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Teach 21: Equipping Teachers to Create Engaged Learners in a Worldwide Intelligent Classroom

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ABSTRACT

Teach 21 is a program designed to support teachers during the process of integrating effective new teaching technologies culminating in student-centered learning. Each participant receives new classroom technology, training and support including, but not limited to: interactive white boards (with wireless, interactive slates), mounted ceiling projectors, and student response devices. Participating teachers agree to a 2 year endorsement program combining Professional Development projects and technology integration projects. The overall goal of Teach 21 is an increase in the level of technology integration in the classroom. Teachers produce project-based units to engage learners in authentic learning experiences utilizing the most current technology. The program utilizes The Learning Pyramid to plan and develop student-centered teaching strategies that integrate technology in an exemplary manner and supports purposeful problem-solving, performance-based assessment practices, and experiential learning. The program is producing engaged, enthusiastic, technology-savvy learners who are increasingly able to connect from their classroom to other learners and professionals across the globe.

KEYWORDS: *Technology integration, Professional development, Engaged learner, Intelligent classroom, Students with disabilities, English language learners, Project-based learning*

WORLDWIDE INTELLIGENT CLASSROOM

What does a high school student in Woodstock, Georgia, (located 40 miles north of Atlanta, Georgia, USA) have in common with an expert in microbiology at the Centers for Disease Control and Prevention (CDC), a local pharmacist, and a farmer? Why are students at Cherokee County High School in contact with a World History teacher in Great Britain and another history teacher in Arizona, 1800 miles away? They are all participants in an “intelligent classroom” – a learning community, connected via technology, creating a worldwide classroom with no walls, no boundaries, and endless opportunities to learn from experts around the world. The CDC scientist, pharmacist, and farmer are all providing their expertise for students in Mrs. Maureen Miller’s AP biology class at Sequoyah High School, Cherokee County, Georgia, as they study antibiotic resistance. The history teachers in Great Britain and Arizona have linked their world history classes to Mr. Bill Burton’s world history classes at Cherokee High School, Canton, Georgia, in order

to compare and share perspectives in the study of world history. This collaboration is made possible by Teach 21, an innovative, unique program begun in the Cherokee County School District, USA, with the goal of providing the finest 21st century education for the students in Cherokee County District Schools.

Teach 21 is a multi-year professional development program designed to prepare and equip 21st century teachers, K–12, to engage students through the use of information and communication technology. The program is designed to help teachers involve students in authentic learning by integrating the latest teaching technology into the classroom. Cherokee County, Georgia, USA, has developed Teach 21 to (1) provide the newest technology, (2) train teachers to integrate the use of technology in everyday teaching and learning, and (3) prepare teachers to guide and instruct their students as they learn and create using these various technologies. The technology is integrated into all required academic subject areas: English, mathematics, science, and social studies. Participants keep an electronic portfolio of growth through the program. In order to complete the program, participants earn points through training classes taken outside of the normal school day, classroom projects, reflections and collaboration.

The focus of Teach 21 is on integrating the National Educational Technology Standards while teaching the Cherokee County School District curriculum standards. Phase I includes teachers in core subject areas: English/Language arts, math, science, social studies, and special education. Phase II includes media specialists.

In the past, many jobs were available for individuals with few technology skills, but that is no longer the case in the 21st century. Appropriate curricula to prepare students for the 21st century must include the use of technology by students. Furthermore, it “must be infused with skills necessary for living and working in an ever-changing society. Relevant, real world education should include: information and communication skills, thinking and problem-solving skills, and interpersonal and self-directional skills”. (Laptops for Learning, 2004, page 5).

Relevant, real world education must include the use of current technology to teach each academic subject, as opposed to previous generations that studied technology independent of an academic subject. In the 1980’s it was common for students to take a computer class to learn to program in a particular computer language such as BASIC or FORTRAN. These courses were separate and distinct from the students’ other academic course work. Teach 21 uses technology to reach students in order for them to learn in all subject areas.

