Case Study of White County High School

Use of the SC ATE Technology Gateway Curriculum for Dropout Prevention

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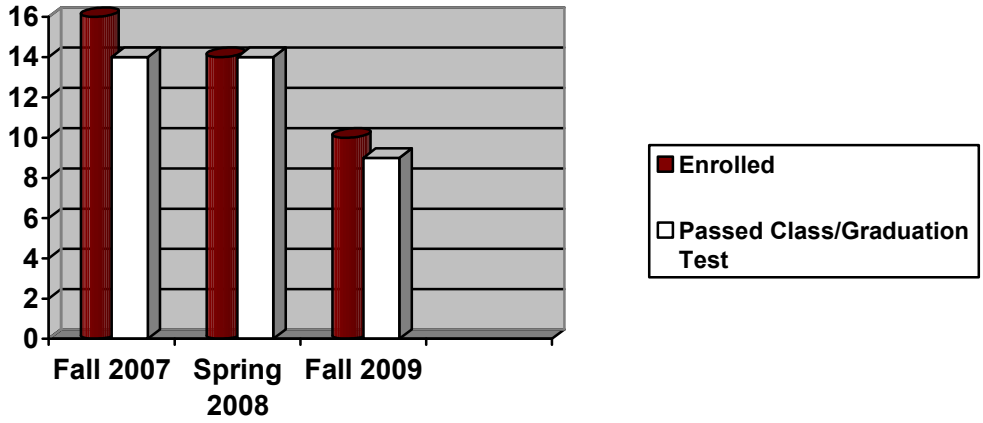
At White County High School, over the past two years, 60 students have been at-risk for failing to pass the math and/or science sections of the Georgia High School Graduation Test, their last requirement for earning a high school diploma. In 2007-08, to help these students pass this test and earn their diploma, White County High School introduced a new class that incorporated the SC ATE Technology Gateway curriculum.

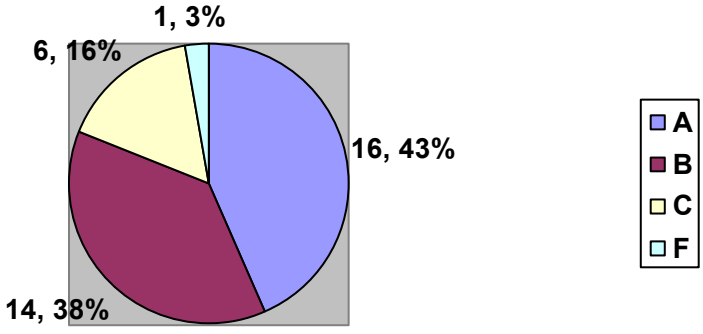
As shown below, since its inception 17 males and 23 females (40 students total) have completed this course. All but three of these students passed the math and/or science sections of the Georgia High School Graduation Test, for a success rate of 93%.

Figure 1. Enrollment and Passing / Graduation Trends for Technology Gateway Class



Additionally, all but three students earned a C or better. For many of them, these were some of the highest grades they had received in high school.

Figure 2. Grades received by Technology Gateway Class Students (Fall 2007 – Fall 2008)



The number of students dropping out of high school before graduating is one of the most serious education issues facing school districts across the U.S. Research has shown that a student's decision to drop out of high school is often the end result of a long series of negative school experiences - academic failure, grade retention, failure to pass end-of-year or other competency test, and more critically, lack of school engagement.[1]

On average, one-third of all high school students leave the public school system before graduating[2], with dropout rates for students of color and students with disabilities higher than rates for white and non-disabled students.[3] In Georgia in 2008 the high school graduation rate was 75.4 percent, up from 63.3 percent in the 2002-2003 school year.[4] Despite this increase, 25% of students in Georgia dropped out before earning a diploma. This was estimated to have had an $18 billion economic impact on Georgia for 2008.[5]

More critical, perhaps, are the consequences of dropping out for the individual. They include:

