

Selected STEM Pipeline Initiatives at Kentucky's Independent Colleges and Universities

Compiled by AIKCU
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Alice Lloyd College	<p>Recently renovated Andersen Science Center which houses the facilities for all of the laboratory portions of the biological and physical science courses offered at Alice Lloyd College. Total cost of renovation: \$2 million.</p> <p>Alice Lloyd College offers financial support for four year graduates, who qualify for the Caney Scholars Program, to attend graduate professional programs in the fields of medicine, physical and biological sciences, nursing, pharmacy, law, English, engineering, and mathematics. This program includes a modern dormitory complex which is located in the center of the University of Kentucky main campus.</p> <p>Faculty, with students, participate in collaborative research projects. One example involves a project aimed at functionalizing multiwall carbon nanotubes. This project involves the University of Kentucky Department of Chemistry and the Center for Applied Energy Research and is currently funded through the University of Kentucky and the Department of Homeland Security.</p> <p>Freshmen students have the opportunity to participate in the "Bridge Program" which covers many topics spanning the gap between high school and college curricula. Some of the topics introduced to students includes: time management, financial management, how to study properly, and how to select a major.</p> <p>Alice Lloyd College has recently created a bachelor of arts program in mathematics to prepare more middle school and high school math teachers for grades K-12.</p> <p>Alice Lloyd College offers developmental courses, MA 100 and Sci 100, to help under-prepared students succeed in mathematics and science.</p> <p>Alice Lloyd College has a strong student tutoring program which is designed to help students succeed and is a component of the Student Work Program. Moreover, student tutors are selected and supervised by faculty members. The general feeling is that students who might be timid about approaching a faculty member for tutoring is more at ease when working with a student tutor.</p>
Asbury College	<p>Over the past five years, 100% of chemistry major graduates who apply to graduate schools have been accepted. Of students applying to medical school, 90% have been accepted. Many students do their senior research with professors at the University of Kentucky and other major institutions around the nation.</p> <p>The senior research course, required of all our chemistry majors, is often integrated with summer internship programs at labs all across the country and can be used to develop expertise in a given area.</p> <p>All biology majors are required to do an independent laboratory research project. They select a research director and project while enrolled in Introduction to Research. Many students elect to undertake their research during the summer between their junior and senior years at major research institutions throughout the United States. During the past 15 years, more than 50 percent of our students have elected this option; several have received stipends (NSF, Hughes Medical Research grants, etc.) from these institutions. Nearly all of these students are currently in graduate or professional programs.</p>