Digital Natives, Digital Immigrants

Cherokee County School District leadership realized that most classrooms are staffed with a teacher who is best described as a “digital immigrant” and students who are “digital natives”, terms coined by Marc Prensky (2001). He describes “digital natives” thus,

Our students today are all “native speakers” of the digital language of computers, video games and the Internet... Today’s students-K through college-

represent the first generation to grow up with technology. They have spent their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all the other toys and tools of the digital age. Today's average college grads have spent less than 5,000 hours of their lives reading, but over 10,000 hours playing video games (not to mention 20,000 hours watching TV). Computer games, email, the Internet, cell phones and instant messaging are integral parts of their lives. (p. 1)

Prensky further defines those from the previous generations, the pre-digital age, as "digital immigrants" (p. 2). This lack of exposure and comfort with all new technologies poses new problems for teachers, digital immigrants, who are reluctant to accept new technology in the classroom. Prensky states, "...the biggest problem facing education today is that our Digital Immigrant instructors, who speak an outdated language (that of the pre-digital age), are struggling to reach a population that speaks an entirely new language." (p. 2)

Concurrent with the issue of digital immigrants teaching digital natives in the digital age, technology provides wonderful new opportunities for digital immigrants who will embrace what technology has to offer. Teach 21 is designed to assist digital immigrants to become fluent in the ways of digital natives and to assist young teachers, digital natives, to flourish!

Engaged Learners

The Learning Pyramid (National Training Laboratories, 1954) indicates that in order to maximize instruction, students need to be actively engaged in the learning process. (see Figure 1).

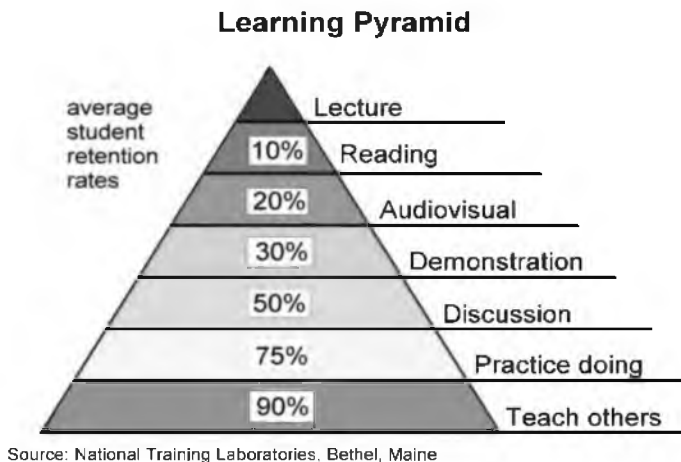


Figure 1. Learning Pyramid

Collaborative learning groups involved in “practice by doing, teaching others, and immediate use” are all hallmarks of engaged learning fostered through the Teach 21 program. In order to engage students in the Cherokee District Schools, the School District leadership determined to reach today’s digital natives by motivating them through relevant uses of technology in the classroom, developing classrooms that are active and interactive learning communities through the creation of “intelligent classrooms”. Intelligent classrooms house emerging technologies such as: interactive whiteboards with remote slate-style devices, student response devices, multimedia computers, podcast and vodcast devices, laptops, multimedia projectors, and classroom audio systems. The use of these types of technologies provides teachers with the tools needed to engage digital natives. Engaged learning as defined by Jones, Valdez, Norakowski, and Rasmussen (1994) is characterized by eight key indicators:

1. students are responsible for their own learning,
 2. learning tasks are challenging, authentic, and multidisciplinary,
 3. students will assess what they actually know and can do using performance based assessment,
 4. instruction is interactive, generative, problem-, project-, and goal-based.
 5. the classroom is a knowledge-building learning community that values diversity and multiple perspectives, that
 6. crosses the classroom boundaries
 7. the teacher is a facilitator, not the primary information giver, and
 8. the student role, that of an explorer, becomes a producer of knowledge, capable of making significant contributions to the world’s knowledge.
- (p. 1-2)

TEACH 21 PROGRAM

Teachers involved in the Teach 21 program, commit to a 2-year program comprised of professional development courses designed to train teachers to use technology in their classes and to facilitate the use of technology by their students. Participants’ classrooms are transformed into “intelligent classrooms” by the installation of several key technologies: interactive whiteboards (with wireless, interactive slates), laptop computer (wireless with docking station), Creation Station computer, ceiling mounted LCD projector, wireless student response devices, and computers for student use (see Figure 2). In addition to this equipment, teachers may request additional technology, hardware and software, as needed to teach their particular curriculum.








	SMART Board Interactive White Board
	Ceiling-Mounted LCD Projector
	Replacement of all PCs in the classroom with new flat-panel, space-saving PCs
	New teacher laptop with docking stand
	Airliner wireless slate that can be used throughout the classroom to engage students in learning
	New black and white laser printer
	Quizdom wireless voting machines that enable students to answer poll questions from the teacher. Results can be viewed by the entire class. (Plus many other uses.)

