. The Google Sites Edit page button.

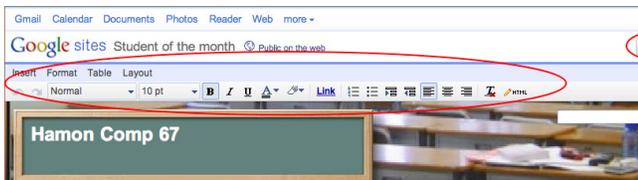


Figure 6. The Google Sites Edit menu bar.

4. Share Your New Site

Before your students can participate in your new class site, you must invite them to the site as collaborators.

- In View mode on any wiki page, click the More actions popup menu in the upper right-hand corner of the window and select Site permissions.
- On the Sharing settings window, enter into the Add People field the email addresses of those you want to collaborate with you on your wiki – for instance, your students. Be mindful to set their privileges to Can Edit. Now students can make controlled changes to the class wiki—changes controlled by you, the Owner.

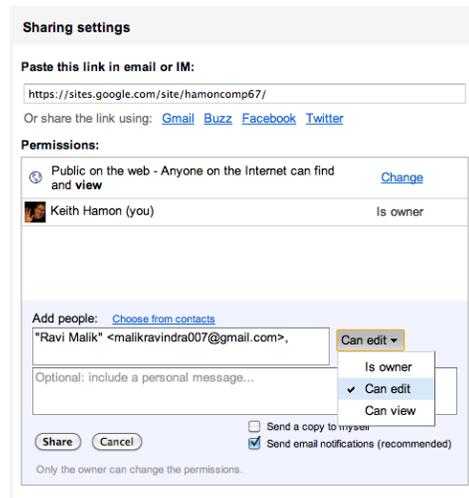


Figure 8. The Google Sites Sharing settings window.

The Visibility options window lists three levels of access:

- *Public on the web*, which means that anyone can access your site without signing-in. By default, these viewers cannot make changes to your site.
- *Anyone with the link*, which means that people cannot search for your site, but if they have the link, then they can view your site without signing-in. As with the first access level, these viewers cannot make changes to your site.

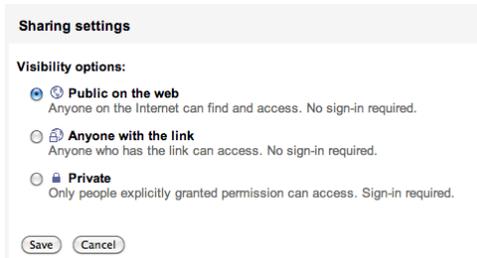


Figure 9. The Google Sites Visibility options window.

- *Private*, which means that only those with whom you have shared the wiki site can view it, and only those with Collaborator rights can edit it. This is the most secure level of access, but it also removes your class wiki from the public Web and stops interchange with anyone outside your class.

Conclusion

As you can see, then, within a quarter of an hour you can have a wiki site up, running, and shared with your class. You will likely edit the site all semester as you think of new ways to use it, but you can easily start your classes with an attractive, engaging, functioning wiki. We think you should try it. We think you'll enjoy it, and we know your students will.

Literature Cited

- Cole, M. 2009. Using Wiki technology to support student engagement: Lessons from the trenches. *Computers & Education* 52: 141-146.
- Munro, M. 2011, May 14. Interactive teaching methods engage students, study finds. *Ottawa Citizen*. Retrieved from <http://www.ottawacitizen.com/technology/Interactive+teaching+methods+engage+students+study+finds/4785578/story.html>.
- Pink, D. 2010, Sep 12. Think Tank: Flip-thinking - the new buzz word sweeping the US. *The Telegraph*. Retrieved from: <http://www.telegraph.co.uk/finance/business-club/7996379/Daniel-Pinks-Think-Tank-Flip-thinking-the-new-buzz-word-sweeping-the-US.html>
- Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon*, 9(5), NCB University Press, pp. 1–6.

Taylor, M. 2010. Teaching generation neXt: A pedagogy for today's learners. Pages 192-196, in *A Collection of Papers on Self-Study and Institutional Improvement*, 26th Edition. The Higher Learning Commission.

About the Authors

Ravindra Malik was born in India where he earned his first M.Sc. in Agronomy and worked for different organizations such as National Seeds Corporation Ltd., Union Carbide India Ltd., and State Bank of India in agricultural financing. He came to the USA in 1992 and did his second MS in Horticulture from Texas A&M-Commerce (then known as Eastern Texas State University). He then moved to Alabama A&M University at Huntsville to pursue his Ph.D. in Plant & Soil Sciences. After completing his Ph.D. he worked at AAMU as a post doctoral associate and research assistant professor and in August 2002 he joined Albany State University in Albany, Georgia. Currently, he is working as an associate professor and director of assessment. In addition to teaching, his research interest is directed to agroforestry, water quality management, biomass production, fertility management, and riparian zone management among others.

Since 2009, Keith Hamon has been the Coordinator of Albany State University's Quality Enhancement Plan, a university-wide program to integrate writing and computers into all classrooms. As of January, 2012, he teaches English composition and literature at South University in West Palm Beach, FL. He received his doctorate in English Composition and Writing in 1984 from the University of Miami, where he studied modern fiction with Nobel prize-winner Isaac Bashevis Singer. He then developed academic support programs for the University of Houston-Victoria and Mercer University, before becoming the Director of Technology at Wesleyan College, where he built a campus-wide network, issued personal computers to all students, and put all students on the Internet—all before the advent of the World Wide Web. In 1995, he left higher education to build a county-wide network for the Monroe County Public Schools in central Georgia, and then in 2009, he returned to higher education with Albany State University. His primary professional interests involve the emerging communication ecosystem in a networked world.

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