<p>Asbury College (continued)</p>	<p>Biology faculty and students are involved in numerous professional and student organizations. The department participates in the Kentucky Academy of Science, Sigma Zeta National Honor Society for students majoring in science and/or mathematics, the Au Sable Institute Environmental Science Course and an annual science lecture series hosting nationally and internationally recognized Christian scientists.</p> <p>Biology faculty and students serve as judges in local and state science fairs and offer laboratory science courses for home-schooled students. Faculty members mentor students in student-dependent research projects, and department socials provide informal opportunities to get to know your professors and peers.</p> <p>Asbury College participates in the Mathematical Contest in Modeling, an international competition held during the spring of each year. Teams of undergraduate students use their mathematical skills to model solutions to real world problems. Some teams participate in the Interdisciplinary Contest in Modeling (an extension of the math modeling contest) which is designed to develop and advance interdisciplinary problem-solving skills as well as competence in written communication. In this year's competition, Asbury College fielded four teams. Two of the teams participated in the math modeling competition and two in the interdisciplinary competition. One team's paper was judged meritorius, two teams' papers earned honorable mention, and the fourth team was deemed a successful participant. Asbury College students compete against such schools as MIT, the Naval Academy, West Point Academy and Duke University.</p>
<p>Bellarmino University</p>	<p>New science and research facilities include the Norton Health Science Center (2003), which boasts 28,525 sq. ft. of space that is home to most of Bellarmine's physical sciences with state-of-the-art laboratories, faculty offices and classrooms. Total cost: \$6.5 million, funded primarily through private donations.</p> <p>Other research facilities are scheduled for renovation in the spring of 2007. Space in both Pasteur Hall and the 2120 Newburg Building will be renovated to accommodate increased scientific research in the areas of physical therapy and clinical lab sciences. (Renovation cost yet to be determined.)</p> <p>Bellarmino's Undergraduate Research Week is an annual showcase for science research at the undergraduate level. The program reaches out to high school students through special events.</p> <p>At this year's Guarnaschelli Lecture more than 1,000 community members heard E.O. Wilson, possibly the world's pre-eminent biologist, speak on campus. Additionally, the visit included a radio show (broadcast to thousands beyond the Bellarmine campus) and small group discussions with students.</p> <p>Physical Therapy senior capstone projects are a key part of Bellarmine's Doctor of Physical Therapy Program. All students must complete a project either on their own or as part of a team that researches topics in physical therapy. This year there were 15 projects that ranged from pediatric West Nile Virus to creating a "Healthy Hometown Movement Resource Manual" that is being printed and distributed for the public welfare by the Mayor of Louisville's office.</p> <p>Faculty, with student assistance, have worked on or are working on a number of outstanding scientific research projects that benefit the greater good. A small sampling of examples:</p> <ul style="list-style-type: none"> • Microbiology project for the Louisville Zoo that helped eliminate bacteria in the penguin exhibit • Biology project that led to the identification of a new neurological gene • "Hearts-in-Motion," a project that included two space shuttle experiments to examine the effects of zero gravity on the heart. • Project that is developing a non-invasive method for blood-typing. Beyond the clinical setting, this project may have the most (and best) implications for instruction in the classroom/laboratory .

Berea College

Berea College's Carter G. Woodson Math and Science Institute is a focused Upward Bound program designed to serve high school students with great promise and limited family resources, providing them with skills and motivation to be successful at the post secondary level. Woodson Institute's added purpose is to recognize and develop participants' potential to excel in mathematics and the sciences and encourage them to pursue college degrees in these fields. Woodson Institute participants enroll at the 9th or 10th grade level and continue in the program through high school graduation. Each summer they participate in a six-week residential session on the Berea College campus that is academically intensive, culturally enriching, and ultimately life changing. They have the opportunity to live as college students and to be involved in a broad range of classes and activities, including one of three interdisciplinary courses, Life Science, Earth and Space Science, or Creative Problem Solving in Mathematics. These courses introduce participants to the excitement and methodology of scientific research. Other activities focus on such topics as career, academic, and college planning, as well as field trips to visit career, college, and science research sites or to experience culturally enriching activities. Weekly academic year sessions build on skills developed in the summer and help students succeed in challenging high school courses. The Woodson Institute is funded by the U.S. Department of Education to serve 50 participants from a cluster of five counties surrounding the Berea College campus. Current yearly funding is \$222,913. Berea College provides additional private funding (\$40,000) for a small number of underrepresented students from the College's larger Appalachian service area.

The undergraduate research and creative projects program at Berea College affords students opportunities in all academic majors to engage in challenging, collaborative and directed research projects in an apprentice-mentor environment. Typically, about half of these projects are in math or science disciplines. Students in the program gain a deeper sense of the critical thought process, develop creative approaches to problem-solving, and make more informed choices regarding graduate education and long-term career decisions. Students are expected to participate not only in the 8-10 week summer project, but also to provide substantive input in the final report and to participate in a professional presentation of research findings. During the summer of 2005 internal funds (approximately \$79,000) supported eleven projects (26 students and 13 faculty participants). Similarly, eight projects (approximately \$64,000) involving 16 students and 12 faculty participants were funded in 2006.

Berea College's Biology Department has joined in a partnership with other undergraduate institutions and Columbia University that will focus on genome sequences and enable students to contribute to actual, publishable genome research projects in the course of their introductory laboratory courses. The goal is to captivate students with the inquiry-based nature of science by enabling undergraduate students, including non-majors, to make original discoveries in their lab courses, rather than merely to "get the right answers" and to prepare students to confront the public policy and personal health challenges that will arise during their lifetimes from dramatic advances in genomics.

