

Dual Enrollment: A STEM/Engineering Initiative

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ABSTRACT

Dual Enrollment partnerships between high schools and universities are not unusual. The Science, Technology, Engineering and Mathematics (STEM) dual enrollment initiative between Kent State University-Tuscarawas and eleven high schools is not only unique in its objectives but also in its delivery method. In conjunction with the Dual Enrollment initiative, we have also implemented a Cyber Club which includes the same eleven high schools and the Women in Engineering seminar. The Cyber Club reaches students on a daily basis in their high schools and the Women in Engineering seminar focuses on bringing more young women into a STEM related field. The result has been an outstanding response and success rate that can be emulated in educational institutions across the country.

Keywords: STEM, Conference Proceedings, Engineering, K-12 Outreach.

IMPLEMENTATION

Dual Enrollment

In the 2009/2010 academic year, Kent State University-Tuscarawas implemented the Dual Enrollment STEM initiative to spark interest in engineering at an early age. This ongoing initiative offers college-level Engineering Technology courses to high school students at their high school campuses at no cost. Students who are unsure about STEM careers can determine whether engineering is the choice for them while earning college credits. Concurrently, the students receive high school credit for the courses.

Kent State University-Tuscarawas purchased desktop computers to establish labs at each of the participating high schools. The university also purchased a laptop, mobile interactive whiteboards, textbooks, lab manuals and lab equipment for each of the schools. For some of the schools, the equipment created the first computer lab for their schools.

Post-secondary offerings limited to academic courses have been available at Kent State University-Tuscarawas for many years. Students are required to attend the classes at the university campus. With Dual Enrollment, the courses are delivered at the high school locations, providing an opportunity for students from low-income families and those students who do not have their own transportation to receive college credit without leaving their high school.

Currently, eight different freshman-level Engineering courses are being taught. The courses offered are Electric Circuits I & II, Introduction to Electronics, Digital Systems, Multimedia & Game Design, Applications in CAD, Technical Computing, and PC Network Engineering & Troubleshooting. The first four courses are hands-on hardware courses, and the last four are software related. By offering a wide variety of courses, the high school students can find out where their interests lie.

The delivery method for this STEM Dual Enrollment initiative gives the program its uniqueness. Kent State University-Tuscarawas professors travel to a different high school for each course while the other participating schools in the class simultaneously connect through Adobe Connect software. This software allows the professor to engage in two-way communication with students at each school using the laptop. The schools that are connected to

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the professor via the software use the laptop to project an image of the classroom; therefore the professor can see all the students as if they were in the same room. Using Adobe Connect features, the professor can lecture with PowerPoint presentations, use mobile interactive whiteboards to draw circuits, and show AutoCAD or other software used in the courses to demonstrate functionality. One major advantage of using Adobe Connect internet-based software is that the students can connect to the class even if they are home for any reason.

The in-person instruction is supported by a web course which is used to provide additional instructional material, assignment submission tools, and assessments. Since students of high-school age enjoy working with computers and technology, they enthusiastically embrace the delivery methods of Dual Enrollment.

Cyber Club

The Cyber Club was created in 2009 to try to bring all the area high schools together and provide activities for students to promote interest in STEM subjects. Each high school develops their own Cyber Club and the activities they perform are dependent on the advisor at each school. The advisors are computer, physics, science, mathematics and Project Lead the Way (PLTW) instructors. Each instructor creates projects for the students to participate in based on their own field of expertise. Kent State University-Tuscarawas sponsors activities such as Technology Day and high school competitions at the university, and visits to local businesses and science museums. Students are given the opportunity to be creative within each of the STEM areas.

Women in Engineering

Each year the Engineering Technology department hosts the Women in Engineering seminar at the campus which is open to any female high school student. During the seminar, the young women are exposed to various activities in the field of engineering. These activities include building small robotics projects, demonstrations of equipment in the Engineering labs and presentations by current college students and graduates who are highly successful in their fields. The students are given the opportunity to ask questions of the presenters and we have found that the impact is positively significant on the attitudes of the students towards STEM fields.

SUMMARY

All of these initiatives are ongoing and we have not seen any results as far as college enrollment as of yet. The feedback we get from the students is very positive and we hope to see this translate into an increase in enrollment for STEM fields in the near future.

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AUTHOR INFORMATION

Tecca Larrick holds a Bachelor of Science in Technical Education from Akron University and a Masters in Technology from Kent State University. For eleven years she taught Engineering Technology Tech Prep at Buckeye Career Center, a vocational high school. During the years at Buckeye Career Center she was also Adjunct Faculty at Kent State University. In 2010, she was hired as a full time instructor for Dual Enrollment in the Engineering Technology Department and also instructs additional college courses in the Information Technology for Administrative Professionals and Computer Technology Departments.