- Fewer employment opportunities, as the labor force increasingly requires persons with higher literacy skills, more education, and enhanced technological skills;
- Increased engagement in high-risk behaviors such as premature sexual activity, early pregnancy, delinquency, crime, violence, alcohol and drug abuse, and suicide; and
- Increased reliance on welfare and other social programs.[6]

In addition, estimates suggest that:

- the lost lifetime earnings of Georgia's 2007 dropout class totals more than $15 billion;
- in 2005, non-high school graduates earned $8,367 less annually than high-school graduates and $36,618 less than college graduates;
- Over an adult's working life, high- school graduates earn $1.4 million – $400,000 more than non-graduates. The average person with a bachelor's degree will earn $2.5 million, with a master's, $2.9 million.[7]

White County, Georgia – "The Gateway to the Blue Ridge Mountains"

White County, Georgia is located in the foothills of the Blue Ridge Mountains, an hour and a half north of Atlanta. Travelers who come this way tend to pass through the town of Cleveland, where White County High School is located, on their way to other destinations just a few miles away, such as the Bavarian-themed town of Helen and its Oktoberfest celebration, Unicoi State Park, the Smithgall Woods-Dukes Creek Conservation Area, or the Chattahoochee National Forest. Those with a little more time may stop in Cleveland to visit either the Babyland General Hospital, where the Cabbage Patch Kids dolls, the conception of native Xavier Roberts, are still created, or the Adrian Fisher Corn Maze which covers eight acres and contains over three miles of mazes in the form of crop circles.

Prior to 1800, the area around Cleveland was the center of Cherokee Indian culture, with villages scattered throughout Nacoochee Valley and what is now known as Helen Valley. In 1813 the Cherokees approved construction of the Unicoi Turnpike, a wagon road through their Nation from the Savannah River headwaters to northeast Tennessee. This trail, now Highways 17 and 75, ran through the valleys toward Hiawassee. For the Cherokees it would become known as the "Trail of Tears" as it was the route by which they were forced from their ancestral lands.

Gold was discovered in Dukes Creek in Nacoochee Valley in 1828. Thousands of miners came into the Valley and mined the foothills for over a century, generating thousands of pounds of gold. Timber officials replaced the miners by the end of the 1800s, after seeing the size and quantity of virgin timber available for cutting. Matthews Lumber Company, one of the first and largest sawmill operations continued production until 1931, shipping lumber to Europe and the U.S. until all timber was cut.

Both the gold rush and timber industry helped prompt the development of Cleveland as a small agricultural center, being officially established in 1857 as Mount Yonah. Even though mining is no longer profitable in this area, logging and commercial farming still support residents, as do small business and the local tourism afforded by the vacation theme town of Helen and other nearby outdoor attractions. Freudenberg-NOK, an auto parts manufacturer, is a major employer in this area as well, but residents worry that with the recent economic downturn fewer jobs will be available at this plant. Like many small towns in rural America, the school system may be the largest employer.

White County School System

The **White County School System** serves approximately 3,800 students across seven schools. Ninety-five percent of its students are white and approximately 40% receive free or reduced lunch. The mission of the White County School System is "in partnership with parents and community…..to promote quality lifelong learning and to foster productive citizenship in a safe and caring environment".

Educators in the White County School System work hard to help their students achieve. Students at all levels (elementary, middle, and high) are required under No Child Left Behind (NCLB) to take part in the state testing program, the Georgia Student Assessment Program, in efforts to monitor their achievement. The high achievement of students in two of White County's schools resulted in them being recognized as Georgia Schools of Excellence. However, like many schools across the nation, some of White County's schools struggle to meet NCLB and Annual Yearly Progress (AYP) standards. In White County High School, where graduation rates and students' performance on the Georgia High School Graduation Test affect whether they meet AYP standards, the Technology Gateway curriculum was used as a basis for a new class to help students at-risk of failing the math and/or science portion of the Georgia High School Graduation Test.