Berea College sent a group of faculty and students to the Symposia on Diversity in the Sciences: Mentoring and Retaining Underrepresented Students held in 2005 at Harvard University. Ideas generated by this group were included in the recommendations recently proposed by the Task Force on Student Success, a group that has been engaged in intensive study for the past 18 months on ways to enhance student engagement. Two proposed initiatives specifically address STEM pipeline issues: the incorporation of Supplemental Instruction (SI) in courses that are historically difficult (including science and math courses) and the development of transitional courses in the sciences. SI is a distinctive intervention aimed at enhancing academic performance and ultimately degree completion; this positive effect on persistence has been demonstrated to be most pronounced for at-risk students who are under-prepared and therefore most likely to disengage from the learning process. Successful implementation of the SI program in the sciences and mathematics will result in a greater percentage of students persisting in these fields. Transitional courses strengthen the skills of entering students so that they can be successful in the gateway courses in the sciences. Berea College has already implemented such courses in mathematics. We anticipate adding transitional courses to the biology, chemistry, and physics curricula to increase the success of under-prepared students.

<p>Brescia University</p>	<p>The Owensboro Alliance for Education has begun a program aimed specifically at STEM educators in the greater Owensboro/Daviess County area to link our educators with local employers who are highly dependent on STEM skills. Earlier this month Dr. Carol Maillet, Assistant Professor of Biology, and Mr. Stephen Webb, Instructor in Mathematics and Physics, joined other area educators visiting Daramic, Inc. and Owensboro Medical Health Systems to learn first hand what science, math, and technology knowledge and skills these employers are demanding of their workforce. The hope of the Alliance is to bring area curricula more in line with the rapidly changing world of science and technology. The Alliance has planned similar outings this spring. The initiative is being funded through the Public Life Foundation of Owensboro.</p> <p>Mr. Stephen Webb, instructor of Mathematics and Physics, heads a cooperative venture with Indiana University and area high schools to monitor local seismic activity. Local monitoring stations have been established on local high school campuses and the campus of Brescia University. Steve collects the data at Brescia and forwards it to Indiana University for analysis. The findings are then shared with area students and faculty to enhance their study of local geology. The project is being funded by Indiana University.</p>
<p>Campbellsville University</p>	<p>Campbellsville's Clay Hill Memorial Forest serves as a 150-acre site for environmental research, an environmental studies institute during the summer for public school teachers, and a site for the study of best practices for the timber industry. It also hosts visits by approximately 2,000 public school students a year.</p> <p>Campbellsville University's Outdoor Classroom Institute (OCI) offers teachers summer time opportunity to deepen their content knowledge, become familiar with strategies and methods of presentation and network with peers while they are becoming more relaxed with teaching inquiry science in a real-world setting. The resources and equipment they receive facilitates their duplication of these experiences with their students as they return to their classrooms and more appropriately as they bring their students to learn at Clay Hill. In the program's five years, outreach has increased from a five county region in central KY to seventeen counties and 244 teachers have participated.</p>
<p>Centre College</p>	<p>The NSF-LSAMP grant has enabled us to bring incoming first-year students and upper-level underrepresented students to work in our science labs during the summer. This will begin in the summer of 2007. Centre currently has a large proportion of science and math faculty engaging in collaborative research with students during the summer. We anticipate that this number will increase now as we offer housing at no cost to full-time research students.</p> <p>The psychology program has altered its curriculum so that students get experience in research methods and advanced research projects even during the academic year.</p> <p>Two faculty members have federally-funded grants that are enabling them to engage in collaborative research with students. (Brian Cusato (psychobiology) and Steve Asmus (molecular biology)).</p> <p>During Centre Term each year, we offer at least one study abroad course that engages students in the process of science in a new environment (eg. Rob Ziemba (biology) studying fish in the Bahamas; Joe Workman (chemistry) studying volcanoes in New Zealand; Paul Sikkell (biology) studying marine life in Puerto Rico; Brent White (psychobiology) studying primates in Barbados).</p> <p>Centre's internship program includes opportunities in the sciences.</p> <p>Science students have initiated the production of the Centre Science Journal which contains contributed papers by students and is published once per year.</p>

