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USING 21ST CENTURY TECHNOLOGY IN THE HIGH SCHOOL CLASSROOM

EDITORIAL

The Modern Way to Teach: Utilizing Technologies in the High School Classroom

It's Thanksgiving week and I am sitting in a condominium overlooking the Atlantic Ocean in Myrtle Beach, South Carolina. I am listening to the waves lap the shore at high tide and just witnessed a beautiful sunrise. It's a beautiful setting but I must get to work.

Let's reflect how this wonderful morning came about. It started with a twelve hour ride from Morgantown, West Virginia in a modern piece of technology called an automobile. The automobile was equipped with an onboard computer to control the engine and transmission and satellite radio. Speed control devices were used to maintain safe and legal speeds. A navigation system was used to find the fastest route between the two points. Cellular telephones were used to communicate between the two vehicles that were traveling together.

Instead of working in my office at West Virginia University, I brought my work with me on a laptop computer. The laptop contained all of my work files (electronic) and numerous computer software packages that make work faster and more efficient. I communicate with others through with a wireless Internet connection. When I finish with this issue of *The Agricultural Education Magazine*, I will submit it directly to the printer via the Internet in an electronic format.

Imagine a modern day Rip Van Winkle waking up in 2010 after a twenty year sleep. Think about the modern technologies that he would have to learn that have been developed in that short time. Take it back another ninety-three years and the authors of the Smith-Hughes Act could not have imagined the technologies the modern agricultural education teacher must teach his/her students.

Dr. Jason Peake is the Theme Editor for this issue of *The Agricultural Education Magazine* on "Using 21st Century Technology in the High School Classroom." He has assembled an outstanding series of articles on ways that technology is being used in the high school agricultural education classroom.

Authors in this issue offer agricultural education teachers a number of suggestions for incorporating technology into their classrooms. This includes wireless slates, a less expensive alternative to whiteboards. Numerous resources available free of charge through the Internet were also discussed.

While the incorporation of technology into the classroom is important, one author cautioned the profession to "run the technology and not to allow the technology to you." With new innovations, new techniques must be utilized to evaluate their use aprogram success. Justin and Tiphanie Peake offered suggestions in assessing student learning following the integration of technology.

I hope that you enjoy the articles on implementing technolgies into the 21st century agriculture classroom.

Footnote

It's hard to believe that a year has passed since I assumed the role of Editor of *The Agricultural Education Magazine*. It has been a tremendous learning experience and I have had some great people who have helped make this year a success. First I would like to thank the 2010 Theme Editors: Antoine Alston, Brad Greiman, John Ewing, Shannon Arnold, and Jason Peake. I could not have delivered six issues without their efforts. I would also like to thank everyone who contributed an article to the 2010 issues. This publication would not be possible without the efforts of individuals willing to share their knowledge and experiences.

There is another group that I owe an extreme debt of gratitude. One of the 2010 Theme Editors failed to deliver on an issue and I was desperate. Dr. Alston was ahead of schedule so I moved the second issue to January/February. Then I called on some friends for some help. They not only helped but they asked others to help. This group of individuals prepared articles on an extremely short notice and helped get the *Magazine* back on schedule. They were: Eric Richer, Ricardo Shirota, Nicole Marinos, Thomas Bruening, Glen Shinn, Mark Balschweid, B. Allen Talbert, Daniel Gottschalk, Kyle Amore, Meredith Gilbert, Callie Wells, Jed Bookman, Katrina Swinehart, Courtney Moenter, Susie Whittington, Hari Vommi, and Billye Foster. Thank you for your assistance.

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Front Cover: *Computer laboratory created for the Bullitt Central Agriculture Department. Photo courtesy of Justin and Tiphanie Peake.*

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Articles and photographs should be submitted to the editor or theme editors. Items to be considered for publication should be submitted at least 90 days prior to the date of the issue intended for the article or photograph. All submissions will be acknowledged by the Editor. No items are returned unless accompanied by a written request. Articles should be typed double-spaced, and include information about the author(s). One hard copy and one electronic copy of the article should be submitted. A recent, hardcopy photograph should accompany the article unless one is on file with the editor. Articles in the magazine may be reproduced without permission but should be acknowledged.

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"If We Teach Today As We Taught Yesterday, We Rob Our Children of Tomorrow"

by Jason Peake

If we teach today as we taught yesterday, we rob our children of tomorrow." This seems an appropriate opening line for an issue of *The Agricultural Education Magazine* that focuses on using 21st century technology in the high school classroom… it seems even more appropriate considering that quote is from the father of Agricultural Education - John Dewey.

To put Dr. Dewey's life in perspective let's start with his birth year (1859) and what the world looked like when he attended high school. When Dr. Dewey started high school in 1873, Jesse James was robbing trains in Missouri (1875), Alexander Graham Bell had not patented the telephone (1876), and the first public exhibition of an electric light had not occurred (1876). It is hard to imagine Dr. Dewey's high school days without the use of electricity and no practical use of telephones. Dr. Dewey was a long lived man; he lived to the age of 92 and passed away in June of 1952. In his life he saw the birth of television (1926), the first atomic explosion (1952), and he lived in the same decade that the Soviet Union successfully launched Sputnik (1957).

The amount of technological change that Dr. Dewey experienced in his lifetime provides a context for his statement "If we teach today as we taught yesterday, we rob our children of tomorrow." In 92 years he saw acceleration not only in the number of technological changes, but also the rate of adaptation by the general public. This trend has continued since his death and evidence indicates a continuation of this trend in the future.

So what? What does acceleration in technology development mean for agriculture teachers? Teachers have moved past asking if new technologies should be adopted and are busy learning new technologies. There are two major questions to consider: 1) what technologies do agriculture teachers need to learn? 2) What is the fastest way to learn new technologies?

1) What technology do agriculture teachers need to learn?

The role technology plays in the world of agricultural education is broad and deep, and the term technology is often a broadly and poorly defined term ranging from plasma cutters to presentation software. Agricultural education promotes community based programs where programs differ from county to county and region to region. Because of the diversity in technology that is available and the diversity in agriculture programs, it is up to the agriculture teacher to decide what technology to adopt. No one knows the programmatic or community needs better than the teacher does; only the teacher can determine what technologies are worth the time and energy to learn for a specific situation.

It is better to focus on the second question, "What is the fastest way for teachers to master new technology?" Below are a few techniques that will help the most in learning new technologies.

2) What is the fastest way for teachers to master new technologies?

How can agriculture teachers stay current on technologies when they are already limited on time? All have opened a new piece of technology, looked at a 200 page operator's manual, and wondered if anyone has actually read it. As the rate of technological change continues to increase at an exponential rate, we struggle to keep pace mastering new technologies. The only way this can happen is to utilize technological advancements to increase our rate of learning new technologies.

> We must utilize technological advancements to increase our rate of learning new technologies.

What are the most efficient ways for teachers to learn new technologies and stay up-to-date? How can they find new information faster? The following are a few tricks that have had the greatest influence on increasing speed in finding and learning new information.

Most of us have used search engines, but how many times have we searched for information and received thousands of results, none of

which were useful. Search engines take queries that we provide in the form of search terms and filter information from databases for viewing. It is difficult to overstate the role that databases play in searching for information; databases are the power behind increasingly sophisticated web-based technologies.

How many use Boolean Logic in search criteria? Boolean Logic was created by George Boole and is a system of logical operations that search engines use to return more accurate results to the user. The process is a simple one: using 'and', 'either', 'or', and 'not' to include or exclude phrases, this logical approach to searching is increasingly important as the number of websites continues to increase. Most of the information is out there, and adopting Boolean Logic saves a substantial amount of time locating that information.

Another time saver is exact phrase searches, most search engines, Google included, add the word "and" between all search terms. So, a search for 'Breeds of Cattle' is interpreted by a search engine as 'Breeds and Cattle' (in this case 'of' would be excluded from the search). Searching for "Breeds of Cattle" in quotation marks returns websites with that phrase in it instead of all websites with the word 'Breeds' and the word 'Cattle'… this small change to exact phrase searching can make a big difference in results.

Many have used the tips mentioned above, so let's go a little more in depth, looking at the search phrase one would use if looking for a PowerPoint presentation on breeds of beef cattle. Some would try 'breeds of beef cattle powerpoint', a more advanced user might try ' .ppt "breeds of beef cattle".' Try using a search operator, using a favorite search engine type in 'filetype:ppt' as part of your search criteria… so a search might look something like this 'filetype:ppt "breeds of beef cattle"'. As you will see you get much better results, results that only include .ppt file extensions, a real time saver for teachers looking for presentations. Search operators like 'filetype' greatly increase your efficiency in filtering the information you want from massive databases.

If you would like to learn more about search operators, search engines, and how to interact efficiently with databases mentioned above go to http://www.googleguide.com/ for more detail… and there are many more details to learn.

Over the past several years the go-to place for teachers seeking information on the Internet has been search engines, next wikis, and to some degree video sites are growing in popularity. Video sites offer the greatest opportunity for teachers to increase their rate of technology adoption over the next five years.

There are many video sites out there, with YouTube being the most popular. YouTube is simply a collection of videos that you can search using the tools mentioned above. I now rely heavily on YouTube tutorials for everything from how to use Microsoft Office to how to set the ignition timing on a truck. These quick tutorials provide that "just in time" support that is needed to get you around a tough spot. Just for fun I searched YouTube for '"Google Search Tricks and Tips Tutorial"' (I almost always add 'tutorial' to the end of my YouTube searches') give it a try; it is a good follow up video for this article. It is amazing how many useful features of video sites and search engines most uses have been missing.

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Upcoming Themes for *The Agricultural Education Magazine*

March-April: Innovative Middle School Agricultural Education Programs

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May-June: Instructional Practices for 21st Agricultural Education Teachers

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THEME ARTICLE

From Blackboards to Bluetooth®: Wireless Slate Technology in Agriculture Classrooms

by Jeffrey Whisenhunt, Joey Blackburn, and Jon Ramsey

Sam was enthusiastic about the "Student Teaching Block." He had dreamed of completing his student teaching and beginning his career as a high school agriculture teacher since beginning college in 2005. Like most of his peers, Sam had practiced the ability to communicate, surf the web, and locate his favorite pizza restaurant using his smart phone GPS all while attempting to walk across campus. He did not consider his technology skills as unique or special; they were simply how he interacted in society. On the "Block," Sam was introduced to a wireless slate (WS), an educational tool designed to make classrooms technologically enabled. The instructors introducing the WS were hopeful that Sam and his peers would readily adopt the technology into their practice. Sam and his peers found the WS appealing and employed the technology to teach a variety of topics ranging from safety to animal husbandry. Sam is a good example of someone who has grown up in the digital age and is sometimes referred to as a "digital native." As a member of the digital age, he has become captivated by and surrounded himself with technology (Prensky, 2001).

