



**Annual Progress Report
(2007-2008)**

for the

**Partnership Institute for Mathematics
and Science Education Reform (PIMSER)**

October 31, 2008

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Associate Provost for Educational Partnerships
and International Affairs**

Executive Summary

The Partnership Institute for Mathematics and Science Education Reform (PIMSER) was formally created by the University of Kentucky (UK) Board of Trustees in May 2005. Its formation was initiated in large part through a commitment made to the National Science Foundation (NSF) by UK's President and Provost to establish an institute to continue the research-based "best practices" for P-12 mathematics and science education reform from the Appalachian Mathematics and Science Partnership (AMSP). The mission of the PIMSER is to enhance learning in mathematics and science for P-20 students and teachers and to prepare students for success in science, technology, engineering, and mathematics (STEM) based-education, professions and teaching careers. This mission is achieved by creating and implementing programs that enhance pre-service teacher preparation, in-service teacher quality, leadership development and support for implementing high-quality instruction and student access to, and retention in, advanced learning opportunities.

The goals of PIMSER are consistent with Goal III of UK's 2006-09 Strategic Plan, i.e., Enhancing the Intellectual and Economic Capital of Kentucky through Growth in Research and its 4th objective which states that "the university will actively transmit the benefits of its knowledge and expertise to the public it serves." Moreover, this transmission of knowledge in many of the PIMSER programs is met and synergized by the knowledge obtained in engagement partnerships from K-12 school teachers and administrators.

The PIMSER is an "umbrella institute" of six units: K-12 Curriculum and Professional Development Outreach, K-16 STEM Outreach – Minority and Appalachian Affairs, Mathematics and Science Computing and Distance Learning Initiatives, Pre-Service Teacher Recruitment and Support Programs, Health Science Outreach Center and a Research, Development and Evaluation Unit. The PIMSER reports through its Director to the Provost.

The 2007-08 year was one of many substantial growth, development, and accomplishments of the PIMSER. It was during this year that the Provost moved three new entities into the PIMSER. These were the K-16 STEM Outreach - Minority and Appalachian Affairs, Health Science Outreach Center, and the Science Fair and STEM Marketing Outreach office. The purpose was to consolidate under one umbrella the university's STEM education research, outreach/engagement, and assessment programs to coordinate and enhance UK's state and national identity in this priority area. The report details the progress of each PIMSER unit during 2007-2008. This summary provides the highlights of the progress of each unit and the PIMSER as a whole, as follows:

I. **K-12 Curriculum and Professional Development Outreach**

- Five grants were awarded by the Council on Postsecondary Education (CPE) and Kentucky Department of Education (KDE) for 2008-2009 for a total of \$1,040,000. They support

improvement of the quality of teacher education and mathematics and science program leadership.

- In addition, this unit was a partner in, and will administer, a Master Teacher (training) Program funded by NSF in 2008 for \$599,000.
- Seventeen Kentucky School Districts contracted this unit for on-site professional teacher development in mathematics and science education for a total of \$80,319.
- This unit was again successful in acquiring funding from the Kentucky Department of Education (KDE) to host the very popular Science Leadership Support Network (SLSN) and Mathematics Leadership Support Network (MLSN). Twenty-eight Kentucky school districts participated in the SLSN and 56 school districts in the MLSN in 2007-2008. The KDE contributed \$121,748 and the districts paid \$220,000 to fund these mathematics and science leadership institutes, contributing an additional \$341,000 to this PIMSER unit's revenues.

II. Health Science Outreach Center

- Renovation of the Outreach Center was completed in 2008 to allow the addition of the Science Fair and STEM Marketing Outreach Office.
- The K-12 students visiting this center over the past year for health science presentations exceeded 2,500. In addition, the mobile van with modular interactive programs continued to serve the area schools and science fairs.
- The PEPP and PEPP II programs offering experiential learning to eligible students interested in health science careers served 76 students from 45 medically underserved counties in 2007-2008.
- The center's innovative Internet Grant Writing Program Workshop was attended by 36 faculty participants from 22 Kentucky institutions. National Institute of General Medical Sciences (NIGMS) participated and awarded a supplemental grant for next year at \$117,000. The center director also gave grant writing seminars to UK upper level graduate students and faculty of the University of Puerto Rico in 2007-2008.

III. Science Fair and STEM Marketing Outreach Office

This is a constituent office within the Science Outreach Center that extends the STEM outreach activities to K-12 schools in programmatic areas beyond the health sciences.