<p>Centre College (Continued)</p>	<p>An innovative Natural Science sequence that runs for one full year offers students who aren't majoring in the sciences an opportunity to understand the world around them from the perspectives of physics, chemistry, biology, and math. (This isn't the only science option for students who don't major in the sciences).</p> <p>Centre has begun to offer a greater variety of computer science courses that appeal to the non-scientists. These include classes like computer animation and web design.</p>
<p>Georgetown College</p>	<p>Each summer Georgetown hosts the Pre-College Academic Experience in Mathematics and Science (PAEMS). PAEMS is a twelve day residential program, usually for rising 10th, 11th, and 12th graders, in which students gain exposure to a number of scientific disciplines via classroom and laboratory experiences and field trips. Current modules in the program are astronomy, biology, chemistry, environmental science and mathematics. The program is designed to encourage academic exploration, attract students to scientific careers, and provide access to high quality science programming for students regardless of financial means (financial aid up to the full \$700 tuition is available based on need). Student surveys at the end of the experience and again two years later are used to measure the impact of the experience on students' education and career plans and shape the direction of future camp sessions.</p>
<p>Kentucky Wesleyan College</p>	<p>Kentucky Wesleyan College opened the 28,000 square-foot Yu Hak Hahn Center for the Sciences in the fall of 2005. The Yu Hak Hahn Center offers students, area businesses and the community use of dedicated laboratory facilities for research and development. The \$7 million project, of which 93 percent was funded by private donations, included the purchase of new equipment for the Biology Department, Chemistry Department and Physics Department.</p> <ul style="list-style-type: none"> • The Biology Department equipment inventory includes sophisticated equipment such as an electron microscope, electronic balances, a projection physiograph, research-quality microscopes and tissue culture equipment. A marine aquarium system and an animal facility are also housed in the Center. • The equipment in the laboratories and instrumentation facilities in the Chemistry • Department consists of digital balances, a Fourier transform infrared spectrophotometer, a nuclear magnetic resonance spectrometer, an atomic absorption spectrophotometer, ultraviolet and visible spectrophotometer, a high performance liquid chromatograph and a gas chromatograph with a mass spectrometric detector. • Extensive laboratory equipment including a nuclear multi-channel analyzer, atomic x-ray machine, high resolution optical spectrometer, computer-interfaced instrumentation and data acquisition systems, and modern electronic workstations are available in the Physics Department. <p>In collaboration with the University of Kentucky College of Engineering, Kentucky Wesleyan College, Brescia University and Owensboro Community Technical College System will offer "Statics," a core engineering course, in the spring of 2007. The three local institutions also plan to jointly develop other core engineering courses in the near future.</p> <p>Kentucky Wesleyan College, in collaboration with the Kentucky Society of Engineers, annually hosts the Green River Regional "MathCounts" competition and the National Engineers Day seminar and workshop.</p>