Digital natives are those individuals born between "roughly 1980 and 1994" (Bennett, Maton, & Kervin, 2008). Youth growing up in such a digital environment have become fond of using technology. Those born in the beginning of the digital age are beginning to enter the workforce. Inevitably, some have chosen to enter education. These new educators have been exposed to various aspects of technology for most, if not all of their lives (Prensky, 2001). Hopefully, these new educators bring new ideas and uses for technology to the classroom. Ideally, educators who are comfortable with technology are more likely to incorporate it effectively into classrooms.

The integration of instructional technology is not a new phenomenon; new mediums are constantly entering the field of education (Reiser, 2001). In the early 1900s an emphasis on visual technologies began with the incorporation of lantern slide projectors (Reiser, 2001). From there, instructional technology advanced to microcomputers and projectors. Today, those two items combined with improved white boards known as interactive white boards (IWBs) can be found in many classrooms. Interactive white boards allow educators to incorporate more technology into the classroom teaching, which allows teachers to actively engage students in their lessons (Haldane, 2007). Incorporating a variety of instructional technology into lessons allows teachers to address an array of student learning styles present in classrooms.

New technologies are constantly being created; one such innovation is the wireless slate (WS). A WS may be used in conjunction with an IWB or singularly to project an image. This new technology allows for mobility in the classroom. Educators and students are able to move around the classroom and still manipulate content on the IWB or projection system. Wireless slates work in the same manner as a wireless mouse or keyboard. A Bluetooth® USB drive is connected to the computer. After downloading necessary IWB and Bluetooth® software the WS is functional. The WS has all of the functionality of an IWB. However, images do not appear on the WS; the user must look at the projection while working with the WS.

> Educators who are comfortable with technology are more likely to incorporate it into classrooms.

According to Nelson and Thompson (2005), teachers often teach as they were taught, so it is only natural for pre-service teachers to learn to incorporate an IWB and a WS into their lessons. The Department of Agricultural Education, Communications and Leadership at Oklahoma State University (OSU) is actively working to include new technologies such as a WS into pre-service teachers' practice. During the spring of 2010, a WS was introduced into one of the microteaching laboratories. This action insured that each lab was equipped with comparable projection technologies. The classroom selected for the WS was traditionally equipped (i.e., chalkboards, pull

down projection screen, and overhead projector). A technology cart with a computer, projector and WS was prepared and transported daily to retrofit the classroom with the appropriate technology. Ramsey, Whisenhunt, Bunch, Edwards, and Robinson (2010) reported, "Introducing the WS into a traditional setting provided student teachers in that lab section the opportunity to practice teaching their lessons while employing all of the features their peers were using in the rooms equipped with IWBs."

Item	Cost Range	Average Cost
Interactive Whiteboard	$1,200 - $3,000	$2,100
LCD Projector	$750 - $3,000	$1,875
PC or MAC Computer	$750 - $4,000	$2,375
Projector Light Bulb	$50 - $150	$100
Software (i.e., SMARTTM SE Notebook Bracelets)	$49 - $55	$52
Wireless Slates	$99 - $789	$444
TOTAL	$2,898- $10,994	$6,946

Figure 1: Average Cost of Digital Technologies

Perhaps the greatest advantage of wireless slates is how versatile the technology is and the range of applications that teachers could attain from their use. Schools with large budgets for technology as well as those districts that are less fortunate can incorporate technology into their classrooms. In an ideal world, every student would have a WS in front of them with an IWB in the classroom. Consider the implication, every student actively engaged in a lesson via technology. In an introductory agriculture class, a simple lesson over breeds of beef cattle could be transformed from lecture-discussion supported by a PowerPoint® to a lesson in which students are manipulating images, writing questions, and comparing breeds side by side. The potential for student engagement is only limited by the teachers' and students' imaginations.

Wireless slates have a relatively low cost compared to an IWB. So, for schools on a tight budget, a WS could take place of an IWB. The WS used during the student teaching block at OSU was purchased for $340.00. This is approximately an 80% cost savings compared to the average cost of an IWB as reported by Bunch, Whisenhunt, Edwards, Robinson, and Ramsey (2010). This allows a school district to incorporate technology without incurring a high cost in times of economic challenges. This can also allow schools to incrementally incorporate technology into classrooms. Many schools begin with a WS and eventually integrate an IWB allowing teachers to easily switch between whole-class discussions, small group learning, and individualized instruction (Smart Technologies, 2007).

The integration of instructional technology, such as a WS, into agriculture classrooms can allow the teacher to increase interactivity and student engagement and possibly increase the effectiveness of the lesson (Haldane, 2007). Rosenshine and Furst (1971) described five characteristics that effective teachers demonstrate: clarity, variability, enthusiasm, being task-oriented, and ensuring students have an opportunity to learn. Incorporating a WS into classrooms can help teachers exhibit these behaviors more effectively. Clarity is enhanced when the content is clear and easy to understand, organized, and assignments are explained clearly. For example, using the "record" feature and a WS, an agriculture teacher could teach the Pearson Square method for mixing a ration by drawing and recording the steps for completing the ingredient percentages, then, play the recording while teaching. The video could easily be stopped, rewound, and concepts explained in more detail. In the classroom equipped with a WS, the teacher can assign students a Pearson Square problem, have the students draw and solve the problem, and then present their findings to the class.

Variability in instruction is another advantage of using this technology. Variability is crucial in preventing lessons from becoming boring and keeping student interest and engagement at a high level. Wireless slates are another tool of variability for the toolbox of an effective teacher.

Wireless slates also help teachers display the third characteristic of effective teachers, enthusiasm. Enthusiasm can include movement, gestures, facial expressions, voice modulation, and questioning techniques. Wireless slates give teachers the freedom to move around the classroom, not only advancing slides, but manipulating the presentation without being tied to the computer or interactive whiteboard.

When a WS is used with active learning in mind, students are task-oriented and learning, not just passive participants in a teacher's lecture. Wireless slates can provide students an opportunity to use technology in a constructive, creative way; which is something most of today's students

value. Wireless slates can also communicate the objectives of the lesson. It is important for students to understand what the goals of the lesson are as well as see where the learning will take them. Instead of simply telling or showing the objectives to the students, a teacher using a WS could highlight the objectives or important points of the lesson before the lesson begins. This allows the students to begin to think and make connections with their prior knowledge and that day's topic.

Wireless slates are a great example of 21st century educational technology. Like any tool, teachers must be mindful to not overuse a WS for fear of diminishing its effectiveness. Whether a school is budget minded or has plenty of funds for technology, a WS has the potential to enhance teaching and learning when used properly.

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CTRL + ALT + DELETE: Rethinking How We Use Technology in the AGED Classroom

by Marshall A Baker and J. C. Bunch

Introduction

One week before class began, I walked into the multi-million dollar, brand new, 21st century classroom where I would soon be teaching. A brand new interactive white board, audio devices to amplify my voice, wireless clickers, student tablets to project students' ideas on the whiteboard, multiple computers, high speed wireless Internet, a flat screen to watch school news, and even a telephone that ran through the computer were available to use. I had everything I needed and more! However, after a few months of teaching, I realized that I was not running the technology, but it was running me. It was time for a classic CTRL + ALT + DELETE in order to re-focus on the purpose of the technology, which was to help students learn.

TPACK

The 2010 National Educational Technology Plan states that,

> Just as technology is at the core of virtually every aspect of our daily lives and work, we must leverage it to provide engaging and powerful learning experiences, content, and resources and assessments that measure student achievement in more complete, authentic, and meaningful ways. (pp. 3-4)

However, research shows that teachers' use of technology does not extend far beyond basic applications in most cases. McCormick and Scrimshaw (2001) labeled these common uses of technology as mere efficiency aids and extension devices, differentiating them from transformative experiences using technology. This describes what was happening in my classroom. Bottom line, schools and teachers are not getting the maximal bang for their buck. So, how can this be resolved?

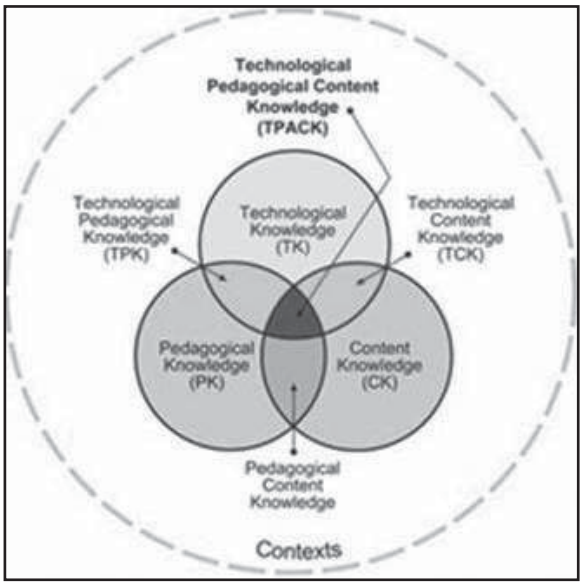

Figure 1. The TPACK Framework and Its Knowledge Components (Adapted from Koehler & Mishra, 2008)

In agricultural education, we love three circle models. But, it is important to understand another three-circle model: TPACK. TPACK, which stands for Technological Pedagogical Content Knowledge (Figure 1), is a framework to understand the teacher knowledge required for effective technology integration (Harris, 2009). One element of the framework is Content Knowledge (CK). This is the knowledge of the subject matter to be taught. Teachers must first have a deep understanding of the concepts, theories, ideas and current events relating to the topic. The better a teacher knows the content, the better he or she can tailor a lesson either with or without technology.

Next is Pedagogical Knowledge (PK). Technology does not make a great teacher, but a great teacher can make technology great. While planning a lesson, it is essential that teachers continue to think of the best ways to gain attention, draw on previous knowledge and beliefs, as well as check for understanding adequately. The final element is Technological Knowledge (TK). This can be very difficult as technological knowledge is always in a state of flux. It can be near impossible to keep up with the ever-changing technology used in classrooms.