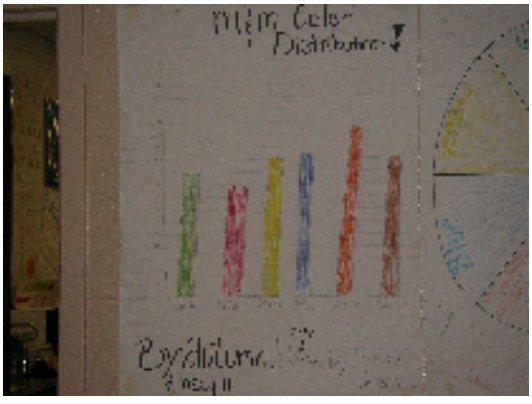
White County High School –The Fighting Warriors

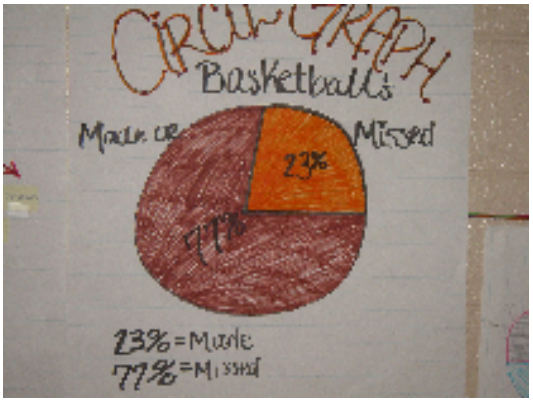
White County High School sits atop a hill located a few miles from the town square, serving approximately 756 students in grades 10-12. Its parking lot has been terraced into the surrounding hill with tennis courts and athletic fields at its base. Entering the school one may be surprised by how clean and orderly it appears, given how schools are often depicted in the news. Students mingle in the foyer in small groups with their friends, greeting other friends and teachers, or gather around tables in the cafeteria waiting for first block classes to begin. Jeans are their de facto uniform although some are wearing shorts despite the blast of arctic air that has blown through this region the last two days. T-shirts too seem to be standard, although many students are wearing sweatshirts, mainly the hooded type, some with the school logo on them. Girls wear their hair long; some boys do too although it is usually at or above their shoulders. Headphones can be seen on many students and I-Pods of all types are being held or passed among friends.

The Technology Gateway Class

As 8:10 arrives the students in the **Technology Gateway class** make their way into Mr. Singer's classroom. This semester this class is made up of fifteen juniors whom teachers have identified would benefit from additional math and/or science help in order to pass the Georgia High School Graduation Test, and two seniors who have one more chance at passing the math or science portion of this exam. Of the fifteen, eight are girls and seven are boys.

Mr. Singer's classroom is arranged like many biology classrooms – desks are arranged in rows with tables against the two side walls. Posters drawn by students depicting photosynthesis, meiosis, and food webs are taped to the walls along with commercial posters depicting weather, birds, and lab safety measures. Outside are more posters, some drawn by students in the Technology Gateway class, depicting math activities they have done to understand how to represent data using graphs.





As students enter they sit next to their friends; some continue talking, others open milk cartons and unwrap snacks. Many seats are empty, underscoring the fact that this class is much smaller in terms of the number of students enrolled, compared to other classes that average thirty students or more.

Mr. Singer, the science teacher for this class, and Mrs. Delk, the math teacher, have taught this class since its inception. This is their fifth class of students. Both are veteran teachers and have different subject matter expertise and teaching styles. However, both appear at ease with their students, greeting and joking with them and each other as they wait for class to begin.

The principal's voice is soon heard over the loudspeaker requesting a moment of silence. After 30 seconds have passed all students stand and recite the Pledge of Allegiance; announcements follow. At the end of announcements one student asks if they are doing science or math today (science) and the answer elicits responses and comments: "What are we going to actually do?" "I like science – I like math too, but it doesn't like me." "Are we going to get to do a project?"

Mr. Singer calls the class to order before introducing me. He then instructs the class to "act the way you normally act – which is great – you are a good class – we have a fun thing planned which is what we always do". Mrs. Delk instructs a student to pass out some materials which again elicits comments: "Is this a worksheet?" "I don't like these formulas." "I thought we were going to do a project!"