Figure 2. Teach 21 Equipment

Participants also must produce multiple technology integration projects as proof of their students' active, engaged, technology-based learning. Professional development courses to train teachers in the use of their new technology include: Using Electronic Whiteboards to Engage 21st Century Learners, Using Quizdom Student Response devices, Podcasting for Educators, Web 2.0, Authentic Learning Using Internet Projects, Maximizing Online Resources, and Scavenger Hunt-Defined Research on the Web.

The final requirement, called a Capstone Project, is a project-based unit cho-

sen by the teacher on a topic of interest to her and her students, and a use of technology to support authentic learning. Teachers share their findings on the effectiveness of the unit and the use of technology with other teachers at the conclusion of the project. An example of a Capstone project is a 4th grade (9-10 year old students) science class who researched (via the internet) common illnesses caused by viruses and bacteria, spread through everyday contact, such as the common cold. The children then invited an expert in microbiology to speak to their class. The scientist instructed the children on safe procedures for collecting samples from around their school in order to learn what disease causing germs are present on surfaces in their school. The professional microbiologist agreed to incubate the samples in his lab and analyze the samples for disease causing agents. The students communicated with the scientist via the internet asking questions and receiving feedback. Students then used computers to create two public service videos on how to avoid becoming sick due to viruses and bacteria on surfaces.

In the second year of the program there are 232 teachers, kindergarten through 12th grade, involved. Each autumn, a new cohort of teachers begins the program, having applied to be accepted the previous spring.

Lo-Ti Scale

Teachers enter the Teach 21 program with a wide range of experience in the use of technology in the classroom. Teach 21 seeks to assist teachers as they grow in their use of technology. In order to expand the use of technology as a tool for authentic learning, teachers must first assess their current use of classroom technology in order to plan for growth. The Levels of Technology Implementation, or LoTi, is a framework developed by Christopher Moersch (1998, p. 42) to accurately measure authentic classroom technology use. (see Table 1) Teachers assess their LoTi Scale rating upon entering the Teach 21 program and again at the end of the program to gauge growth. Care is taken to select a Capstone project that has a higher rating on the LoTi Scale than the teacher had when he/she began the program.

Table 1. LoTi Scale

Level	Category	Description
0	Non-use	Lack of access to technology-based tools. Existing technology is text-based (e.g., ditto sheets, chalkboard, overhead projector)
1	Awareness	The use of computers is generally one step removed from the classroom teacher (e.g., computer-based pull-out programs, computer literacy classes, central word processing labs).
2	Exploration	Technology-based tools serve as a supplement to existing instructional program (e.g., tutorials, educational games, simulations).
3	Infusion	Technology-based tools including databases, spreadsheets, graphing packages, probes, calculators, multimedia applications, desktop publishing, and telecommunications augment selected instructional events.
4A	Integration (mechanical)	Technology-based tools are integrated in a mechanical manner that provides rich context for students' understanding of the pertinent concepts,

		themes, and processes Technology (e.g., multimedia, telecommunications, databases, spreadsheets) is used to identify and solve authentic problems relating to an overall theme/concept.
4B	Integration (Routine)	Teachers can readily create Level 4 (Integrated units) with little intervention from outside resources. Technology-based tools are easily integrated in a routine manner that provides rich context for students' understanding of the pertinent concepts, themes, and processes.
5	Expansion	Technology access is extended beyond the classroom. Classroom teachers actively elicit technology applications and networking from business enterprises, governmental agencies, research institutions, and universities to expand student experiences directed at problem-solving, issues resolution, and student activism surrounding a major theme/concept.
6	Refinement	Technology is perceived as a process, product, and tool toward students solving authentic problems related to an identified "real-world" problem or issue. Technology provides a seamless medium for information queries, problem-solving, and/or product development.

RESULTS

Since Teach 21 has only recently begun, collection of data measuring student achievement gains due to Teach 21 is on-going. Student standardized test scores will be monitored to discern measurable gains and gains for students in Teach 21 classrooms are just beginning to be measured. Student performance on high-stakes tests used to assess compliance with No Child Left Behind mandates will be used to assess the effectiveness of Teach 21. One such high-stakes test is the Georgia High School Graduation Test (GHS GT). Students in Georgia must pass this exit exam, GHS GT, in order to receive their high school diploma. This multiple-choice exam consists of 4 sections: English, math, science, and social studies, as well as an essay writing component.