The National Research Council (NRC, 1999) explained that it is important to become technologically "FIT (Fluency on Information Technology)". Basic principles and skills are essential to operate and use technology. After these skills are mastered, they can be applied to new technologies. Obviously, the acquisition of TK is a never ending learning process, and the more individuals are exposed to and use technology, the more "FIT" they become. Similar to the agricultural education model, when individuals can find themselves at the merging point of the three circles, students are affected positively. When a teacher combines a deep understanding of the content to be taught, with technological "fitness" and good pedagogical strategies, transformational uses of technology

will occur. In my classroom, I had too much focus on TK. I was finding ways to work the technology, instead of finding ways to have technology work for me.

Each teacher has his or her personal style and method. Fortunately, the framework of TPACK is flexible and can accommodate everyone from the occasional PowerPoint® user to the advanced white board junky. To purposefully reside in the "sweet spot" of the TPACK model, I suggest three simple strategies. First, begin with the end in mind. Second, share best practices, and third, know when to say no.

Keep the End in Mind

Anyone who has been through a teacher education program in agricultural education has heard the phrase, "Always begin with your intended outcomes or objectives." Even though this concept is a simple one, it is critical in creating transformational use of technology. Too many times, teachers find themselves lured into the technology before planning instruction.

Though a slight change in mindset, it is important to first think about the intended outcomes and how technology helps accomplish the goal. For example, I planned a lesson on landscaping. I had fancy, new software that allowed students to design a landscape digitally and estimate the cost of the project. I began planning by grabbing the software manual and figuring out what the technology could do. I was caught in the trap! The result was a lesson where students watched me click on various plants using the whiteboard while they sat bored and disengaged. With the TPACK model in mind, I should have first identified the outcomes of the lesson, and then looked at the new landscaping software to determine how it could support the lesson. A better use of the technology would have been to create clients requesting a landscaping design bid and teams of students creating and presenting landscape plans using the technology. The second approach better merges pedagogy and content with the technology, as TPACK would prescribe. Teachers can ensure that happens if they always start with their objectives and not the technology.

Communities of Practice

How many teachers have sat through professional development workshops on technology in the past several years? Technology providers invade the school and present long demonstrations on the "bells and whistles" of the newest educational technology tool. Often times, these workshops are very technical and focus on the technology itself. I know in my past experience as a secondary agricultural education instructor, I have left the workshop saying, "WOW! That was neat! Now, how do I use it in an effective manner to teach my students?" Often, professional development workshops lack the key component of pedagogy to enhance student learning in practical ways.

Professional development workshops should focus on best practices and pedagogical approaches. One option to enhance pedagogical approaches in professional development workshops is by using the concept of communities of practice (COPs). COPs are a group of teach-

Table 1
Example COP Developed Idea of Practical Uses of Technology

Unit	Learning Activities	Compatible Technologies
Water Quality Testing	Local water source testing: turbidity, dissolved oxygen, pH level, flow rate, carbon dioxide, temperature	Vernier® Sensors and Interface, Mac or PC, Excel to arrange data, Virtual water testing Internet sites
Career Development Events	Training CDE teams	Interactive whiteboards with an interactive response system (clickers), Skype™ for networking, Powerpoint®, online images and tutorials, flash-based simulations, podcasting of speeches.
Current Agricultural Issues	Multiple school debate, research of current media	Video conferencing, Skype™, news websites, email, chat groups
Chapter Leadership	Chapter officer development, program of activities, chapter meetings, award applications, record books, fundraising	Social network websites, email, chat, online software, video conferencing, chapter website, podcasting, digital camera
Agri-Science	Microscope use, study of biological concepts, specimen identification, dissection	Virtual dissections, interactive videos, document camera systems with microscope abilities, interactive whiteboards, slides of specimens

ers working together to address either specific or multiple issues regarding education. Rather than a "techy" filtering into schools to inform teachers about an educational technology, professional development coordinators should facilitate teacher discussions around how they implement technologies effectively. COPs allow teachers to work collaboratively and draw on each other's experiences. This peer and social learning environment develops strong relationships among teachers. As a result of these relationships, teachers may develop strong networks with other teachers from different schools to continue sharing their new practical approaches. An example of a COP developed idea of practical uses is presented in Table 1.

Know When to Say No

Finally, it is important to know when to say no to technology. Dewey (1938), explained that not all learning experiences lead to learning:

> How many students, for example, were rendered callous to ideas, and how many lost the impetus to learn because of the way in which learning was experienced by them? How many came to associate the learning process with ennui and boredom? How many found what they did learn so foreign to the situations of life outside the school as to give them no power of control over the latter? How many came to associate books with dull drudgery, so that they were 'conditioned' to all but flashy reading matter? (p. 27)

Technology can be an extremely useful tool in facilitating learning, tailoring education to individual students, and making learning relevant. However, it can also become a tool that, when overused, can have short- and long-term negative impacts on students' learning. As agricultural educators, it is critical to remember that relevant experiences – learning by doing – is what makes the program effective in growing students. Many students spend most of their school day poking whiteboards, typing on computers and being force fed PowerPoint® presentations. At times, dissecting the eye of a cow virtually just does not have the same effect as grabbing a scalpel and cutting an eye. The opportunity to help deliver a calf, grow plants, create a flower arrangement, give an injection, exhibit an animal, identify a tree disease and landscape a school campus are the quality experiences Dewey spoke of that build student motivation, self-efficacy and life-long learning. Technology can support these learning experiences, but cannot replace them.

Conclusion

Just as CTRL + ALT + DELETE provides an opportunity to view what applications are running, sort through the effectiveness of each and then close those that aren't working, TPACK provides a framework for educators to step back and evaluate the use of technology. A combination of strong content, pedagogy, and technological "fitness" positions classrooms for student success. If educators start with the learning objectives, build communities of practice, and remain true to the experiences that make agricultural education what it is, learning will occur and students will succeed.

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Google Guide to Program Management

by Michael Coley and John C. Ricketts

When you consider integrating technology into an agricultural education program there are two important questions to ask (1) will this innovation improve my program and (2) will it make my job easier? If the answer is yes to one of those two criteria, then it is worth investigating. If the answer is yes to both, then you have found a great resource. Most people are familiar with the Internet leader Google. Over the past several years, Google has grown from a simple internet search engine into a multi-faceted company that provides web-based personal, business, and entertainment management applications. Whether it is free email, calendars, documents, websites, or picture storage, Google has many different solutions that can improve your program and make your job easier when you put them to use in your classroom and agricultural program.

The first step to using Google products is to sign up for a free account at www.google.com/accounts/NewAccount. When you register you are able to create a unique account name which will apply to all of your Google products. Many times you can get a very basic, unique account such as "joesmithffa@gmail.com." You may want to keep the account name simple because a strength of a Google account is its simplicity. Once the account is setup, the user is immediately able to begin using the large selection of different Google products including but not limited to the five that will be discussed in this article. For a complete list of all the Google products, visit www.google.com/options.

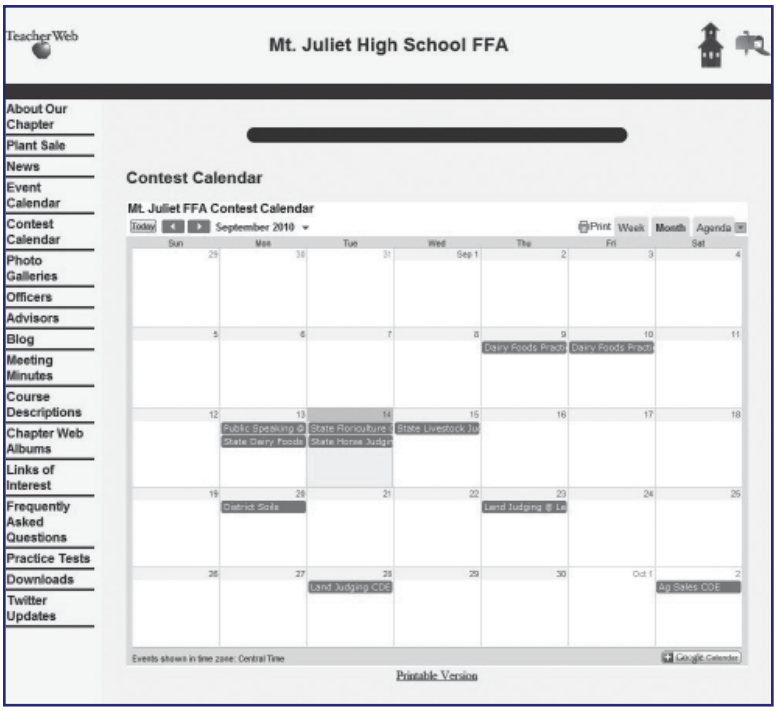
The first service most people take advantage of is Google's email client "Gmail." Gmail is similar to Microsoft Outlook which is a different e-mail system that many schools use across the country. In Gmail it is possible to create folders for organizing emails, create contacts and contact groups, and access your email from any web enabled computer or mobile device. In some school systems, it is possible to set-up e-mail forwarding from your school e-mail to your Gmail account. Google also has a strong anti-spam system that does an excellent job of keeping your inbox clean of unwanted emails. As agriculture teachers, we believe some of the best uses for Gmail include seemingly limitless communication storage and its ease of use for contacting students, parents, alumni, and the general public. School e-mail addresses are often generated and assigned without any input from the teacher and can be difficult to remember. A simple and memorable e-mail address can go a long way towards encouraging initial and sustained contact with key program stakeholders.

The next important Google service for an agricultural education program and FFA chapter is the "Calendar." Agriculture teachers know how to juggle activities, but regardless of the type of program, it can be very challenging to manage all the events that are occurring at the same time. CDE practices, committee meetings, SAE visits, school holidays and testing can make it seem impossible to get anything done. While the old calendar on the office door works great for many programs, some may need to expand. With Google Calendar, expansion is limitless. Google Calendar is a simple web-based calendar tool where the user can enter each program activity therefore helping them to stay organized. They can also share this information with students, parents, fellow teachers, or stakeholders.

The way the calendar is initially setup, everything is defaulted to a single calendar; however you can create as many different calendars as needed (i.e.: events, contests, SAE visits, etc). When an event is added, the user can add details about each event. You can add a description, time, location, reminders, and even invite guests. All this is available anywhere you have an Internet connection. For teachers that have a smartphone (i.e., Blackberry, iPhone, or Droid), the calendar can be synced directly to that device.

