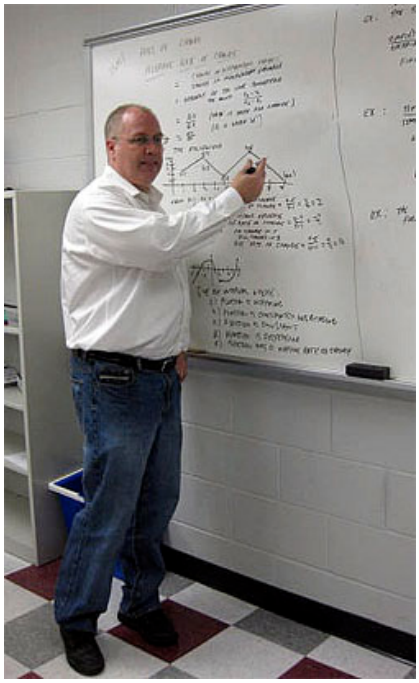
VA: Challenging students with math at J.E.B. Stuart High School



Mathematics teacher, William Horkan, helps students unravel the mystery of derivatives in his International Baccalaureate Mathematics Studies course.

Summary: If you think all students can't handle advanced math, think again! Students at this high school handle advanced math with aplomb thanks to a teacher who believes that any student who wants to, can pass his IB math class. And results show he's right. In 2009, twenty out of twenty-four students coming into his IB class with no advanced math experience passed the IB exam. Read more to find out how it works.

William Horkan, mathematics teacher at J.E.B. Stuart High School in Falls Church, Virginia, believes that students will rise to a challenge when they are offered one. As a result, two years ago, he took the unusual step of opening his advanced International Baccalaureate Math Studies (IBMS) course to any senior who had completed Algebra II either in the regular or advanced sequence of Algebra I, Geometry, Algebra II, and Precalculus. Since then, students, including those for whom math is not their strong suit, have indeed risen to the challenge as they consistently not only pass his class, but also pass its rigorous International Baccalaureate examination.

Many of Horkan's students are also experiencing the linguistic, cultural, and economic challenges that come with being members of recent immigrant families. This suburban school of about 1,600 students, profiled in *National Geographic Magazine* in 2001 as the most diverse school in the country, has second language learners from over seventy countries, and 55 percent of the student body receives free or reduced lunch. Almost ninety percent of the senior class is college-bound, with many graduates attending local colleges, universities, and community colleges because of economic constraints.

District characteristics
Name: J.E.B. Stuart High School
State: Virginia
Type: Suburban
Grades: 9–12
Enrollment: 1,580
Students per teacher: 12.4

Enrollment characteristics
Economically disadvantaged: 54.94%
English language learners: 35.82%
Students with disabilities: 15.57%
White: 27.53%
Black: 10.0%
Hispanic: 40.76%
Asian/Pacific Islander: 18.10%
American Indian/Alaska Native: n.a.
Other: 3.61%
Source: Fairfax County Public Schools

Horkan's IBMS course is part of the challenging International Baccalaureate Diploma Studies Program in which J.E.B. Stuart High School has been certified since 1994. David R. Roylance, J.E.B. Stuart IBDP Coordinator, describes the program as "a strong liberal arts philosophy wrapped around a rigorous curriculum that is designed to prepare students to be successful in college and later as citizens of the world."

At the high school level, students can either take one or several IB courses in various subject areas, or enroll in the full two-year Diploma Program. All courses, including math, require some form of an extended project, such as a research paper, and an end-of-course examination externally assessed by international evaluators. Annually, anywhere from 10 to 20 percent of the school's 300–350 seniors are enrolled in the full IB Diploma Program, and about 50 percent of all juniors and seniors take at least one IB course, according to Roylance.

Horkan's "Aha!" moment about opening up his class came when two students who had failed precalculus enrolled in his course by mistake and passed it and the end of year International Baccalaureate test. "I thought maybe other students who are in the regular math sequence could benefit from being in an advanced math course. My department head at the time told me to go for it, so I did," says Horkan. From an average of thirty-three students per class, the number of students taking IBMS increased to fifty-seven in 2009 and to eighty-

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seven this year (Horkan now shares responsibility for four classes with another teacher, Keith Kohr).

Horkan firmly believes that students develop their math talents at different rates. “It’s like growing. Not everyone grows at the same rate. Some students might ‘get’ math in fifth grade, others in ninth grade, and some might not truly understand it until twelfth grade,” he observes. “If a student doesn't do well in seventh or eighth grade Algebra I for some reason, and the teacher doesn’t recognize the student’s potential to be a stronger student, that student goes into the regular track and can’t take advanced math courses later on. Their high school math career ends at precalculus.”

Horkan recruits registrants for IBMS from his own Algebra II students. He also receives recommendations from his fellow math teachers. “Other teachers ask me what kind of student I want recommended for my IBMS class. I don’t care what grades they previously had in math or in other courses. If they want to be in my class, I’ll take them,” Horkan asserts. One student recounted that her brother’s success in the class had inspired her to enroll. Horkan has also begun to see a small stream of siblings in IBMS.

Lessons learned: What does it take to begin to turn a school around?

