

## Engaging Learners with Technology



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## Introduction

*In 1930, the Republican-controlled House of Representatives, in an effort to alleviate the effects of the... Anyone? Anyone?... the Great Depression, passed the... Anyone? Anyone? The tariff bill? The Hawley-Smoot Tariff Act? Which, anyone? Raised or lowered?... raised tariffs, in an effort to collect more revenue for the federal government. Did it work? Anyone? Anyone know the effects? It did not work, and the United States sank deeper into the Great Depression. Today we have a similar debate over this. Anyone know what this is? Class? Anyone? Anyone? Anyone seen this before? The Laffer Curve. Anyone know what this says? It says that at this point on the revenue curve, you will get exactly the same amount of revenue as at this point. This is very controversial. Does anyone know what Vice President Bush called this in 1980? Anyone? Something-d-o-o economics. "Voodoo" economics... Bueller?... Bueller?... Bueller? (Hughes, 1986).*

You might recognize the quote above from the beloved 1986 film *Ferris Bueller's Day Off*. This, for those who are unfamiliar, is the scene where the impossibly dry economics teacher presents history's most boring and disengaged lecture in a monotone voice and with no room for student interaction, which ultimately compelled Ferris and his friend Cameron to take that famous day off. Who could blame them? The movie was wildly successful, partially because most people have been in similar situations at school or work. Far too often, teachers make no effort to engage students who find themselves uninterested and indifferent, and even though they may be physically present, their minds have taken the day off. It makes for a humorous story on the silver screen but in real life listening to, "...Anyone? Anyone?" is not so funny.

How do we avoid the absurdity of Ferris' economics teacher? The answer is active engagement. Active engagement refers to a method of teaching and learning in which the teacher does more than lecture to keep students interested and help them learn. Generally, this refers to integrating activities into classroom instruction rather than just giving homework or other activities to be completed outside of the classroom. Active engagement (which is also referred to as active learning) is often juxtaposed with more traditional methods of classroom instruction, such as lecture, where students receive but do not participate in the dissemination of content (Prince, 2004). Teachers must insert activities that support their lessons into their instruction to keep students engaged. Active engagement helps students to learn new information by invoking self-questioning, deeper thinking, and problem solving which may lead to elevated student performance (Lorain, 2008).

Activities should not be added to instruction without first thinking about what type of activities will best reinforce the content, promote deeper understanding and help learners to retain the material (Prince, 2004). Additionally, activities should be placed in a context germane to students and should appeal to their interests (Depue & Little, 2006). This is most important in today's schools. In Marc Prensky's article "Engage me or Enrage me," he explains that students typically fall into one of three groups. The first two groups, which are made up of kids who are truly self motivated and those who have learned how to play the game of school, are typically served relatively well by our current school system. But, the third group tends to cause schools more challenges. This group is the group of kids who "are used to having anyone who asks for their attention – their musicians, their movie makers, their TV stars, their game designers – work really hard to earn it. When what is being offered isn't engaging, these students truly resent their time being wasted" (Prensky, 2005, p. 60). These kids are the ones in the back of the classroom listening to their ipods, texting on their cell phones, and essentially tuning their teachers out.

While the third group has always existed in some form or another, it is different now than it was in the past. Prensky explains, "The big difference is ... kids back then didn't expect to be engaged by everything they did. There were no video games, no CD's no MP3's. ... Many if not most of them never knew what real engagement feels like" (p.60). This is not true of our students today. Most participate in activities that they find truly engaging, so they may be less tolerant of classes in school that they find boring and dull. When students are interviewed, they say that many of their classes are not engaging. Quotes from students across the country include:

- *I'm bored 99 percent of the time. (California)*
- *School is really, really boring. (Virginia)*
- *We are so bored. (Texas)*
- *Engage us more. (Texas)*
- *[My teachers] bore me so much I don't pay attention. (Detroit)*
- *Pointless. I'm engaged in two out of my seven classes. (Florida)* (Prensky, 2008)

Active engagement is well supported by the educational community and research supports its effectiveness as a learning strategy (Prince, 2004). Further evidence of the effectiveness of actively engaging students with technology is supported by traditional learning theories such as differentiated instruction, VAK and the theory of multiple intelligences.