An advantage to the Google Calendar system is the ability to share it with the public. Each calendar you make has a unique web address that can be sent to people allowing them to view your events. You can also very easily take a small link from Google and embed your calendar into your own chapter website (see attached picture/screenshot). If you do not have a chapter website, then Google also has a solution for that problem.

Having a website can be a great resource for an agricultural program, but many times it simply takes too much time and expertise to create and manage such an important tool. Google's website tool, "Sites" is designed to be a simple, easy to use website builder. When you go to www.sites.google.com, there are options to create a new site, or edit an existing site. You are able to have up to five websites for each one Google account. Suppose you need a chapter site, but you'd also like to have one for each of the teachers in your department. With Google sites, you will probably only need one account to do



Google Calendars can easily be added to your own website to show your visitors what your program is doing at that time.

so. This makes managing your sites much easier. The main thing to remember is a computer science degree is not necessary for building or maintaining a quality website. Google has many built in help features that assist with common user questions and problems.

Once you have decided to create a new website, there are options to choose between either building your page from scratch, or getting a head start from many different prefabricated page designs or themes that are available to you. There is even a design section complete with various schools and educational themes. If you have selected a pre-made theme, your page is automatically formatted and filled with example information. You are now able to alter the existing generic information with the specific details you want to be on your site.

A recommended use for Google Sites is SAE documentation. Students can learn how to develop and maintain a website at the same time they are recording and publishing important photos, experiences, skills learned, records, etc… that are associated with the SAE portion of their agricultural education. Showcasing "Learning to Do" and "Doing to Learn" has never been easier.

Google has also developed a way to create and share your documents, presentations and spreadsheets online. Google "Docs" is a great alternative to similar services such as Microsoft's Office Suite. While not as advanced, Google's Docs are great for the ~90% of the simple computer tasks you need to do each day. Documents are easy to create, format, and share. In Spreadsheets it is simple to input data and compute formulations. Presentations are a good way to create a simple presentation that does not need a lot of additions such as sounds, various transitions, and animations that sometimes distract from the point of a presentation. While none of these applications are as detailed and fine tuned as their retail counterparts, for the most common tasks that just need to get done quickly and simply these web services work well. This article was even written mostly using Google Docs.

Despite the ease and simplicity of these documents, the best part about this service is the mobility and ability to share documents. Once a document is created, it is stored on the Google Docs website at www.docs.google.com. These files are available no matter where or when you log on to Google's site. Teach in more than one room and use a file on more than one computer each day? Start working on something you need to finish at home? Not a problem, just log on and open your files wherever you might be. After a file is created and saved online, you also have the ability to share this with anyone. You can just set the privacy controls to public and send them a link. You can also control what rights they have once they open the link (read-only, read and edit, etc.).

One easy example within agricultural education for Google Docs would be to encourage students to have their own Google account so they could share files. This could be for an assignment for class or maybe a project for FFA. Either way they can simply add you, the teacher, to the list of editors to the document, and you can go in to make corrections, give advice, or highlight areas to improve on. You may also assign students to groups, and they can even work on a document simultaneously from different locations. No more excuses, right!

Throughout a teacher's career, it is difficult to count the number of pictures we take. Whether it is for contests, class projects, SAE recordbooks, or any number of other reasons, agricultural programs always end up with a large number of pictures that often take countless hours to manage, sort through, and organize. The last Google product to be covered in this article, though there are more tools being developed daily, is a photo management service called

"Picasa." Picasa is downloadable software that allows you to manage, edit, and organize pictures you take throughout the year. This is an excellent way to do both basic and in depth editing to pictures. It can be as simple as cropping an image and removing red-eye, or as complex as adjusting exposure and color temperature. You can also organize your photos into folders based on event, date, and location.

Even with all these great editing features, some of the most useful aspects of Picasa are the many different management options. You can tag each picture with keywords such as SAEs, individual classes, or chapter projects. Each photo or album can also be tagged with a location so that you can see exactly where your chapter has traveled over time. Another outstanding management feature is facial recognition. While it can be a little unnerving at first to see a computer recognize individual faces, once you tag individual faces in pictures and associate them with names, Picasa is able to learn those relationships and then suggest other pictures that have the same person in them. Once you build a good foundation of pictures (10-15 per person), Picasa will display other images that it analyzes as the same person. You are then able to either accept or reject each of the suggestions. This is important because it does not always get faces matched with the correct individuals.

Besides the organizational ability and obvious cool factor that these management options give you, they can also be an invaluable resource for FFA applications and documentation. When you need pictures for a student's proficiency or STAR application, you can just look under that student's section of pictures instead of the photo shoot with wardrobe changes we've all done the week before. Suppose you need pictures of students SAE's, pictures of chapter meetings and activities for recruitment, or even presentation pictures for a contest like Ag Issues. All of these tasks become much easier when you have tagged your pictures with keywords, locations, and faces. While it may take a little longer to input the pictures, in a pinch they can be a lifesaver.

There is also an option for a resource called Picasa Web Albums. This is an easy way to post your pictures online in albums with various privacy settings. Similar to other picture sharing services like Flickr and Photobucket, Picasa Web Albums is a basic photo hosting website that has the ability to connect to the downloadable Picasa software. This feature can be very helpful if a teacher needs to transfer pictures from your camera, edit, tag, and upload to the web all at once. It is very easy to use and a great way to publicize your chapters activities, as well as classroom and SAE projects. You can even embed different albums in your chapter's website, even if it is not from Google Sites.

Gmail, Calendar, Sites, Docs, and Picasa are only the beginning of the products and services available from Google, and they are releasing new products every day. One important thing you should remember when trying to use Google services from school is your school system may have blocked these websites for various reasons. While this can sometimes be avoided with a strong appeal to the school's technology specialists, sometimes there is no way to avoid it. When that happens, just remember what your doctor tells you about anything new: "results may vary."

All-in-all these resources from Google can be a great set of resources for an agricultural education program. Google designed these programs for individuals, but many times they fit all the basic needs you might have for your department. With the wide popularity of web enabled cell phones, laptops, and MP3 players, most teachers and students are connected to the Internet in some form throughout their entire day. Google has made sure that their services work well on all these mobile devices. Now that you know some of what Google offers, I encourage you to take a look and see if these products, or others, may help your program. There are so many different services from Google that odds are you will find at least a few that will help you. Good luck integrating Google into your agricultural education program.

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Technology as a Differentiated Instruction Tool

by Ann M. De Lay

Within the classroom, there are a myriad of learners and styles of learning present. Differentiated instruction (DI) is a teacher's acknowledgement there are many avenues for learning and sense making (Scalise, 2007). The value-added approach of DI is essential to the teacher's arsenal for successful learning outcomes. Tomlinson condensed DI into the curricular elements of content, process and product (2001). Students must have experiences with different types and formats of content, different methods for content acquisition, and they must be able to demonstrate their learning through different types of assignments and assessments. By varying the approach taken to instruct, guide and assess, teachers increase the likelihood of reaching every student.

The idea of differentiating the learning environment is at the foundation of DI. Teachers must do all they can to communicate effectively with students and provide them a platform to reciprocate. Students comprising the Millennial generation are considered to be digital natives, exhibiting an intuitive approach to digital interaction (Haynes, 2010). When technology is excluded from the curriculum, teachers fail to address this major avenue for student learning. This means the platform for communicating about new information must include the language in which students feel most comfortable; in this case, the language of technology.

Most teachers do not fall into the Millennial generation and find technology difficult to infuse into their teaching (Murphrey, Miller, & Roberts, 2009). However, inclusion of technology need not be an all or nothing approach. Integration should occur gradually, be connected with content standards, find its way into students' hands, and maintain a high level of rigor and relevance (Rubenstein, 2010). The following tools provide opportunities for teachers to work more productively with digital natives. They also let digital natives more adequately show what they know in a formative and summative capacity. Read through the descriptions while bringing up the online addresses to experience the tools. Then brainstorm ways in which each techie tool can enrich the curricula.

Techie Tools

Glogster (edu.glogster.com) There are many poster design activities included in the lessons for a typical course. Each time the activity is used, there are a number of materials teachers must compile and track. Glogster is a free, online tool for students to design posters in a multimedia format. For example, perhaps the lesson is on oxyfuel welding. The student may wish to create a poster by adding graphics illustrating the different flames the operator must be able to identify to ensure quality penetration. As there are safety considerations, students may also include audio clips of the sounds indicating when hazards like popping or hissing should be of particular concern. Dynamic features like these pique the interest of more students and cannot be accomplished in the traditional poster format.

Animoto (animoto.com) – Video is a powerful communication medium. However, creating quality videos within a single class period can be a nearly impossible task due to the level of detail work associated. Despite the challenge, video generation should not be shied away from as a form of classroom instruction and assessment. Animoto will convert photographs, text and video clips into a stylized, engaging cinematic feature set to music with unique transitions. Should state agricultural commodities be the topic at hand, students can gather images to quickly tell the story of that crop from field to table. Students can create 30 second videos for free, or schools can purchase full access for a low monthly rate.

Flip Video Cameras (http://www.theflip.com/en-us/) - Flip cameras are great sense making tools for permitting students to demonstrate their understanding of a concept. Once students settle on a topic, they can storyboard ideas for arranging the details in a sensible order then set out to capture the necessary footage. After filming, students may integrate the footage into a video editing program for stylizing. Because of their size and simplicity, portability is a cinch and students can easily capture quality audio and video given little instruction. No money in the budget to purchase flip cameras? No problem! The Flip website boasts discounted pricing for educators.

Prezi (prezi.com) – When PowerPoint was unveiled, the world cheered. Audiences finally had the benefit of visual images and text to help them follow along during presentations. Fast forward a number of decades and PowerPoint has become overused and often used improperly, leaving speakers and audience members drowning in text and praying for a reprieve. Prezi brings a fresh perspective to the category of presentation software. Presenters can design a digital presentation as if they were writing on whiteboard. Snippets of

information and graphics can be added to the screen in a random fashion then linked in the order they should appear. In show mode, information is zoomed in upon from a global perspective lending movement and flow incapable with traditional presentations. Teachers may use Prezi to jazz up classroom lectures while students may use the tool to create visuals for activities like SAE project competition, discussion meet, or even for classroom presentations of their own. Prezi is free for the basic version but there are additional features which can be purchased for a yearly subscription.