Lindsey Wilson College	<p>Lindsey Wilson College recently opened the 42,000-square-foot Jim and Helen Lee Fugitte Science Center. The \$9 million project, which was funded almost entirely with private gifts, allows Lindsey Wilson's curriculum to expand in mathematics and science and also offer additional support programs to area high school teachers and their students.</p> <p>For more than four years, Lindsey Wilson has offered an Upward Bound program to 50 high school students from six counties: Adair, Cumberland, Green, Marion, Russell and Taylor. As part of the program, the students attend a six-week summer session in which they are eligible to earn college credit in mathematics and the sciences. A federally funded program allowed Lindsey Wilson to help additional regional high school students prepare for mathematics and science courses in college.</p> <p>Lindsey Wilson also recently created a bachelor of arts program in mathematics to prepare more middle and high school math teachers for area K-12 schools.</p>
Mid-Continent University	<p>Mid-Continent University is in the initial planning and evaluative stages to develop a mathematics major for traditional undergraduates at the university's main Mayfield campus.</p>
Midway College	<p>Midway College has placed a priority on improving K-12 math and science by focusing on teacher education in STEM disciplines: secondary mathematics, middle school science, and secondary biology. Additionally, Midway's traditional women's undergraduate college is addressing the shortage of women in scientific fields through its biology program's emphasis on preparing women for professional schools (pharmacy, medicine, veterinary) and graduate programs.</p>
Pikeville College	<p>Pikeville College has been an active member of the Appalachian Mathematics and Science Partnership (AMSP) since its inception nearly five years ago. The AMSP program seeks to demonstrate improved student achievement in mathematics and science through the support of partnerships that unite the efforts of teachers, administrators, guidance counselors and parents in local schools with administrators and faculty at area colleges and universities. The partnership involves 10 higher education institutions and 52 school districts in Kentucky, Tennessee and Virginia. The partnership main offices are at the University of Kentucky and the funding for the project has been through the National Science Foundation. Faculty members from Pikeville College's Math and Science Division have played a major role in the following AMSP initiatives:</p> <ul style="list-style-type: none"> • Summer Science and Math Workshops: For the past four years, faculty from Chemistry, Biology and Physics have been involved in the development and implementation of inquiry-style content workshops for K-12 teachers. • Development of Inquiry-Style Science Courses for Pre-Service Teachers: As part of the AMSP program, Pikeville College has implemented an inquiry-style physics course that is required for all Pre-service teachers. Pikeville College faculty have also worked inquiry-style aspects into other science courses. • Math Explorers Program: For the past four years, Pikeville College has been involved in the AMSP Math Explorers program. This program seeks to encourage college students to pursue teaching careers in the math and sciences through service as teaching assistants and peer-mentors. • Secondary Math and Science Academy (SMSA): As part of an AMSP Partnership Enhancement Project (PEP) Pikeville College partnered with University of Virginia at Wise, Letcher County, Knott County, and Floyd County on a PEP proposal to make systemic changes in the approaches and methods used to teach mathematics and science at the high school level. The focus of the SMSA Project is to create a Professional Learning Community of teachers who will investigate pedagogy, instructional strategies, and data analysis along with interactive activities to demonstrate exemplary models of high school mathematics and science instruction.

**Pikeville College
(continued)**

- Partnership to Enhance Algebra Instruction at the Middle and Secondary Levels: As part of an AMSP PEP, Pikeville College has partnered with local school systems to improve algebra instruction.

Other activities underway at Pikeville College to enhance the STEM pipeline include:

- For the past 12 years, Pikeville has funded and hosted a week long Math/Science Summer Camp for students entering grades 5 through 8. The purpose of the program is to encourage student interest in math and science. The program will host 200 local students in two week long workshops this summer.
- Pikeville College will host the regional Science Olympics for middle and secondary students in Spring 2007. The Purpose of the Science Olympics is to promote and improve student interest in science and to improve the quality of k-12 science education throughout the nation.
- Pikeville has been working with local high schools to offer General Chemistry I and II and Calculus I on a dual credit basis to qualified high school students. The program allows qualified students to earn both high school and college credit at the same time. The intention of this program is three fold: to provide high caliber students some extra challenges; to allow students to earn college credit which can transfer to other colleges and universities; and to provide students with the opportunity to have a "College Classroom Experience" that will hopefully help ease the transition from the high school to the college.
- Pikeville's Booth Scholars Program is a privately funded program that began in 2001. Our primary focus is to assist academically promising youth in Pike County, Kentucky and Grundy, Virginia, throughout their high school career, to further their preparation for entrance into and success in higher education. The program is designed to provide selected students with academic enrichment, technology links to campus-based and Internet resources, summer residential programs, and a wide array of activities and mentoring relationships designed to maximize preparation for post-secondary education. The Booth Scholars Program focuses on the areas that have been identified as the most deficient in the region, especially in the areas of technology, math, and science.