Differentiated instruction contends that students are individuals with different strengths and weaknesses and therefore have different needs and methods of learning. To address these differences, teachers should modify instruction to meet the needs of students rather than force

the students to try to adapt to the teacher's instructional style (Hall, 2002). This blends well with VAK, which stands for visual, auditory and kinesthetic and refers to an individual's preferred method of learning (VAK Learning Styles, 2008). Essentially, people learn more easily by seeing, hearing or doing. Because teachers typically expect a mixture of all three learning styles among the students in their classroom, they must prepare multimodal instruction that appeals to each of the three preferred methods and ensures that most students' preferred learning styles are addressed.

Howard Gardner's theory of multiple intelligences also contends that because people are different they learn differently. Gardner specifically addresses intelligence, defining it as a cumulative examination of an individual's strengths in eight categories:

- **Linguistic:** word smart
- **Logical-mathematical:** number/reasoning smart
- **Spatial:** picture smart
- **Bodily-kinesthetic:** body smart
- **Musical:** music smart
- **Interpersonal:** people smart
- **Intrapersonal:** self smart
- **Naturalist:** nature smart

Learning happens more easily if it is aligned more closely to a learner's stronger intelligences. Most people are strong in only two or three intelligences (Christensen, Horn, and Johnson, 2008). As with differentiated instruction and VAK, instruction should be flexible and varied so that it can appeal to the unique intelligence of each learner.

Collectively, differentiated instruction, VAK and the theory of multiple intelligences require flexible teachers who can deliver multimodal content that is aligned to different learner intelligences. This should include activities interspersed throughout a lesson that require students to think, participate, collaborate, cooperate and solve contextually relevant problems (Prince, 2004). Technology enhances a teacher's ability to actively engage learners, increasing the possibility that their students remain interested and, ultimately, that their students learn.

Two well known videos on this subject are "Do you Know?" and "A Vision of Students Today." Both videos are available online and are designed to stimulate conversations about why it is important to engage students and how technology can be used as a tool to help. "Do you know?" includes facts about the world today and how it is different for today's students than it was for students in the past. One quote from the video that embodies this is, "We are currently

preparing students for jobs and technologies that don't yet exist...in order to solve problems we don't even know are problems yet" (Fisch, 2006). Because we need to prepare students for a world we don't know very much about, we have to actively engage them so they learn how to learn, not just how to play the game of school, thus enabling them to continue learning long after they have left the classroom.

One way to do this is to encourage students to use the tools they are familiar with to learn the content in the classroom. Students often complain that teachers do not allow them to use Wikipedia in research papers, that they have math assignments that are "no calculator," or that their history tests only judge recall of names, dates, and places. While knowing how to use the library, how to do simple arithmetic, and how to memorize information are good skills to learn, they are not the most important skills that students need to be successful in the modern world. Instead of teaching students how to use the Dewey decimal system to look up books, drilling them on their multiplication tables, and testing their spelling, teachers can use the time in class to teach students how to read and understand a variety of texts, how to write concisely, how to synthesize information and how to work collaboratively. These skills will serve them well in whatever careers they may pursue.

In, "A Vision of Students Today," college students share how they feel about their school experience. They tell about some of their frustrations about how frequently they use technology outside the classroom in comparison to how infrequently they use it in the classroom. It included the quote, "Today's child is bewildered when he enters the 19<sup>th</sup> century environment that still characterizes the educational establishment where information is scarce but ordered and structured by fragmented, classified patterns, subjects, and schedules" (McLuhan, 1967). This quote from 40 years ago still characterizes the educational system today. Schools are not changing to meet the needs of current students. Many of the problems with the education system today come from this failure to change. Students' "short attention spans are [only] for the old ways of learning. They certainly don't have short attention spans for their games, movies, music, or Internet surfing. More and more, they just don't tolerate the old ways" (Prensky, 2005, p. 64).