SimpleDiagrams (simplediagrams.com/) – One thing LifeKnowledge made clear is students happily and readily demonstrate their learning when asked to do so through pictures. SimpleDiagrams lets students give birth to their understandings by arranging chalkboard style drawings into graphical representations of complex ideas. Things like the nitrogen cycle, blood flowing through a heart and the process by which a four-cycle engine operates can all be communicated through diagrams and flow charts. SimpleDiagrams can provide a fun, technological format for students to simplify complex content for greater retention.

Infographics Infographics are clear, concise visual representations of data designed for quick consumption by reviewers. Featured and celebrated in the *New York Times*, Infographics can be rich tools for communicating about issues in agriculture. A challenging topic like water allocation and distribution in western states can be distilled to its very essence and presented through images and brief descriptions. An example featuring water facts and consumption can be downloaded at: http://www.circleofblue.org/waternews/2009/world/infographic-ten-things-you-should-know-about-water/. Infographics may be created using tools as simple as PowerPoint and even Microsoft Word!

Jing (jingproject.com) - This online video tool enables users to develop screenshots and screen casts. In the classroom, Jing can help students create instructional how-to's based on photos or footage associated with a skills based lesson. For example, in the floriculture classroom, students can quickly create an instructional video on boutonniere construction or may even film themselves giving a speech from home and email it to their teachers for feedback. Public speaking practice can be carried out online!

Blogging (blogger.com or wordpress.com) – The pressure to meet every standard and include more writing in the classroom is felt by teachers campus-wide. Blogs provide additional instructional time and an e-format for student writing (Colombo & Colombo, 2007). Blogs can serve as a forum for students to share how they have incorporated their classroom learning into their SAEs and how those projects have enhanced their understanding of classroom concepts. Students can cite lingering questions, needs and goals they have for the growth of their SAEs. Blogging can also be used to tell the story of an agricultural biology student's agriscience fair project. Posting guiding questions, data, decisions and next steps can help students share where they are in their research and receive guidance from others who may provide their expertise through comments to their posts. Perhaps the school is located a number of hours from the university or from an appropriate mentor. A project blog can surpass the limitations of time and space, permitting mentors to provide direction without a face-to-face meeting.

VoiceThread (ed.voicethread.com) – This multimedia tool allows students to collaborate in many ways. Students may upload an image, text, video, or audio and may respond to others in a similar fashion. Comments can be made by phone, microphone, text, file upload or webcam. Perhaps the topic of sustainability is addressed throughout the horticulture curriculum. Students can create a voice thread explaining sustainability and addressing the challenges, issues and steps necessary to implement the practice. Other students in the class could post responses to their peers' voice threads to encourage dialogue. This site charges a low monthly fee or a yearly subscription may be obtained.

Tagxedo.com (www.tagxedo.com) - Similar to Wordle (www.wordle.net), Tagxedo generates word clouds based on the frequency of words used in a document. While other word cloud design sites produce indistinguishable blobs, Tagxedo allows users to select an overall shape for their word clouds. For example, the meaning of the FFA Creed is addressed in virtually every first year agriculture class. When the creed appears in a word cloud format, students can clearly extract meaning based on the major words revealed. In addition, the final word cloud can be customized to appear in a unique shape like the United States to reference the final paragraph. Teachers may also use Tagxedo as a game with students to introduce a new topic. By entering key words from the lesson or unit plan into the online program, teachers could have students anticipate the next topic of study!

Bonus Techie Tool

Although this application could

be used to enhance students' experiences in the classroom its inclusion is offered primarily for program management purposes.

Picnik (www.picnik.com) – This online photo editing site lets users enhance photos absolutely free! Think of all of the awards applications, slide shows, videos, scrapbook pages, websites, newsletters, and other materials agriculture programs must generate within a given year. Each project requires a number of stunning images to tell a gripping story. Sometimes the untouched images are a bit blurry, dull or off center and falling just shy of "stunning." The simplicity and power of Picnik is such that it is easy enough for students to use and creates magic in minutes. The site also saves pictures to the computer or the online account for use as needed. For a low monthly fee, subscribe to Picnik Premium for greater access to editing tools and storage space.

There is a very real need for teachers who can differentiate their instruction (Colombo & Colombo, 2007). The stakes for teachers to ensure their students are successful on state testing are increasing all the time. Thinking outside the box to differentiate a lesson's content, process and product is a key factor to promoting a student's potential for academic achievement (Tomlinson, 2001). Additionally, teaching in such a way as to address students' various readiness, interests and learning profiles makes the classroom experience more enjoyable for students and teachers alike.

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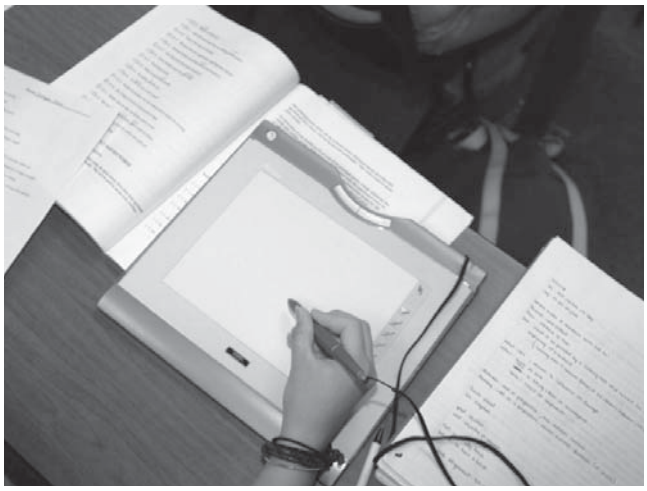


Students using a wireless slate in a high school agricultural education classroom. *Read the complete article on page 6.*

Teaching with Technology: Using What We Already Have

by Tiffany Drape

As educators, we have been bombarded with technology. From ever changing software to help manage our schedules and grades to things like plasma cutters and automatic watering systems in our greenhouses, we could spend hours trying to keep up. Many of us try to but get frustrated when we don't get support, things get outdated, or they simply don't work. As educators, we have tried to keep pace with education, but after classes are taught, the FFA chapter is advised, and the other countless tasks are done, there are simply not enough hours in the day. What small things can we do with what we already have to enhance our curriculum and engage students through technology?

How do we not feel like we're drowning in a sea of technology? There are no solid answers because we're all different. How we process, the speed at which we process, and our adoption time are all factors in how we engage with technology in our classrooms. Ultimately, we all have a preference in what we teach and how we teach it. The key for you might be to start small.

As a former middle and high school agriculture teacher, I was very fortunate to work in a school setting where my technology habit was supported. My habit or love for all things technology related stemmed from a job in college designing websites and maintaining a server farm to help pay for my education. I was always looking for resources to help other teachers in agriculture education, free lessons and curriculum sets, and anything that might be helpful to meet the needs of as many students as possible. It wasn't always an easy road. I faced the same challenges that some of you still do. One of the biggest challenges I faced was with students carrying cell phones. My school had a policy of no tolerance and while it may seem easy to "just say no," there were times when I wouldn't catch a student. On one particularly frustrating and beautiful spring day, I was working with my junior high students and there was a flurry of cell phones. I confiscated some, had some on my desk for safe keeping, and some were still in the hands of my students. It was the last period of the day and I was fighting an uphill battle. Out of sheer frustration I assigned homework. Each student was to go home over the weekend and use their cell phone to take a picture of a habitat or ecosystem, since that was the unit we were currently studying in class. Students were to bring their phones back on Monday and we would look at their pictures and discuss each habitat and pick a winner.

My students impressed me on Monday. I anticipated that at least half would not complete this assignment. I was wrong. All of my students came in Monday with their cell phones and some even greeted me at the door with, "you want to see my pictures?" The winner was a student who had been out turkey hunting and came upon a huge beaver house and took some great photos of the house and the pond/dam that the beavers had built. The students were happy to show me their phones and their pictures and surprisingly, there were fewer frustrating days with my class. I often reflect on the "why?" of this incident. Was it because I allowed them to use them, turning something that was taboo into something was acceptable, but in an educational context?

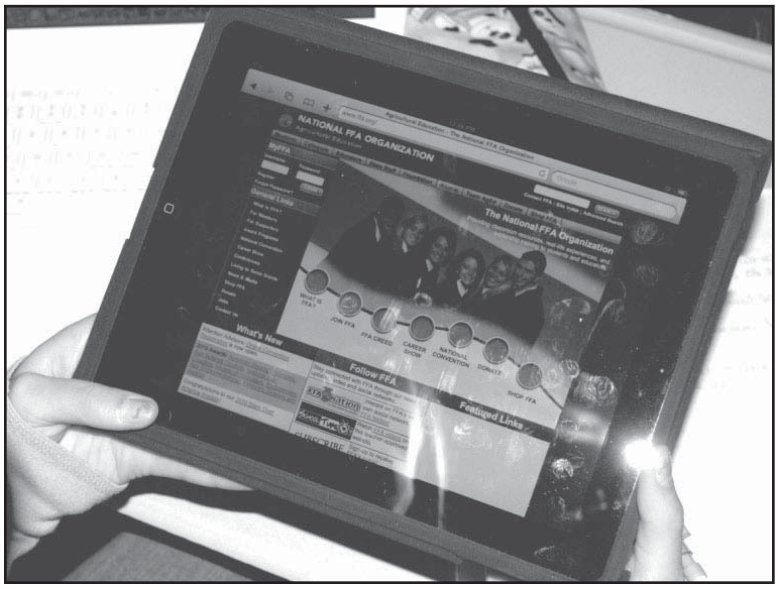
Cell phones also proved to be a valuable piece of technology at various times using Poll Everywhere (www.polleverywhere.com) that would give real time results using a cell phone as the medium of communication. This was a great tool for students and the instructor. Students who were shy or unsure about speaking up in class as well as the rest of the class could get real time results and I found it helpful to ask follow up questions and help me gauge student progress.

I had students with a variety of special needs and IEPs each year. Many struggled with reading comprehension. Students would come to class with an AlphaSmart or NEO, a mini word processor, to take notes and print them later for reading with their resource teacher. Other times, they would sit and struggle to read a piece of text or article for class. I discovered a free, online service called Read The Words (www.readthewords.com) that would read pieces of text to my students who needed the help, for free! Since I had computers, and many students have headphones already, it was a great way for my students with processing and comprehension challenges to be able to glean information in the same manner as other students in the class.