Once all students appear to have the handout Mr. Singer begins to explain what they will cover today. He speaks a few sentences and then looks up. One of the girls has on a pair of glasses with a large elongated frame. "Hey, Elton John." She looks at him and laughs as the rest of the class tries to glimpse her glasses. He asks her if she even knows who Elton John is. "Of course I do!" she says with mock indignation. Mrs. Delk tells the class that her parents live next to him in Atlanta and that every Monday he pays $10,000 to have yellow roses placed throughout his apartment.

Mr. Singer gets back to business and negotiates with the class how many minutes he has to lecture. They suggest one but he negotiates to three and it stretches to seven, but the students are still engaged. He introduces them to Newton's three laws of motion. He reads them and then explains each using a scenario he thinks they will relate to. One of Newton's laws states that for every force there is an equal and opposite force. Many of the students in this class have been hunting or been brought up around guns and thus Mr. Singer talks about the kickback of the gun one experiences when firing a shot. The students talk about having experienced this themselves. As their discussion digresses to where one should best shoot a deer, Mr. Singer brings them back to the handout. He points out that one of the pages is the "exact page you will see on the graduation test". He notes that this page may seem intimidating but that as they cover this material it will begin to make sense, and should not intimidate them on the test.

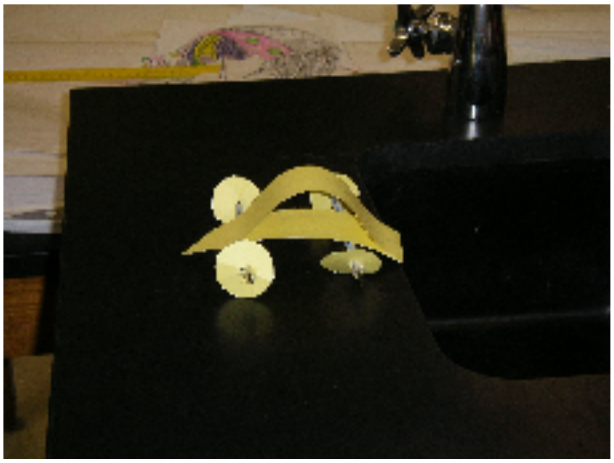
With no break in flow, Mrs. Delk takes over and begins explaining the project they will begin. She tells them that they will build a car out of cardstock "**AND"** that one of the goals is for them to figure everything out on their own. She tells them they may talk to each other and ask each other questions, but may not ask her or Mr. Singer for help. She then asks them to think about a semi-truck and a VW Beetle and asks them if they know how streets in San Francisco look. "Which of these would go down one of those hills faster?" she asks. For the most part the students agree that the semi-truck would be faster. When asked by her, they connect this to Newton's second law of motion: force equals mass times acceleration. Mrs. Delk explains that they will race their cars the next day and that whoever's car goes the fastest or travels furthest

gets a prize. With the warning to not glue their wire (axle) to their car when they glue their straws (axle cover) on, the students begin.

Some of the students remain where they are seated as other students group together in the back of the classroom and still others hand out scissors and compasses. One student asks Mrs. Delk a question. She tells him, "You have to **READ** to find out the procedure". He whines a little but begins to peruse the handouts. Some students are talking about ways to make their cars faster and she reminds them they can only use cardstock. She tells them that last semester the class cheated and added pennies to the base of their cars. She finds one and shows it to them. "I guess it shows they understood the importance of mass to speed!" she muses with a smile.

She and Mr. Singer begin moving around the classroom, checking in with students or sometimes just listening. Some students are talking about their cars, others are talking about boyfriends, two are listening to I-Pods and trading headphones with each other as different tunes catch their attention. But are all working on their cars. As the cars progress Mr. Singer uses a wire cutter to cut the axles from some wire clothes hangers. Like any good salesman, as students come to him for the wire he shows them the basic line but also the "upgraded" and "deluxe" line of axles. He looks at their cars and helps them decide which "model" to "purchase". They know the only difference is that some axles are longer than others.