Instead of just lecturing or having kids do worksheets, some schools are starting to experiment with using technology to help the students interact with the content of the class. For example, in Great Britain, the government is trying to create a digital curriculum that is almost entirely game based to focus on the interests of their students (Prensky, 2005). Other schools are using online social networks to capitalize on the importance of interpersonal interaction. In Australia, a university has constructed a virtual classroom in the online virtual world "Second

Life.” This classroom allows students to break off from the main group and work together for a while, discussing what they are learning. The students can also come together for whole group discussions and activities (Brown & Adler, 2008). Additionally, some schools are experimenting with alternate content delivery methods. Marietta Middle School in Ohio has begun using PowerPoint presentations and smart boards in the classroom. The lessons are then uploaded to the students’ iPods through podcasts (Depue & Little, 2006). Other teachers are experimenting with replacing all in-class lectures with podcasts that students can watch at home. The teachers may then use class time for traditional “homework” activities. Furthermore, many classes are beginning to use Web 2.0 applications such as Google Docs and other wikis to allow students to collaborate more easily on projects and papers. By using technology that students are familiar with, many of these schools have been able to actively engage learners and are seeing improvement in student attitudes and achievement.

## **Web 2.0**

The Web 2.0 medium is a new and emerging trend in education, which provides educators with tools that have the potential to engage students in the learning process. Web 2.0 is a term that has developed over the past few years to describe the second generation of the World Wide Web. With the birth of Web 2.0, new tools have developed such as blogs, wikis, social networking sites, and podcasting, just to name a few. Web 2.0 tools facilitate creativity, collaboration, and sharing by allowing the users of the service to interact and participate with the content.

The Web 2.0 medium is slowly reinventing education, because it is engaging for students and it fosters learning for multiple intelligences. Web 2.0 is creating an “environment where knowledge is gained through bottom-up, individual methods, rather than top-down, traditional forms” (Riedel, 2008). This is a completely different model than what education is used to. Bottom-up learning or student-centered learning fosters creativity and critical thinking in students. Chris Dede from Harvard’s Graduate School of Education states, “thinking is now distributed across minds, tools, and media, groups of people, and space and time” (Riedel, 2008). Education is evolving and seeing “a shift in the type of knowledge and skills society values; the development of new methods of teaching and learning, and changes in the characteristics of learners” (Riedel, 2008). This evolution is being pushed by the job market of the 21<sup>st</sup> century. Students of today’s classrooms will be entering a world where jobs are constantly changing. “We can no longer expect to send someone back to school to be retrained”

(Brown, 2008, p. 30). Students need to graduate from school with critical thinking skills and the ability to think creatively which will allow them to adapt to a changing job market.

Web 2.0 tools are beginning to find their way into classrooms across America as teachers discover that blogs, podcasts, and other Web 2.0 tools can foster learning and student engagement at the same time. Students need to feel that what they are learning and producing in the classroom is relevant and purposeful. It is not enough for teachers to use technology in their lessons, because today's students "are not as interested in the technology itself as they are with the experience it provides" (Podolski, 2008). Due to the use and availability of social networking sites, cell phones, and iPods, students are constantly engaged by activities outside of classrooms. It makes sense then, that students expect to be engaged in the same way at school. "Today's kids are challenging us, their educators, to engage them at their level, even with the old stuff, the stuff we all claim is so important, that is, the 'curriculum'" (Prensky, 2005 p. 64). Not only do students want to be engaged in the classroom they want to feel like what they are learning and producing is relevant to their 21<sup>st</sup> century lives (Riedel, 2008). Students benefit from using Web 2.0 tools because their work can be shared with the public. Students take more ownership in their learning and their work becomes more authentic when it is no longer produced only for the eyes of the teacher. Below are examples of how Web 2.0 tools are being used in the classroom by teachers to facilitate student engagement and learning.