Many of my students, particularly my FFA students, would work on award applications or on speeches, and then take them home to work on, by sending an email or putting things on a USB drive. They would send them back to me to edit and I would

run into compatability issues and one of us would be unable to open the document for editing and there would be multiple copies with confusion about which one was the master document. I began using Google Docs to help alleviate some of this confusion (www.docs.google.com). Google Docs enabled my students and I to put our documents in one area and I gave access to each student. This helped minimize the number of emails, printed copies, and second guessing what we were doing on a daily basis around application time.

For other students availability to word processing software was too expensive on their home computer. They would write things in Microsoft Works and then it would be incompatible with Microsoft Office. NeoOffice (www.neooffice.org) for Macintosh and Open Office (www.openoffice.org) for Windows were two free options that I suggested my students download after getting parental permission. The formatting was minimal from one of these to a Microsoft application and they have similar features and functions to Microsoft products.



A student checks out www.ffa.org on one of the department's new iPads. Read the complete article on page 26.

Agriculture teachers might struggle to integrate instructional technology because they don't feel comfortable utilizing it. The innovation of technology was introduced and for a variety of reasons but not adopted by agriculture education. Factors such as training, self-efficacy, and barriers can combine in various ways to affect how agriculture teachers feel about technology and the integration into the classrooms (Redman & Kotrlik, 2004).

Support of integrating new technology can come in many forms. The public, availability of technology for teachers and students, training, time to plan and learn the technology, technical support for troubleshooting, and administrative support can all change the rate of adoption that a technology has in an agriculture classroom. Teachers may often require more than a one day tutorial at an inservice day and it may take several weeks, months, or years to be able to effectively use technology. How complex an innovation is will also affect the integration time. Complexity deals with the perception of the innovation and how difficult or easy it is to use (Rogers, 2003). If agriculture teachers perceive that something will be complex, their attitude and self-efficacy may decrease, decreasing their rate of adoption. Agriculture teachers may also not want to feel forced into a new technology. Intense frustration can follow and also decrease the rate of adoption.

You may be thinking, "I can do that" and in reality, you can! Start small, get to know what you want your students to use first. This will help you answer their questions and help pose new ones to them. There is no magic fix to technology integration but being picky about what you choose to integrate and learning as much as possible about the technology will help you to integrate it more effectively. Ask questions! Your technology coordinator, the online "contact us" link, or another colleague can be an invaluable resource.

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Catching Up with Our Students... Millennials and iGen: Is Agriscience Education Ready?

by Kimberley Miller and Theresa Pesl Murphrey

There is an old Chinese proverb that states: "Do not confine your children to your own way of learning for they were born in another time." It is very possible that this statement holds more truth today than it ever has in the past. Agriscience teachers are educating students who have never known a world without the Internet, a cell phone, or an iPod™. Computers and related technologies are often a student's best friend.

Agriscience teachers are currently educating "Generation Y" also known as "Generation NeXt" or simply "Millennials." These students, born between 1976 and 1998, have parents known as "helicopters," a term utilized because of their hovering approach to raising their children (Taylor & Keeter, 2010). The students of this time period are often technology savvy -- using social networking sites to maintain friendships all over the world and using their multimedia phone to communicate, capture, and stay organized. Millennials possess the ability to search the Internet proficiently for the answer to almost anything and they expect to be entertained as they learn because of their generational lifestyle. In fact, they can become impatient if a task takes too long, as they expect information to come to them quickly and easily.

After "Generation Y," and likely due to a lack of a more creative term, comes "Generation Z." Some refer to this generation as "iGen" since they have never known a world without the Internet. Martha Irvine of the Associated Press states, "they are the tech-savviest generation of all time...even toddlers can maneuver their way through YouTube and some first-graders are able to put together a PowerPoint presentation for class" (2010). A teacher's most complicated struggle with Generation Z is not necessarily how to relate lessons to them, but rather how to prepare these students for careers and jobs that don't even exist yet.

The creation of fun and engaging lessons to gain the attention of students is something that most all agriscience teachers want to achieve. In fact, secondary agriscience teachers have all attended at least one in-service or seminar that focused on encouraging student excitement about a subject or involvement in classroom or curricular activities like FFA. The problem is that although the classroom is the same (despite a few more wrinkles or permanent injuries from helping halter break a steer or two) and teachers are the same, the types of students wandering into our classrooms every year are changing rapidly. Students' needs and interests change because they are expected to function in an ever-changing environment. Are secondary agriscience teachers ready for the challenge to change and develop the new generation moving through our classrooms?

Using Technology Successfully

An agriscience teacher's success in incorporating technology into teaching often requires being comfortable with the technology tools they choose and in being sure that using them not only fits the needs of the teacher, but meets the needs and skills of the student. There are a multitude of suggestions (both online and in print) for incorporating technology tools into educational lessons. In fact, some of your students could download a list in less than 5 minutes. However, often these lists can become burdensome. Teachers need ideas that are easy to implement and be used at a varying extent.

The Challenge of Hands-On Activities

Offering online courses to secondary students has become increasingly popular in many areas of the country; however, the lessons taught by secondary agriscience teachers often require hands-on activities in order to facilitate learning. How can this challenge of needing "hands-on" activities be met? First – we need to remember that learning needs to take place before, during, and after the hands-on activities. Technologies can often serve to enhance the "before" and "after" segments of a lesson -- keeping a student learning long after they have left the classroom. Second – creativity is essential in the presentation of information to students. Technologies can help an instructor be creative in both content and presentation. Third – learning from others can often be just as important as learning from the teacher. Technologies are offering increasing options to allow and encourage student to student learning.

A Tool to Enhance "Before" & "After" Segments of a Lesson

Utilizing a website to post handouts, lecture notes, or recorded lectures is becoming a popular method of supplementing secondary instructional delivery. In some instances, to help with budget issues, teachers post information on their website and stu-

dents print what is needed for class at home or in a computer lab. GoDaddy.com offers an array of stylish, easy to use website templates and building ideas. Ask your district about available site building software. Something to try: Have students help design a site or designate a student aide or senior member of your program to help maintain the uploading of files or the creation of the interactive aspects of your course or program website.

Tools to Enable Creativity

Recording an audio or video clip (whether a short note or a lecture) has historically been a complicated process – but not any more. New technologies are allowing quick and easy ways to share audio and video with your students. One of these technologies is Jing™ - a free, simple recording tool that allows one to record their voice and anything that is shown on their computer screen. Available at http://jingproject.com. Something to try: Ask your students to search the Internet for information on a specific topic. Then, have them use Jing™ to record a 3 minute explanation of what they found. This recording can be shared with the class.

iPods™ are primarily known for their ability to bring music and video to owners anywhere they wish. However, through the free software iTunes™ there are thousands upon thousands of educational videos and Podcasts™ (audio only recordings). iPods™ can be plugged into a television or LCD projector, making any video on the iPod™ viewable to large or small groups. Imagine being able to have the equivalent of hundreds of the DVD's regularly used to enhance instruction in one small device. Links to podcasts can also be posted on websites. Tips on finding, using and creating podcasts can be found at http://www.apple.com/itunes/podcasts/ Something to try: Ask students to search for subject relevant podcasts and submit them for review. If they are appropriate, allow the student to explain to the class what the podcast entails and present it to the class.

Tools to Encourage Student-Student Learning

Secondary students love to talk, but not necessarily in front of the class or with particular groups of individuals. Encourage students to participate in face-to-face class discussion by engaging them in online discussion groups. Blogs are a great way to encourage students to join a conversation and extend learning beyond the barriers of class time. Discussion groups help focus conversation while allowing students to express opinions, experiences or thoughts without worrying about who is watching. Giving students the ability to post files or website links strengthens their learning and the information they share. Google groups is a free discussion/blog site available at http://www.Google.com. Ask your district about available online discussion tools. Something to try: Ask students to post one main idea that they learned from a lesson. Give them a set number of days to complete their post, print the posts and share copies with the whole class. Note: This method is most effective when offering extra credit or bonus test points. Unless all students have access at home or school to a computer with Internet, a discussion group should not be a mandatory assignment.

Set Aside Fears and Hesitation – Involve Your Students

The key to using technologies is to TRY. Set aside fears, hesitation, and doubt and involve your students in the process. "Millennials" and "Generation Z" can be a tremendous asset to Agriscience Education. Technology has the potential to enhance the agriscience classroom more than ever before -- It is the way that the technologies are used that will make the difference.

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Assessing Student Learning with Regards to Technology in the Agriculture Classroom

by Justin Michael Peake and Tiphanie Peake

It was only a few years ago when technology in the agriculture classroom consisted of a single teacher computer, a few VHS tapes, and an overhead projector. The old chalk dust, paint, and conventional technology did not create much excitement for learning; along with the classroom was a traditional laboratory that was in the same need of updating. Students of the 21st century who walk into Bullitt Central's agriculture classroom will have a different experience with technology than that of the past. At Bullitt Central we recognized the need for change and the need for technology. With the help of our local Farm Bureau, Bullitt County Agriculture Development Board, and the support of school leaders, Agriculture Teachers were able to create a new computer laboratory, update the classroom technology, and integrate more technology in laboratory equipment.

As agriculture teachers, we have to be adaptable and resourceful; the dynamic industry that we represent revolves around change. The days of agriculture teachers having students draw plans for a new hay spear by hand are dwindling. Current students who walk into agriculture classrooms use computer added drawing software (CAD) to design three dimensional models of new ways to handle hay. Change and adaptation can be intimidating at varying degrees for teachers. In today's agricultural industry, we cannot afford to be resistant to change. Programs that sit idle and watch the wagon go by are missing out on opportunities. As the Agriculture Program at Bullitt Central High School increased its level of technology integration it became apparent that evaluation of student learning in relation to the technology was going to require a new application of evaluation techniques. Below are a few examples of technology integration, but perhaps more importantly, how the teachers were able to evaluate with authentic alternative assessments the level of student learning in relation to the technology.

Example 1: Portfolio

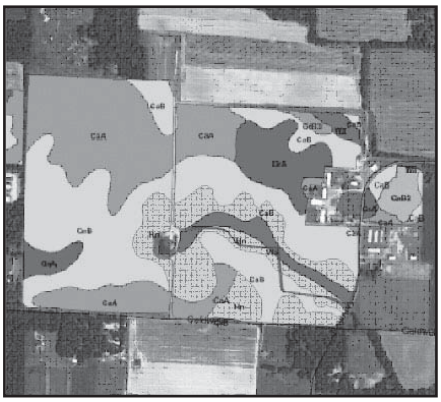
With the installation of Pro Landscape software in the agriculture computer laboratory, students gain hands on experience with industry standard landscaping software. This new technology allows students to create more accurate site plans that are visually enhanced, professionally looking proposals that can then be presented to customers. The fundamentals of landscape design are still taught, however, landscape design is now primarily a digital format. This new technology will give students the advantage they will need when entering the horticulture industry.