- Don’t be afraid of giving students a challenge. Students will rise to a challenge if you present them with one. “If you give a person a chance to go higher than they did before, they’ll at least try, and most of them will actually do it,” Horkan says. “Just because someone’s not on an honors or advanced track to begin with doesn’t mean they can’t handle that work later in their educational career.”
- Every educational system has room for creativity and experimentation. If you have an idea, look for opportunities and ways to improve the system. Don’t just accept things the way they are. “Teachers and school systems should always be looking out for what’s best for each student rather than getting locked into one set way of doing things,” says Horkan.
- Keep the system as flexible as possible. “There’s nothing wrong with tracks or required sequences as long as they aren’t inflexible,” says Horkan. Rather than lock students into a set math sequence, for example, students should be able to crisscross sequences—or mix and match advanced and regular classes—so that they can take courses that challenge them and so that late bloomers can also take advantage of advanced courses. Further, to enhance students’ opportunity for success, “everyone should be put in the highest class that they can succeed in as soon as possible, “ notes Horkan. “This is not the same as putting everyone into Algebra I in seventh or eighth grade, as early as possible, which is the current trend.”
- A support system—a department or program head, or a principal who believes you should try something—is necessary to implement new ideas. “My former department head gave me the latitude to test my idea, and my current head supports the effort now,” asserts Horkan. “When I first wanted to try it, the former school principal also had the attitude of “Go ahead. If it works, great. If it doesn’t, try something else.” The IB program also supports encouraging more students who are not in advanced or honors programs to “stretch into IB courses,” notes David R. Roylance.
- Encourage teachers who teach advanced courses to take professional development courses to increase their ability to teach students who are “middle of the road” students enrolled in advanced courses. David R. Roylance says “It’s not always easy for teachers who are used to teaching very high level students to try to raise less advanced students to the level required to succeed in advanced coursework. Bill Horkan’s gift is that he can work with students at all different levels and bring them all along successfully.”

Part of his students’ success arises from Horkan’s deep-seated belief that they can pass his course. “If someone doesn’t want to take my course, I’m not going to push them into it. Once they’re here, however, I’m going to do everything I can to make sure they pass the class.” And, once students enroll, Horkan does not recommend that anyone drop the class, nor will he sign the forms for them to do so. “If a student wants to get out, they can ask their parents to get them out, but very few of them do so. I feel that no matter how badly they’re doing, they’re better off in my class than not.”

What makes this math class different? “We focus on problem solving rather than on a lot of memorization that’s often required in other courses. Students need to know how to apply what they learn to new material to solve problems. The process of getting to a solution is as important as the answer. Critical and analytical thinking are emphasized,” notes Horkan. In addition, students must write a 2,000-word research paper that is math-based, an excellent project that combines math with English skills. Students can select any topic, such as the correlation between number of parents in the household and a student’s GPA, or the relationship between the number of hours a student studies for a test and his test grade.

Students’ comments reflect how they feel the course enriches their learning experience. One student who enrolled directly from regular Algebra II, skipping precalculus, said: “I really like the class because….It focuses on real world problems, and I can see how math is useful every day…I also never knew how to study for a math test, and now I do.” A student enrolled in the IB diploma program echoed her sentiments: “The course material and tests are cumulative so you’re always building on your knowledge base. Even if it’s math that you studied in another course, we review it and apply it here. It’s an integrated way to learn.” Another student adds: “I was scared of not being ready for college next year. I knew this course would help me get prepared for the first year of college math classes.”

Several extra incentives that can have an impact on college admissions also make this class an attractive one. “Although IBMS is the lowest level of the IB math courses, it is still an advanced course. Students receive a bump up in their GPA for taking the course, plus they have an IB course listed on their transcript if they pass my course and the IB exam. College admissions’ officers know the value of an IB course and respond favorably to seeing a challenging course on the record. Sometimes, students can get college credit for it,” * says Horkan. Parents who are concerned about their students enrolling in a challenging course immediately see the value of these incentives. “Parents are the easiest ones to sell on this class,” notes Horkan.

The results speak for themselves. Of the fifty-seven students in 2009, twenty-four came from non-advanced mathematics backgrounds and twenty of them passed the IB test. His previous average class size had been thirty-three students with advanced math backgrounds, all of who passed the IB test. “What’s important is that we had twenty-four more students taking the class who normally wouldn’t have taken it—not only did twenty-four more take it, but twenty of them passed the IB exam. That made me very happy,” says Horkan. In his six years of teaching the course, “only two students have ever failed and they had to work hard to do that, like refuse to write

the research paper."

Horkan has high expectations for and confidence in his current students: "This year, I'd be surprised if we didn't have at least seventy-five of the eighty-seven students enrolled pass the IB exam in May. That would still be forty-two people who passed [beyond the thirty-three of two years ago]. Of course, all eighty-seven students passing would be the best possible result. No matter what, they'll all be better prepared to be successful in their college math courses."

Former student, Alex Brahmstedt, now a freshman at George Mason University, couldn't agree more: "[Mr. Horkan's] method of emphasizing note taking and practice of mathematical concepts has helped me out in a positive way. I currently have an A in my statistics class and am able to help out some of my peers. Mr. Horkan's class definitely helped me to become a more prepared student and has allowed me to succeed in college level math."

* David R. Roylance notes that the Virginia legislature has passed legislation that will mandate equity for IB results with Advanced Placement college credit in Virginia colleges and universities. The legislation awaits the governor's signature.

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Anonymous @ 4/24/2010 8:42:34 AM

This is very nice article on your efforts, Bill. It is teachers with your success oriented attitude that will be the ones that will make a difference. A teacher with a good positive attitude will always be able to succeed in schools where failure was the only expectation - a negative attitude.

Make sure that your tests are not designed to induce failure. A test should be viewed as an opportunity for the student to demonstrate his or her personal achievements. My 4 rules of education are the same as yours, I believe.
1. Tell them what you are going to teach them.
2. Teach them.
3. Tell them what you taught them.
4. Let them tell you what you taught them and especially noting how mathematics has impacted their life.

Keep up the good work, Bill.

Dr. Robert Suding -(PhD in Systems Analysis in Educational Management) (Bill's father in law)

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