## Podcasting

The creation of podcasts by students helps teachers to engage students in a real and meaningful way. When asked about her most recent experience creating podcasts Tiffany Chen



from Duke University said, "I really enjoyed putting time and effort into creating a work that could be given to the public. It puts it on a different level of importance and allows for more creativity since it is in word and sound" (Widham, 2007, p.56). Podcasts however, are not just for the university level. Students of all ages can create and make podcasts.

Students in 8<sup>th</sup> grade at Sierra Middle School in Parker, Colorado are creating podcasts for their social studies class. For this research project students are given a scenario that they are to travel back in time and visit three of the original thirteen colonies. When students arrive back to present day they create a podcast of their journey. Students find this project fun and engaging, but at the same time it requires them to synthesize their research information as they write a script for the podcast. 1<sup>st</sup> graders at Saddle Ranch Elementary School in Highlands Ranch, Colorado are even creating podcasts. On the school's technology

[web page](#) one can view animal riddle podcasts and United States symbols podcasts all recorded by 1<sup>st</sup> graders. These students do have help with the technology, but the authenticity of the projects is the same for these 1<sup>st</sup> graders as it is for the 8<sup>th</sup> graders at Sierra Middle School. If an instructor is looking for a way to engage students, podcasting is an excellent choice.

## **Blogs**

The use of blogs or blogging is another common Web 2.0 tool that is being used by teachers to engage students in their learning with technology. Although blogs are often seen as a way to work on and improve writing, they can be used in a number of different ways with all levels of students. 6<sup>th</sup> graders at Prairie Middle School in Aurora, Colorado are using a blog in their math class for conversations about math, checking their homework, and posting questions. The blog also provides links to other websites which they can go to in order to review and practice their math skills. Other students have used blogs as a way to have class discussions about books, field trips, how they solved a math problem, display their artwork, share observations from a science experiment, and communicate with their peers while at the same time allowing the conversations to extend beyond the time limit of the classroom (Selingo, 2004). The fact that students are carrying on discussions and work on blogs outside of the classroom seems proof enough that blogs are engaging the students.

Blogs are an interactive, online way for students to express themselves that also levels the playing field. Some students who might not talk in front of the class may become more involved online through the blog (Selingo, 2007). Again, blogs are a method for engaging students in a real way that is applicable and exciting to them as 21<sup>st</sup> century learners. Not only do blogs connect with the 21<sup>st</sup> century learner, but because of their various uses and flexibility, blogs can connect to multiple intelligences of diverse students. It may be that they are asked to write and respond to a question or book using their linguistic strength. Using the interpersonal strength they may respond and interact with other people. The blog may post a picture, math problem, or even music using the spatial, logical, and musical strengths of that student. Blogs can be multidisciplinary, individualistic, and collaborative (Huffaker, 2004). From this evidence, one can see that blogs offer numerous ways to engage a student.

## **Google Docs and Google Earth**

Google Docs is another Web 2.0 tool that is becoming more widely used. The possibilities it offers are extensive. Google Docs is much more than just a word processing

program. It not only allows users to create word documents, presentations, spreadsheets, and



Welcome to Google Docs

questionnaires/quizzes, but it also enables multiple users to contribute to these documents as well as it gives users the ability to share these documents

with multiple people. This allows for individuals to save, create, edit and store things completely online. Additionally, students can collaborate, share, and work together on the same paper, presentation, or project as long as they have Internet access. Students may be in the same class or in different countries. They can share comments, revisions, and even check the revision history to see who has done what and when. Surveys and quizzes can be created to gather information and that data can then be immediately put into a spreadsheet. Multiple people can work on a document, presentation, spreadsheet, or survey, while having a conversation through a chat during a presentation.

Google has more to offer than just Google Docs to engage students in the classroom. Google Earth is another great resource that allows students to visit places they may never otherwise have an opportunity to see. Students might follow or “go” to places in a book in language arts, see the places and paths of people from history or even study astronomy and land forms in science.