Technology:

- Present all scholars with a laptop computer to use throughout high school and replace that computer with a new one during their junior year so they will have a more updated computer for college.
- Train all scholars in the proper use of their computer with classes such as Laptop Orientation, E-Portfolio, Digital Scrapbook, Digital Video and Photography, GPS Devices, and Green Screen.
- Provide home internet service for any scholar who cannot afford it.
- Maintain an online connection with all Scholars throughout the year through the use of: email, WebCT, and webpage.
- Encourage Scholars to take classes via Kentucky Virtual High School and Kentucky Virtual University for which we provide payment of tuition.

Math and Science:

- Math and Science Advantage is taught to all rising Sophomore Scholars. During this class, the scholars are given a TI 84+ Silver edition calculator and are instructed on its functions in Algebra, Geometry, Calculus, Chemistry, and Physics. Scholars then apply these new skills in various math and science lab activities which require the use of their new calculators.
- ACT and SAT Preparation is taught to all rising Junior Scholars. The primary focus of this class is to provide Scholars with content specific instruction that will improve their understanding of concepts assessed on these exams and improve their overall score.

Pikeville College (continued)	<ul style="list-style-type: none"> ➤ Science electives are added to our summer program schedule every year in an effort to better prepare the Scholars for their college science courses and to provide them with scientific opportunities that are not available in the local high schools. For example, during the summer of 2006, Science Lab was taught by Dr. Tom Hess, who instructed the students through various advanced Chemistry and Physics laboratory activities. Forensic Science was also taught during the 2006 summer session by Professor Craighton Mauk.
Pikeville College School of Osteopathic Medicine (PCSOM)	<p>The Pikeville College School of Osteopathic Medicine's Professional Education Preparation Program (PCSOM-PEPP) provides a medically rich educational environment for high school students from traditionally disadvantaged high schools located in rural Kentucky and has shown that participants complete the program with an understanding of the level of intensity of medical school, its competitive characteristics, and the level of dedication needed to succeed in the medical profession. High school students with an interest in medicine are chosen to participate in a two week program that consists of lectures (25.5 hours), anatomical laboratory and pro-sections (17 hours), volunteering in the local hospital (21.5 hours), and participation in social and cultural events. Since 1999, more than 360 students have graduated from the program.</p>
St. Catharine College	<p>In the fall of 2005, St. Catharine College opened the \$10.5 million dollar Richard S. Hamilton Health and Science Building. This 52,000 square foot facility houses state of the art undergraduate chemistry and biology laboratories as well as health sciences laboratories. The health science labs in radiography, sonography, surgical technology, nursing, and pharmacology allow instruction in live, hands-on facilities that replicate up-to-date health care settings.</p> <p>St. Catharine College is in the process of launching the state's newest teacher education program. The program emphasizes field-based studies and will include middle school science and environmental science and sustainability will be a thread in all of the programs. After program approval, middle school mathematics is the next planned area. The college has also streamlined its associate degree transfer curricula to enhance preparation for transfer to four-year programs in mathematics and natural sciences within the state transfer framework.</p> <p>St. Catharine College is in the process of establishing a cohort based foundations curriculum for under-prepared students which will link: Developmental mathematics, Developmental English and Reading, Information Literacy, and Study and Personal Skills in a one-semester program designed to accelerate the progress of under-prepared but well motivated students toward fully matriculated status.</p> <p>In Academic Year 2004-2005, St. Catharine hosted a state-wide Developmental Education Workshop in cooperation with the National Center for Developmental Education. This workshop has lead to an initiative in 2005-2006 at St. Catharine to test compressed block instruction in developmental mathematics. The initial results were encouraging and indicated that innovations in pedagogy, text and instructional materials, student support resources, and most importantly blocking of instructional time could result in improvements in developmental math education.</p> <p>In 2006-2007 the faculty of the Academic Foundations Division and the Math and Science Division are examining new course blocking formats for developmental math which are intended to:</p> <ul style="list-style-type: none"> • Reduce the current sequence of three semester courses of 3 credit hours each to two courses of 4 credit hours each. The goal is to simultaneously reduce the time and financial burden of these courses to the students while increasing the time on task available in each course. Breaking the fragmented instructional paradigm of 50 minutes a day, three days a week of the traditional three credit college course holds substantial promise for improved pedagogy in developmental education. • Align the outcomes of the courses to ACT competencies in a way that is more directly related to both placement standards and to subsequent college level mathematics courses.