Within the first year of using this new software the teachers found it difficult to accurately assess the students learning as some students seemed to have a natural aptitude while other students only produced the minimal product to meet standards. In an effort to better assess the students' learning, the teachers have implemented a landscaping portfolio to complement the Pro Landscape software. Students are required to develop two samples of the following projects: traditional residential landscapes, modern residential landscapes, urban commercial landscapes, freelance landscape designs, and landscapes which integrate a water feature. The summative evaluation occurs when the student has completed all of the projects mentioned and their portfolio is graded.

Example 2: Journal

The students in Bullitt Central agriculture laboratory have recently began to experience interactive video conferencing. This technology allows students to interact with other locations across the world via two-way video and audio transmissions. Students are able to sit down with other agriculture students from multiple countries and discuss farming practices and their worldwide impact.

This seems like a good learning experience for the students, but teachers often find it difficult to document the learning that occurs. The best way we have found to measure student learning is with journals using directed self-reflection. For example, when students watch a presentation from an economist at the University of Kentucky, they can be asked to reflect on what they have learned in their journal. However, students often limit their responses to what the economist said; regurgitating facts and numbers, but not truly reflecting on what they have learned. We have found it more effective to provide cues to direct the students in their reflective writing. For example, "I agree with the economist on value added marketing because I have seen this locally through…" or "The economist discussed supply and demand in niche markets and I understand this because I have seen it… ." These writing cues help the students avoid simply restating what the speaker



stated and helps the teachers know if the students have reached a level of understanding beyond knowledge.

Example 3: Product Based

The ability to raise a traditional garden is valuable to students, but as technology changes so do the ways that we can teach gardening. In an effort to increase the level of science integration in our program with hydroponics, we have started a 24 bucket Bato system of growing 48 tomato plants. Each student enrolled in horticulture class is responsible for planting two tomatoes at the beginning of the semester and plan to sell vine ripened tomatoes by the end of the semester. The ultimate goal is that students will grow enough tomatoes, lettuce, and other vegetables to supply our school cafeteria and/or local groceries. Students learn the components of hydroponics, how to set it up, and have a better understanding of the advantages and disadvantages of growing crops using hydroponics. Once the system was put in place and the crops started growing, students started learning to operate a cottage business. They developed a company name, set goals, wages, keep track of employee hour, inventory, and marketing of the product.

This is an interesting and fun way to teach class, however again the question arises of how to assess student learning. The horticulture side of this project is assessed via a product… the pounds of produce that the student is able to produce. The business side of this project is assessed by a different product… the students Supervised Agricultural Experience (SAE) record book. The students are consistently reminded throughout the semester of two things they have to do for this class; 1) produce vegetables to sale, and 2) accurately complete their SAE record book.

How to Grade Portfolio, Journal, Product, and Performance Assessments

When looking at portfolio, journal, product, or performance based assessments the question still arises of how to assign a grade to these items? How does a teacher effectively communicate to students what meets standards and what does not? The best way the teachers at Bullitt Central have found to accomplish this task is through the use of rubrics based on Bloom's Taxonomy. In the following performance based assessment example there is an explanation of the rubric, how it was developed, and why.

Instead of simply discussing Global Positioning Systems (GPS) and precision farming practices, the students have been given an opportunity to learn and demonstrate GPS. Ag Connections, an innovative computer software company located in Western Kentucky, visited with the students and provided a demonstration of the software which was designed to meet modern farming practices. Ag Connections downloaded a version of their Land-db software to the student classroom or laboratory computers, sent a representative, and provided training for the students as well as local community farmers. As agriculture teachers,we have to work hard to create learning opportunities, the students will recognize our efforts and strive to meet expectations, but how do we know when those expectations have been met?

To authentically assess student

	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Load a map from Bullitt Co.	I can describe how to load a map	I can demonstrate loading a map	I did it, I loaded a map	I can outline how to load a map	I have composed a file containing my map	I can tell if the map loaded correctly and to scale
Overlay a soil map	I wrote out how to overlay maps	I can restate how to overlay a soil map	I was able to overlay my soil map	I have analyzed the soil map	I can perform the overlay of a soil map	I can judge if the soil map overlaid correctly
Calculate land area in acres	I can list the sequence of steps to calculate acres	I can create a report that list land area in acres on my map	I successfully calculated the land area in acres	I can compare hand calculations with the computer calculations	I can produce an accurate calculation of acres	I can assess the accuracy of acres to the .10 acre

Figure 1. Abbreviated rubric for precision farming project.

(continued on page 25)

Bonham High School Ag Mechanics Going Green!

by Clint Minnick

The Bonham High School Agricultural Science department located in Bonham, Texas quietly managed to accomplish something no other high school class in the nation has to date when they recently converted an older gas-powered Ford 9N tractor to electric drive.

Heads turned at Earth Day in Sherman when the boys from Bonham pulled up with the electric-drive pick-up the BHS Ag power class converted last year and this year's project, an electric-drive tractor.

"The tractor was a lot more complicated," remarked BHS Ag - mechanics teacher Clint Minnick when asked to compare these two breakthrough projects. "Truck conversions had been done before and this is a great way to introduce 21st century technologies into an Ag Mechanics program. This type of project is what a lot of organic farmers are looking for to fit their type of operation. Also, with fuel prices out of control we can cut input costs for the small agricultural producer."

BHS computer analyst Mike Barkley has been an important part of this conversion team and so far he and Mr. Minnick have three successful projects under their belts.

The first experiment was a small trailer that carried a battery pack. The electric-power-assist trailer doubled the gas mileage on Barkley's PT Cruiser once it reached highway speed. "It turns anything with a hitch into a hybrid," Mr. Barkley points out.

Last year the class converted a small pick-up into an electric vehicle that could be utilized by the school district on a daily basis. The 20-horsepower electric motor is only capable of running highway speeds for a short distance, but it has proven to be a perfect fit for what it was designed to do -- run errands between Bonham ISD campuses.

Maybe the most impressive thing the electric truck does is save the school district approximately $2,016 annually; an employee is compensated 45 cents per mile to use his or her own vehicle, while the electric vehicle costs between two cents and three cents per mile to operate.

The electric-drive Ford 9N tractor has a solar array mounted on the canopy and this would be an ideal set-up for someone who uses a tractor for two or three hours at a time. The tractor should be able to pull a shredder for close to three hours, recharge via the solar panels and be ready to go again tomorrow. It can also be plugged into the grid to recharge the five heavy-duty batteries quicker.

The tractor conversion was a project that the students really enjoyed and were excited about doing. It was not your typical Ag mechanics project. The students started by removing the old engine and all of its components. They did a lot of brainstorming on how to fabricate the frame to tie the existing chassis into the front suspension since the engine would no longer be there to function as the frame. The students fabricated a frame out of 3/8 inch angle iron to hold a 60 horsepower electric motor salvaged from a large forklift. The motor is just a little smaller and similar in weight to the original engine. The electric motor is linked directly to the input shaft of the transmission.

The young men who worked with Mr. Minnick and Mr. Barkley on this latest project were: Josh Cline, David Barnett, Michael Hubbard, Trevor Allen and Cory Hall.

The tractor is virtually noise free except for some drive train noise from the rear axle.

The students also learned how to wire up this type of an electrical system including the control modules. They fabricated a ROPS (Roll Over Protective System) on the tractor to include a canopy that contains six solar panels to aid in charging the batteries.

The tractor is still fully functional as a normal agricultural tractor. The three point lift and PTO still function normally. The Ag department plans

Assessing Student Learning ***(continued)***

learning for this project, teachers utilize a performance based assignment. However, the question still remains as to what performance meets standards and what performance falls short. To achieve this goal a rubric was designed specifically for this project that utilized the levels of Blooms cognitive domain to form the scale of the rubric, and lesson objectives to form the criteria, and descriptors aligned with the levels of Blooms cognitive domain. This allows students to formatively assess their own level of learning, clearly communicates expectations, and allows for authentic assessment on the summative evaluation at the conclusion of the unit. An abbreviated version of the rubric is provided in Figure 1 to illustrate the design.

The students are given the rubric before they begin work on their performance so the expectations for the assignment are clearly communicated between the teacher and students as to what is expected. In this case, students are expected to reach at least the application level for all objectives on the rubric in order to receive a "Pass". If any student scores below the application level they will be worked with one-on-one until they reach the application level for that objective. We found using Bloom's levels of learning in the cognitive domain to be the best criteria because it lets teachers and the students know exactly where they are and where they need to be.

In conclusion, this rubric represents the best assessment technique we could create today, however we have to recognize the need for improving assessment techniques. This rubric will continue to be modified each semester in an effort to improve it as we move forward and keep changing.

Justin Michael Peake is an Agriculture Teacher at Bullitt Central High School, Shepherdsville, KY.

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Going Green! ***(continued)***

to use the tractor for students' driving tests for the National Safe Tractor and Machinery Operation Program.

The students are getting hands-on training to work on the next generation of cars and trucks - electric vehicles. Also, the students understand how projects such as these can be a tremendous benefit to our environment. Farmers and ranchers are stewards of their lands and this is a great way to ensure the possibilities of agriculture for centuries to come.

The tractor conversion project could even be turned into a small business. Old tractors are readily available and there is a rapidly growing market for affordable electric tractors.

How can the community help these projects? Bring old car batteries to the BHS Ag class and Interstate Battery will pick up the old batteries and give the class credit towards new batteries for future projects. Thanks in large part to GE employees in Bonham; the students have turned in enough old batteries to earn $2,400 in credit. Another important player, Silgan Can Company, has donated much-needed electric motors from broken-down forklifts.

If you don't have any old batteries, perhaps a contribution would help the class buy supplies for the next cutting-edge experiment. One important contribution came from a teacher that noticed the impact these projects are having on students. That may be an even more remarkable accomplishment than having the first electric-drive tractor in the nation built by high school students sitting in the Bonham High School Ag class.