As this is happening my attention focuses on one girl who appears to be spending most of her time walking around class and checking in on others' progress. But in all of her wanderings she is one of the first to finish her car! It is very aerodynamic with a curved top and I wonder if it will be one of the winners tomorrow.



Some students don't progress as far on their cars – most have concentrated on their wheels with little thought to the body of the car so they are left making a body out of their scraps. One student has made a Monster Truck – it has the small body and jacked up wheels one sees on the commercials that begin "Power, Power, Power – The Monster Truck and Tractor Pull is coming!" Tomorrow his wheel will fall off and as Mrs. Delk tries to help him get it to stay on she'll accidentally make a second hole in his wheel, besides the one where the axle attaches. As this happens she'll push the car in his hands and run away, claiming not to know anything about this new "feature" as she refers to it, as he good naturedly complains.

"Like A Family" - Making it Real

"I know it sounds corny to say - we are **like a family** in here." Mr. Singer explains to me when I talk to him later in the day. But one of the four students from last semester's Technology Gateway class has already told me the same thing, "The teachers [Mr. Singer and Mrs. Delk] said that we were like family". The other three explained what that meant, "The teachers weren't uptight at all." The teachers were there as a friend – if you ever needed anything." "Yeah – they didn't yell at us if things went wrong or we got out of line." "We could ask more questions [than in other classes]."

Mr. Singer tells me that it was intentional to keep the class small and have two teachers, one math and one science, co-teach the class. He also says that he and Mrs. Delk have always tried to be open and honest about things in the class, such as their own failures and frustrations with science and math. This is done, he says, to build trust with the students and with each other. He notes that they don't need to have a rigid structure to class because of the trust between the teachers and students that they are here for the same reasons – to help the students be successful and pass the Georgia High School Graduation Test.

The impact of this trust and shared goal was emphasized by two students I talked to. They recounted how one of them came to the others' house to get him out of bed one morning so that he would be in school and not miss this class. The student who had tried to sleep in noted that at first his friend and teachers were more invested in him passing the Georgia High School Graduation Test than he was, but that over time he became invested as well because of "how the class was – how it was run and what we did". Mrs. Delk talked about this student as well when I met with her. She wondered if his past failure of the Georgia High School Graduation Test was not because he couldn't, but because he didn't think anyone cared whether he did. After last semester's class he passed and she believes he made that effort to please her and Mr. Singer.

Another way trust is built is by helping students better communicate with each other. Both teachers talked about the Technology Gateway curriculum's focus on communication, collaboration, and teambuilding and have used many of the exercises and problem-solving activities to develop this among their students. All of the students I spoke with remember building "the straw house" while not being allowed to talk to each other. The students noted that this and other activities have helped them work better with each other and that they even hang out together now whereas they didn't before, even if they had been in classes together.

"Hands-on" - Making it Relevant

The Technology Gateway curriculum provides the basis for some of the academic curriculum that is used in this class. The main curricular pieces used are the ones that address what students will be tested on for the Georgia High School Graduation Test. When discussing how lessons from the Technology Gateway curriculum are identified for use with this class both Mr. Singer and Mrs. Delk spoke about the need for what the students to learn to be "relevant" to them. Because the Technology Gateway curriculum is project-based and thus makes material less

abstract, they believe it better allows students to see how what they are learning applies to them. The teachers believe that the hands-on aspect to learning that is also provided via this curriculum is one of the key aspects to helping students achieve. However, the students say it best: "Normally I fall asleep and I don't fall asleep here." "It's **hands-on** - lots of hands-on stuff – you're always doing something, always up doing." "We never do bookwork – I can't learn with bookwork because it's boring and puts you to sleep" "[In other classes] You just follow along with teacher – they are not even teaching anything!" "This [the class and the hands-on activities] is more helpful than any other class out there."