St. Catharine College (continued)	<ul style="list-style-type: none"> • Open the way for self-paced instruction enhanced by technology and for students to accelerate their learning and to be able to test out of developmental education by demonstrating well defined competencies at multiple points in the semester or academic year.
Spalding University	<p>This past summer Spalding University partnered with Louisville nonprofit Project One to deliver math, science, and technology training to middle and high school students. The students worked Monday-Thursday at various businesses in town, and came to the Spalding campus every Friday for 8 weeks (from June 23 to August 11). On average, 100 students attended the program at Spalding. While on campus, the students attended learning sessions conducted by teachers from the Jefferson County Public School system, and worked to improve their technology skills and knowledge in Spalding's computer labs. They heard presentations from local business people, as well as from representatives from Spalding's offices of Admission, Financial Aid, Student Life, and Athletics.</p> <p>Recognizing the need to address incoming students who may be under prepared for college in the area of mathematics, Spalding University adopted new mathematics placement criteria in Spring 2006, in alignment with CPE's policy for public institutions, with a change in curriculum in an effort to better prepare student for success in college algebra. The primary goal of the Spalding University Quality Enhancement Plan (QEP) is to specifically address the challenge of increasing student ability to use mathematical skills to solve problems. Importantly, this student learning and increased skill promotes greater competence, both currently and in the future, of the student learners in their community, and as workers. The key feature of the QEP is the creation of a new mathematics course, Intermediate Concepts in Algebra (MATH 104). A new instructional design focusing on Math 104 is critical to ensure the success of our students in the use of mathematical skills to solve problems. Math 104 consists of enhanced features for the achievement of student learning outcomes, including a highly interactive style of instruction, which includes experiential activities, student groups and computer-assisted instruction, low student/faculty ratio, expanded contact hours, a teaching assistant in the classroom with the instructor, and tutoring. This course is a vehicle to assist the student (1) in developing the ability to demonstrate the application of mathematical concepts in everyday life situations and (2) in continuing successfully with academic studies and, ultimately, graduating from the University.</p>
Thomas More College	<p>The College has a history of excellent preparation of science undergraduates for advanced study. A recent <i>Journal of the Kentucky Academy of Sciences</i> article found that no college or university in the Commonwealth, public or private, had produced more undergraduates that went on to complete their Ph.D. in physics over the past twenty-five years than Thomas More College. Impressive numbers were also cited for biology and chemistry, ranking sixth and twelfth respectively.</p> <p>The College received a one million dollar lead grant to begin the first phase of renovating the current science building and upgrade equipment. To date, the College has added a smart mathematics classroom, tissue culture facility, new instrument lab and numerous spectrometers.</p> <p>The Science Division partners regularly with area high schools, both public and private, to offer dual credit/AP courses on the Thomas More campus as well as the high schools. In addition, the College partners with Gateway Community and Technical College to offer special laboratory sections. The Biology Department operates a satellite Field Station that conducts research and testing to support local industries, as well as hands-on experience for students. The research is well known for its advances regarding Kentucky plant life, indigenous species, microbiology, immunology and aquatic biology. The Station holds numerous day-long programs which impact thousands of Kentucky residents on an annual basis.</p> <p>The Physics Department operates the <i>Bank of Kentucky Observatory at Thomas More College</i>. The Observatory was recently recognized by Harvard University for its ability to be accurate with calculations relative to small bodies. The Observatory not only serves as a research tool, but as a center for community outreach. Monthly sessions are hosted at the Observatory that are open to the public.</p>