Footnote: *The BHS ag class is currently converting a John Deere zero turn lawn mower into a fully electric powered lawn mower. They hope to have this Emower project done by spring.*

Clint Minnick is an Agriculture Teacher at Bonham High School, Bonham, Texas.

Are You "Plugged In?" – Using Technology to Enhance Your Secondary Agriculture Program

by Linda Peterson and Amy Smith

As educators, technology is all around us – and seems to be increasing all the time. Each fall, it seems that our students return to school with a greater variety of electronics right at their fingertips – laptops, iPods, iPads, cell phones, etc. Consider the amount of time they spend using technology each day; it is astounding. In fact, one report suggests that by the time these Net Generation students reach the age of 21, they will have spent 10,000 hours playing video games, 20,000 hours on email, 20,000 hours watching TV, 10,000 hours on cell phones, and under 5,000 hours reading (Bonamici, Hutton, Smith, & Ward, 2005).

Recognizing how "plugged in" this generation of students is, some educators are embracing technology, integrating it as often as possible into coursework and school-related organizations. Are you?? Do the students in your agriculture courses get "plugged in" or are they encouraged to "unplug" while in your classroom? In South Dakota, many school districts have become "one-to-one" schools, in which all students in grades 9-12 are issued a laptop for their use while in high school. As a result, teachers are then encouraged to seek out additional ways to integrate technology use into their classes – and decrease the dependency on paper/pencil assignments, tests, etc.

Certainly, there are a number of excellent tools and resources being used by secondary agriculture teachers across the country. Some such resources can be beneficial for enhancing instruction and making learning more meaningful; others are beneficial for program management, communicating with students or student organization members, or a variety of other purposes. However, trying to incorporate them all – or knowing which resources are most beneficial – can be overwhelming. This article is here to help. In the pages that follow, you will learn about several online technology resources that have been tried and tested by secondary agriculture teachers. Read about them, pick one or two, and try them out in your classroom. You have nothing to lose, and everything to gain.

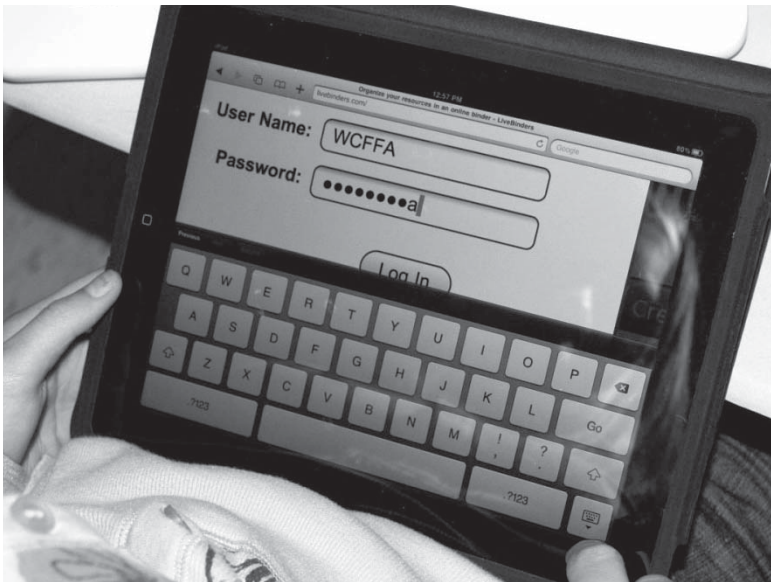
Classroom Resources

Skype (http://www.skype.com/intl/en-us/home): Have you ever wished that the budgetary constraints that often limit field trips didn't exist? Or, have you sought a specific individual, who would be an outstanding guest speaker to come visit your classroom, only to face scheduling or travel conflicts? Thanks to Skype, both of those barriers can be overcome. Available as a free download from the Internet, Skype offers teachers the ability to easily and affordably offer their students opportunities previously not available. In addition, Skype can be beneficial when conducting chapter officer meetings, advisory council meetings, or collaborating with other secondary agriculture teachers.

Tagxedo (http://www.tagxedo.com/): If you're familiar with Wordle (www.wordle.com), Tagxedo is the next best thing – allowing you or your students to create word clouds in various shapes and formats. For teachers who seek fun ways to add meaningful graphics to student work, this resource is a must. When teaching the FFA Creed, students could create word clouds in the shape of the FFA emblem. Or, when students are writing papers, Tagxedo could be used to help them identify recurring words of emphasis. There are virtually limitless possibilities to using this resource!

Shared (http://www.4shared.com/): Losing years and years of files accumulated from teaching courses, advising FFA activities, and supervising SAE projects is devastating! To prevent this from wreaking havoc on you and your program, check out 4Shared, a free file sharing service. With 4Shared, you can upload zipped or compressed files up to 50 mb in size, and provide links for your students to download the folder when needed. Each free account provides you with 10 gb of storage space, making 4Shared great for backing up files you don't want to lose if the school's server or your external hard drive crashes! There are advertisements on 4Shared, however, most school filters block them so students cannot view them.

Poll Everywhere (http://www.polleverywhere.com/): Would you be interested in a tool that provides you with immediate feedback and allows your students to find a productive use for their precious cell phones? If so, Poll Everywhere is a tool to check out. It is a free service (for audiences of 30 or less), and provides one of the easiest ways to get real time, live responses and reactions from your students. Poll Everywhere works well for facilitating exit questions during the last few minutes of class, helping to keep students learning during those last moments where they would



A student logs in to the West Central FFA's Livebinders site on one of the department's new iPads.

usually "turn off" and begin thinking about what's next in their class schedule. Using Poll Everywhere, you can check for understanding, allow students to chose which unit will be taught next, select topics for group projects, etc. Allowing students to use their cell phones in class really makes them feel like they're getting away with something while they really are continuing to learn. Of course, your ability to utilize this resource will depend on your district's cell phone policy.

FFA Resources

LiveBinders (http://livebinders.com/): With all the 3-ring binders you have for organizing curriculum materials, FFA award applications, and career development event resources, do you ever feel like you're running out of space on your shelves? If you would prefer to downsize the number of actual binders occupying shelf space, LiveBinders offers you the option of keeping them all in an electronic fashion. Using LiveBinders, you are able to create folders and tabs in each notebook to organize your materials. Another convenient feature of LiveBinders is that anyone you grant access to (by providing an access code) can upload materials and/or download from your binders. This feature is especially convenient for having students assist in gathering and organizing CDE materials or sharing resources with other teachers/student teachers.

Facebook (http://www.facebook.com/): While many schools discourage teachers from interacting with their students through social networking sites (and rightfully so), Facebook and other similar sites can be very helpful for promoting and publicizing FFA activities and events. If utilized correctly, and appropriately monitored, Facebook can be an excellent tool for communicating with all chapter members regarding FFA activities and events. With the frequency students check Facebook and communicate with friends using it, this can be especially helpful for agriculture teachers who do not have daily contact with all students/FFA members. Getting the word out about meetings, deadlines and activities just became easier.

Doodle (http://www.doodle.com/): Do you struggle to find convenient times to hold chapter officer meetings? With chapter officers who are involved in band, chorus, athletics, church activities, and hold part-time jobs – scheduling around their schedules can be a nightmare. Luckily, free online services, such as Doodle, make this a bit easier. Simply enter in the email addresses of your chapter officers, select potential dates and times for your meeting, and invite them to respond indicating their availability. Once all officers have responded, you can quickly determine which meeting date and time is most convenient for all involved. This cuts down on the time involved in hunting down your chapter officers and gathering schedules from each. Doodle is so simple to use; one of your chapter officers can easily take responsibility for coordinating schedules once they are familiar with the process.

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The Agricultural Education Magazine	300 Garrigus Building / 325 Cooper Drive Univ. of KY, Lexington, KY 40546-0215
(not-for-profit ... no stockholders)	

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12. Tax Status *(For completion by nonprofit organizations authorized to mail at nonprofit rates) (Check one)*
The purpose, function, and nonprofit status of this organization and the exempt status for federal income tax purposes:
☑ Has Not Changed During Preceding 12 Months
☐ Has Changed During Preceding 12 Months *(Publisher must submit explanation of change with this statement)*

13. Publication Title	14. Issue Date for Circulation Data Below	
The Agricultural Education Magazine	July/Aug '09-May/June '10	May/June 2010

15. Extent and Nature of Circulation			Average No. Copies Each Issue During Preceding 12 Months	No. Copies of Single Issue Published Nearest to Filing Date
a. Total Number of Copies *(Net press run)*			2,230	2,000
b. Paid Circulation *(By Mail and Outside the Mail)*	(1)	Mailed Outside-County Paid Subscriptions Stated on PS Form 3541(Include paid distribution above nominal rate, advertiser's proof copies, and exchange copies)	2,011	1,834
	(2)	Mailed In-County Paid Subscriptions Stated on PS Form 3541 *(Include paid distribution above nominal rate, advertiser's proof copies, and exchange copies)*	0	0
	(3)	Paid Distribution Outside the Mails Including Sales Through Dealers and Carriers, Street Vendors, Counter Sales, and Other Paid Distribution Outside USPS®	0	0
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c. Total Paid Distribution *(Sum of 15b (1), (2), (3), and (4))*			2,036	1,859
d. Free or Nominal Rate Distribution *(By Mail and Outside the Mail)*	(1)	Free or Nominal Rate Outside-County Copies included on PS Form 3541	0	0
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	(4)	Free or Nominal Rate Distribution Outside the Mail *(Carriers or other means)*	0	0
e. Total Free or Nominal Rate Distribution *(Sum of 15d (1), (2), (3) and (4))*			0	0
f. Total Distribution *(Sum of 15c and 15e)* ▶			2,036	1,859
g. Copies not Distributed *(See Instructions to Publishers #4 (page #3))* ▶			194	141
h. Total *(Sum of 15f and g)* ▶			2,230	2,000
i. Percent Paid *(15c divided by 15f times 100)* ▶			100	100

16. Publication of Statement of Ownership
☑ If the publication is a general publication, publication of this statement is required. Will be printed in the Nov/Dec 2010 issue of this publication. ☐ Publication not required.

17. Signature and Title of Editor, Publisher, Business Manager, or Owner
Wm. Jay Jackman, Business Manager — Date: Oct. 29, 2010

I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading information on this form or who omits material or information requested on the form may be subject to criminal sanctions (including fines and imprisonment) and/or civil sanctions (including civil penalties).