The teachers have even gone beyond some of the Technology Gateway projects to make them more relevant to the students: One of the projects in the Technology Gateway curriculum requires students to problem solve using simple machines. In this problem students are asked to consider the scenario where they must move multiple heavy boxes from a basement to the first floor and to develop a scaled down model of a machine to help them do this. Mr. Singer and Mrs. Delk posed the problem to the class as "How would you move multiple heavy boxes from the biology room to the ceiling above?" After having little success in solving the problem using scale models, the students convinced the teachers to let them actually try. One student welded a platform together during welding class to hold heavy weights; other students built a pulley system. When the system was tested, the students found it was easy to move a few boxes, but hard to pull the pulley more than ten or so times before becoming tired. They then added counterweights and solved their problem. The students noted that contextualizing the problems to fit a scenario they may encounter and using a hands-on approach helped them remember the concepts they were learning. They talked about taking the Georgia High School Graduation Test and remembering the concepts they would be asked about by relating it to the project or activity they had done.

The issue of relevancy is the only concern the two teachers have about the Technology Gateway curriculum. Using it as a part of a dropout prevention program with high school students, versus using it with college students, necessitates that the curriculum is as relevant to students as possible. While some of the curriculum addresses areas not covered by the Georgia High School Graduation Test and thus are not used in this class, other areas are areas in which students will be tested, but the associated activities lack relevancy or do not provide teachers the means to teach it using a hands-on approach. But both teachers recognize the Technology Gateway curriculum as helpful approach for working with at-risk students and credit it for helping them think of ways to teach differently.

Real + Relevant = Student Engagement and Teacher Renewal

Perhaps the greatest thing about the Technology Gateway class is that students are engaged in what they are doing in the class, as well as more engaged in school in general. Students reported that having the Technology Gateway class first thing in the morning helped them start their day off on a positive note. For some students it was what made them decide to come to school. A few students reported that in the past, even when they came to school they ditched some classes, but were less likely to do so now that they were in this class. It's clear something has changed for them. As one student said, "It's like being in kindergarten". Kindergarten is a time of

exploration where learning and fun are inseparable – maybe this is what is going on here.

Much of this engagement comes from students' feelings that the hands-on projects they are doing have helped them to be successful and understand concepts they did not comprehend in the past. Students reported that the classroom structure where students are required to work and communicate with each other has helped them feel less isolated. Students also noted that the way Mr. Singer and Mrs. Delk interact with the class has had a large positive effect on them because the teachers treat them with respect and are willing to help them if they have questions. These students feel that their teachers are engaged with and by them, and they are responding. As one student put it, however, the engagement impacts them more than academically, "We're learning more than academics – the way they [Mr. Singer and Mrs. Delk] talk to you – it's not morals – I guess its values".

Using hands-on activities to teach at-risk students has engaged the teachers as well, making both more aware of how much learning it affords. Mr. Singer and Mrs. Delk reported that they now use more hands-on activities when teaching lessons in their other classes because of the success they have had with the Technology Gateway class. In some cases they even use the same activities they use with the Technology Gateway class. Both teachers believe that teaching this class has had a positive effect on them as professionals. As Mrs. Delk noted, "Teaching this class has made me a better teacher, so it helps them [students in regular cases]". Mr. Singer explained, "I found out there really is a way to reach students that are at-risk…. Professionally it is invigorating to me to think that finally here is a model of teaching that addresses all concerns: it helps students make connections between their academic life and the real world, prepares them for standardized testing and perhaps most importantly, renews the classroom experience for both teachers and students."

Synergistic Activities and Observations

Mr. Singer also reported on the synergistic activities in which he has engaged his Technology Gateway classes. One example involved having this class team with the honors physics class to navigate the campus using compasses and applying trigonometric principles. Each Technology Gateway student was paired with a physics student and assisted him or her in the process of navigating and diagramming their results. Mr. Singer noted that his students were engaged in this activity and contributed to what the physic students were doing. He stated, "…an outsider would not be able to distinguish one from the other...except for the fact that the [Technology Gateway] students tended to do better on navigating with the compass and the physics students were more familiar with the number crunching aspects due to prior experience".