Google Docs and Google Earth allow teachers to engage students of multiple intelligences through a variety of teaching strategies bringing them in to the 21<sup>st</sup> century at the same time. It might be something as simple as writing a paper, working with a group, and seeing a visual of different places that is done through Web 2.0 in a way that will engage the learner. Podcasting, blogs, Google Docs, and Google Earth are just a few of the emerging Web 2.0 tools that are being used to engage learners of today.

## Clickers

Personal response systems, (better known as clickers) are relatively new technologies that engage students in ways that were never before possible. They are designed to aid teachers in filtering real time responses from their classes. In its most simple form, the student is presented with a multiple choice problem. The student responds by pressing the button corresponding to their desired answer. This is significant in the realm of multiple intelligences as it requires a tactile response from the students. Depending on the complexity of the system, more options can be available to the teacher.



The research supporting the effectiveness of personal response systems is robust. There have been a number of studies that have measured the effectiveness of some of these systems over other brands (Hanley & Jackson, 2006). Some studies have confirmed that the use of personal response systems increases both student engagement and enjoyment of the material (Martyn, 2007). Larger groups have used clickers effectively (Herreid, 2006). They have been used successfully even in large scale university lecture hall formats (Trees & Jackson, 2007); (Morling, McAuliffe, Cohen, & DiLorenzo, 2008). It is clear that although there is some research that supports clickers, there is still much to be understood in terms of their broader effectiveness in other venues.

Some of the best practices for clicker systems are elaborated on by their creators. The system allows for students to respond in an anonymous environment without the threat of embarrassment in front of one's peers. However, with some of the more advanced systems that allow for touch screen response, teachers might find it productive to highlight the exemplary work of a few students by displaying it on a common screen or sending it to each of the student's displays. When students would like to articulate themselves with the use of visual aids, they have the option of sketching (a geometry problem, for example) and then having that projected on the screen.

Another original idea that the creators of clicker systems have devised is the means for tracking the class's responses in real time, taking those data, and computing the statistics that might be helpful for the teacher. In an evaluation setting, the teacher would have quiz and test results instantly and so would the students. Not only that, but the students would be able to instantly compare their scores to larger groups.

Clickers continue to grow in both capabilities and power. It is possible that the clicker may someday be phased out in favor of software that performs these functions and is installed on laptops for each student in the classroom, or on Interwrite Pads.

## **Document Cameras**

The document camera is another tool that teachers may be already familiar with. With this tool teachers have a shortcut in how they can present information. Rather than scanning or transcribing information to be presented, a physical document can simply be shown to the class by projecting an image of it from the document camera. This is again important in the realm of multiple intelligences because it provides a very convenient way for teachers to insert a visual modality into the curriculum.

The research into document cameras tends to be melded into the research surrounding presentation technology in a more general sense. It has been proposed that new presentation technology does not necessarily enhance the student's sense of self efficacy (Susskind, 2008). As it was with the clickers, the doc cam has been shown to improve some aspects of how the students perceive the material as compared to more traditional styles of teaching. (Stephenson, Brown, & Griffin, 2008); (Kerfoot, Masser, & Hafler, 2005). Some have even shown that higher test scores can be yielded from a diversified presentation involving new technologies such as doc cams (Calderwood, 2008).



There are a number of best practices that teachers may not know about yet that could dramatically improve access for their students through the use of the doc cams. The typical use for the doc cam can include showing material that the teacher has written or drawn and quickly switching that out with other pictures from other sources such as student work. One use for the doc cam is that it could easily become a stage for a puppet show complete with a simple backdrop. Students could be asked to design their own show or reenact a scene from history or literature and have technology add a degree of novelty. In an art class, someone could demonstrate a method for painting or drawing. As the technology becomes more widespread, emergent uses such as these are created.

## **Interactive Whiteboards**

Interactive whiteboards are a marriage between regular whiteboards and computers. This technology takes all of the pedagogical advantages afforded by computers to a higher level by increasing a learner's ability to interact with and become engaged in information. The concept is quite simple. It combines touch-screen technology to access all existing computer applications with the simplicity and sensibility of a whiteboard. Some of the obvious advantages of using interactive whiteboards in the classroom include large screens for classroom presentations, increased interactivity, writing in digital ink on computer screens, saving annotated screens for later viewing, and a plethora of online resources for creating or augmenting curriculum and lesson plans.