<p>Thomas More College (continued)</p>	<p>The Biology, Physics and Chemistry Departments have collaborated to offer week-long science summer camps to area high school juniors and seniors. The camps use a hands-on approach and involve projects at both satellite facilities. In addition, these departments have collaborated with CINSAM to offer workshops to high school teachers and their students.</p> <p>The Biology Department co-sponsors <i>River Run</i>, a week-long trip devoted to studying life along the Ohio River. The workshop is open to faculty, students and teachers.</p> <p>The Division actively engages students in undergraduate research, regularly having students present at the <i>Argonne Undergraduate Research Symposium, American Immunological Association Conferences, Kentucky Academy of Sciences and the American Microbiology Association.</i></p> <p>The Chemistry Department has an active co-operative education program working with both local industry and government agencies.</p> <p>From a curricular standpoint, the College recently added a Bachelor's Degree (B.A.) in Environmental Science to complement the work at the field station and has also added degrees in Forensic Science (Chemistry or Biology track). Historically, the College offers a traditional B.A. in Biology and both B.A. and B.S. (Bachelor of Science) in Chemistry and Physics. The division also actively offers pre-professional programs in medicine, dentistry, pharmacy and medical technology.</p>
<p>Transylvania University</p>	<p>Transylvania is in the midst of a renovation of the Brown Science Center. Two physics laboratories and a flexible use biology laboratory were completed in 2006. The chemistry and biology laboratories will be completed over the next three years with most of the work being done over the summer so that classes will be disrupted at a minimum. The new laboratories will allow for more research opportunities and continue the research excellence that Transylvania has encouraged and enjoyed over the past 35 years since the Brown Science Center was built.</p> <p>Biology professor Belinda Sly spearheaded a successful grant application to purchase a gene sequencer during 2006. The sequencer has been set up and the training for its use is in progress. This commitment by the university in purchasing state of the art science equipment has continued and allows us to continuously supply our students access to the best and most modern tools available to scientists at a liberal arts college. Similar matching fund grants over the past 10 years have supplied a 300 Hz nuclear magnetic resonance spectrometer, atomic absorption spectrometer, a gas chromatograph-mass spectrometer, and a fluorometer as well as other equipment.</p> <p>Each fall, the division of natural sciences and mathematics hosts a Science Day for high school students in the surrounding area. Transylvania students and faculty present demonstrations and lead discussions on science opportunities as careers. This year, the high school students had the opportunity to listen to a recent Transylvania graduate who is working in the computer industry in developing games and other new products for this industry. Each spring, Transylvania hosts a group of middle school female students to help them see directly the opportunities science careers offer them and how they can attain these careers.</p>
<p>Union College</p>	<p>Union College participated in the Appalachian Mathematics and Science Partnership (AMSP) Math Explorers program. Union math majors have been involved tutoring other undergraduate students who need particular help with classes, thus helping to improve math skills. In addition, they have encouraged some of our better students to consider a career in math, or math education.</p> <p>Union has initiated a Transitional Math course (MATH 099) designed to help those entering freshmen who have low math scores to improve their math skills. This is Union's first effort toward such remediation in this area—the college will evaluate the results and make considerations as to future refinements, expansions, etc.</p>

University of the Cumberlands	University of the Cumberlands hosts two events designed to serve, encourage, and foster further interest in students who have special interest in science and mathematics. The Chemistry Symposium/Science Olympiad is a day of competitive individual and team events for high school students. The collection of activities has been designed to offer challenges in Biology, Chemistry, and Physics. The competition spans a wide range of academic competitions: written tests, verbal quick-recall, demonstrations, laboratory experiments, problem solving and construction - all in a framework of competitive challenge and fun. The regional high school mathematics contest is held the spring of every year. High schools bring students to compete individually and as teams in five categories: Algebra I, Algebra II, Geometry, Precalculus, and Calculus.
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