Implications for Teaching and Learning

Schools are not always places of learning for students who do not learn in traditional ways. Students who do not learn information well via reading or lecture often struggle despite having the same learning capabilities as their peers. The comments from the students interviewed for

this case study, both about the Technology Gateway class activities and teachers and their other teachers, suggests that these students are bright and may be failing because they are non-traditional learners. Most of them indicated that their struggles to learn have less to do with the material than the way in which it is taught. The Technology Gateway class provides these students a hands-on means for learning from teachers who recognize that traditional teaching methods will not work with them. Whereas what used to be taught were reading, writing and arithmetic, the new "three Rs" are Real, Relevant and Rigorous. Curriculum that helps students make connections between what they are learning to real-world situations by providing them hands-on ways to apply, model, and test is critical, but probably most critical to those at-risk of being left behind. However, such curriculum may need to have training support attached to it so that teachers learn how to teach and feel confident teaching using a hands-on approach that supports all students' learning.

For the Technology Gateway students, frustration and boredom as they fell behind made it easiest to not care about trying harder and/or graduating. They spoke of being ignored by other teachers and students and saw no reason to try to change the low expectations they felt had been placed on them. In the Technology Gateway class they feel a part of a community where everyone's learning is supported and helping each other learn is valued. They are too busy engaging in learning to be bored and frustrated. All of them expressed the desire that all of their classes were taught like the Technology Gateway class. However, few of them could identify other teachers in their school that could teach so hands-on. This suggests that for classes to become more learner-focused teachers will need to be taught pedagogical methods and provided opportunities to see them modeled in classrooms in order that they can promote a more learner-centered classroom environment.

The Future of the Technology Gateway Class

No one talks about the Technology Gateway class without noting with pride how much it has helped the students who have participated and met its goals of reducing student dropout rates / increasing graduation rates. However, the future of this class is not clear. While an extremely successful class, the cost of this class is high when one considers that two teachers are working with fifteen students. If this were a regular class only one teacher would be involved and he or she would teach twice as many students. Given the state of the economy both nationwide and locally, the school system may need to make budget cuts and/or not fill new positions. If the high school is required to trim its budget or cannot hire new teachers, depending upon class demands Mr. Singer and Mrs. Delk may be required to teach a class that is required for graduation and reaches more students. In such a scenario, it is very likely that this class would be cut.

What such a scenario may mean for use of the Technology Gateway curriculum remains less clear. As Mr. Singer marveled, "If this system works with at-risk students who care the least about school and have not had a good experience in our system - imagine what would happen if you could do this [use hands-on activities / Technology Gateway curriculum] with your regular classroom!" But the realities are that the regular classroom has both more students and more learning goals that teachers are required to cover. Project-based activities take more time, require more resources, and are harder to conduct successfully when there are thirty or more

students in a classroom. Given this and the pressure to ensure students pass end of course state assessments it's not surprising that teachers rely on lectures to provide students the information they need. It seems likely that Mr. Singer and Mrs. Delk will continue to incorporate more hands-on and project-based activities in their regular classes regardless of what happens to the Technology Gateway class, but the likelihood of adopting a totally hands-on / project-based curriculum seems unlikely.

End Notes

[1] For more information please see the California Dropout Research Policy Brief by Rumberger and Lim titled "Why Students Drop Out of School: A Review of 25 Years of Research."
[2] Swanson, C. (2004). *Who graduates? Who doesn't? A Statistical Portrait of Public High School Graduation, Class of 2001.* Washington, DC: The Urban Institute, Education Policy Center.
[3] Greene, J. P., & Winters, M. A. (2005). *The Effect of Residential School Choice on Public High School Graduation Rates.* Education Working Paper No. 9. New York: Manhattan Institute for Policy Research.
[4] Information from http://www.13wmaz.com/apps/pbcs.dll/article?AID=/20081119/NEWS02/81119025
[5] Information found at http://www.btobmagazine.com/Articles/2008/April/eco_dev_beat.html
[6] Bridgeland, J., DiIulio, J., and Morison, K. (2006). *The Silent Epidemic: Perspectives of High School Dropouts.* Bill and Melinda Gates Foundation.
[7] See #3.