When considering the goal of increasing student engagement in the classroom, interactive whiteboards are a valuable tool. A teacher can ask students to navigate the web while other students observe. This can instantly transform a teacher-centered lesson into one that is more student-centered. Instead of a teacher simply lecturing on how to use search engines or the best techniques for navigating the web, students become engaged, sharing their

own knowledge. Students can also write in digital ink on any screen in order to point out important information or show their thinking through annotations. This offers endless opportunities to layer lessons with higher level thinking. The accessibility of graphs, charts, maps, pictures, and other graphics also makes inter-curricular applications more readily available. For example, a social studies teacher can show how math is used in social sciences and then have students demonstrate their understanding.

With a more sophisticated approach, interactive whiteboard technology can be custom designed to fit a particular lesson or learning objective. A potential boring act of memorization can be turned into a game that serves as an interactive formative assessment. Thus, students can more easily demonstrate their understanding of material in a way that empowers them.

If a teacher wanted to leverage this technology for even higher level student engagement, interactive student presentations are an outstanding option. With this approach, the technology can serve as a summative assessment for student learning while engaging them in the act of teaching. Again, this technology lends itself quite well to putting students at the center of the lesson, having them do the thinking, the talking, the writing, and even the teaching.

SMART is one of the leading brands in interactive whiteboards. SMART emphasizes the ability of this technology to engage the learner. Online tutorials for this technology are easy to find and access.



Furthermore, this technology is increasingly becoming more affordable and disruptive technologies are enabling people to recreate interactive whiteboards for a fraction of the cost of name brand materials.

## **Interwrite Pads**

Another technology that has great potential for increasing student engagement is the Interwrite Pad. This portable interactive screen connects to a computer via Bluetooth technology. The pad can display computer screens and can be written on with a digital pen. The pad itself can be used at significant distances from its projecting computer. This technology provides many of the same advantages as the interactive whiteboard, but it also has the benefits of being hand held and portable. Furthermore, multiple pads can be used in one classroom in order to increase student accessibility.

This tool provides an excellent means for small groups to share information with a class. Considering that numerous pads can be used in one classroom with the teacher or students

choosing which pad is being projected, this technology also makes it easy to check for student understanding.

Finally, and similarly to the interactive whiteboard, the Interwrite Pad can be installed with graphics, pictures, maps, graphs, and charts. Therefore, students do not need to leave their desks or their groups in order to share information with a class. Students can potentially use all of the technological advantages for presenting information, Word documents, PowerPoint presentations, Excel spreadsheets, etc. coupled with the ability to highlight and annotate information.

## **Conclusion**

It is clear that there is an exciting proliferation in the ways that students are being engaged in the classroom. While new technology is implemented, it is important that teachers remain both current with emerging systems, as well as faithful to effective older technologies and established learning strategies. When the goal is always set as engaging the students in new and creative ways, a teacher will find that students gain a new appreciation for the material that would not have developed from antiquated methods of teaching.

## **Participant Roles**

The topic, direction, and theme of the paper were decided collectively by the group. The writing was split into three sections with two-person teams handling each section. Carolyn Crapo and Greg Lea wrote the introduction. Karen Abrams and Adam Thornton addressed Web 2.0 applications. Zach Alstad and Ben Lindemann focused on hardware and the conclusion. The construction of the final paper and presentation was also split among these teams with each team contributing the content for the presentation relevant to the previously mentioned topics. Additionally, Carolyn and Greg were responsible for building the website, Karen and Adam were responsible for creating the slide show, and Zach and Ben were responsible for the final edit of the paper. There were plenty of other contributions as well and team members worked together to develop needed images, audio presentations, video presentations and to contribute hardware needed for the classroom presentation.

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