One Teach 21 participant, Mrs. Barthlow, prepared her students to take the science section of the GHS GT using only Teach 21 technology and methods. She reported a 100% pass rate in 2008 on the science section for students that prepared using Teach 21 resources as opposed to 91% passing in 2006, before the total use of Teach 21 resources were available for review. Prior to Teach 21, students prepared for the GHS GT using teacher-led review sessions involving pencil and paper as opposed to digital technology. As a result of using Teach 21 technology, Mrs. Barthlow's students performed better than previous years' students. (See Figure 3)

Of greatest significance is the 100% passing rate among student groups that typically do not pass this exam on their first attempt, students with disabilities (SWD) and English Language Learners (ELL). The teacher, a 22 year veteran, reports that the students expressed a higher level of confidence in their preparation (Teach 21 methods and digital resources) as opposed to the stress levels of test takers in previous years that prepared the traditional way with fewer digital resources. This teacher's students were college prep chemistry students, none of which were labeled gifted or advanced placement.

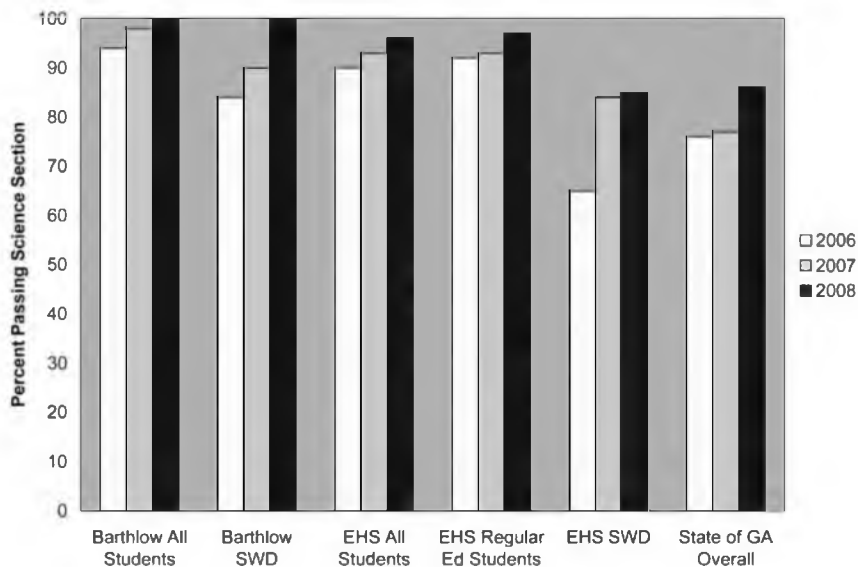


Figure 3. Digital GHS GT Results

As a result of Mrs. Barthlow's students' success on the GHS GT, her preparation program is being shared across Cherokee County in hopes of reaching more at-risk students, especially SWD and ELL students. Teachers that are not preparing students for the GHS GT are modifying her model to teach their particular subject matter, including preparing students for high-stakes tests other than the GHS GT.

Lo Ti Scale Improvement

Mrs. Barthlow's LoTi scale measurement jumped from a 2 at the beginning of the Teach 21 program to a 6 at the end. Similar gains are recorded for most Teach 21 participants.

CONCLUSION

Since the beginning of Teach 21 in the fall of 2006, the response from teachers and the results for students has been overwhelmingly positive. Teachers rushed to be the first to learn how to more effectively utilize technology in their classrooms. Students were thrilled with the arrival of each new piece of equipment. Engaged learning was immediate and the consequences far-reaching. Teachers report that students are excited about learning and ask for permission to stay after school to continue to work on technology-based projects after the school day has ended. Students that have not thrived in the 'old ways' of teacher-led, unengaged learning – sitting passively and completing worksheets, are experiencing new success in the classroom. For these students, technology-based lessons have allowed them to have very positive learning experiences.

For his vision and leadership in developing Cherokee County District School's Teach 21 Program, eSchool News recognized Cherokee County School Superintendent, Dr. Frank R. Petruzielo, as one of the Top Ten Tech-Savvy Superintendents in the Nation (USA) in 2007. As word of the Teach 21 program has spread, teachers from outside Cherokee County are requesting access to the teacher-made and student-produced projects in order to use these resources in their schools.

Although in its infancy, Teach 21 is training teachers and providing technology for the classroom to provide authentic, student-led, project-based learning for the children of the Cherokee County School District and is linking learners across the globe with professionals in the individual field of expertise that the student is studying. Through the professional development courses taken over a span of 2 years, teachers are learning how to best integrate information and communication technology to teach their curriculum. Students are provided with opportunities to work and learn alongside classmates in their own classrooms as well as with children and experts around the world. Students in Teach 21 intelligent classrooms are involved in student-centered, purposeful, problem-solving, performance-based, relevant, experiential learning. Teachers, administrators, parents, and students all agree that the program is well worth the investment of time and financial resources.

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