- This office coordinates the Central Kentucky Regional Science and Engineering Fair (CKRSEF), an Intel™-affiliated event for students of 32 Kentucky counties. These participating students are eligible if they place in the top 5-10% of a Kentucky school or local fair in these counties.
- The CKRSEF for 2008 had 18 4th grade-, 92 5-8th grade-, and 38 high school students. Communication among and between the participating districts and

students is maintained through a CKRSEF website. The high school winner of this year's fair competed in the Intel™ International Fair and was awarded 2nd place. In addition, three of the middle school participants were the only ones from any regional KY fair chosen as National semi-finalists in the Society for Science and the Public Middle School Program. This new event of the PIMSER has given the UK new visibility in 32 Kentucky counties.

IV. K-16 STEM Outreach Minority and Appalachian Affairs

This unit is funded by a NSF- Louis Stokes Alliance for Minority Participation (LSAMP) grant. It is a comprehensive, multidisciplinary, undergraduate program of five Kentucky and five West Virginia partner institutions of higher education (IHEs). It is designed to substantially increase the quantity and quality of students, especially African American, Hispanic and Native American students, pursuing degrees in STEM programs. Each IHE develops mission-appropriate strategies for increasing the pipeline of these students who are so badly needed for the 21st century workforce. The UK President is the principal investigator and chairs a governing board of the presidents of the participating IHEs. The total NSF KY-WV-LSAMP award is \$2,447,261.

- Students from all ten KY-WV-LSAMP partner institutions presented posters on their research at the second annual Research Symposium (2008). The research was judged to be high level and relevant to the LSAMP goals.

V. Research, Development, and Evaluation Unit

This unit is the locus of the PIMSER's continuing **development** and **assessment activities** to support research and **grant-writing initiatives and their evaluation**. This unit was particularly active and successful in 2007-08. One of the most significant outcomes of the PIMSER's assessment and evaluation activities is relevant to **UK's development of a Five Year Interim Report for SACS in which it must submit evidence of ongoing assessment and improvement of student learning by its educational units**.

As previously stated, one of the principal reasons for the establishment of PISMER was to sustain, adapt, and expand the most effective programs developed by the AMSP **to enhance student learning** in K-12 mathematics and science as well as contribute to building a quality teacher workforce in those program areas. One of the greatest challenges in measuring student learning as a result of any educational program is the establish a causal relationship to that program that clearly distinguishes it from other, co-existing programs and factors that also impact student learning. The NSF and other agencies and foundations supporting STEM education reform are no longer satisfied with relying solely on pre- and post-tests to assess student learning following the implementation of a particular intervention program. These do not eliminate the other factors that influence this assessment. New

evaluation methodologies are required that also link student learning to teaching. Therefore, measurement of student learning using only summative tests like the Commonwealth Accountability Testing System (CATS) is not sufficient to establish cause and effect relationships.

A PIMSER and AMSP Evaluation team, with the addition of a faculty expert in econometrics from the Martin School of Public Policy, pursued a new direction in evaluation. Led by the econometrics expert, a two-stage evaluation procedure (with an education production function and TOBIT model) was developed and used to demonstrate a significant (1% to 10% level) effect of the AMSP programs on student learning in mathematics and science in participating middle and high schools in central Appalachia. Submission of these results to the NSF and a presentation to this agency's national conference led to a proposal to acquire a Research, Evaluation, Technology Assistance (RETA) Program to more extensively evaluate student learning related to the AMSP and other mathematics and science education programs. The evaluations are within the context of new "statistically rigorous techniques that recognize the biases created by the lack of randomized trials in these professional development programs" (NSF Proposal—RETA). The RETA was awarded in 2008 at approximately \$1.5 million. This program will contribute to UK's ongoing assessment and improvement of student learning through its AMSP and PIMSER programs.

Another approach to enhancing student achievement in K-12 mathematics and science courses is to create **Master Teachers** that are embedded in the schools to enhance programs and teacher professional development of their colleagues. The AMSP was awarded a \$600,000 grant (2008) from NSF to develop 15 Master Teachers that must have a master's degree in a mathematics or science related discipline placed within the economically and educationally stressed districts of Appalachia.

Presentations on PIMSER and AMSP best practices as related to STEM education and its relationship to workforce development were made by the director to the Business and Higher Education Forum (BHEF), the CPE's Translational Research and Teacher Quality Summit Conferences, the National Academies' "Rising Above the Gathering Storm" conference, the Department of Labor's Workforce Innovations-2008 conference, and to the AT&T, Alltech, and Toyota Kentucky businesses in 2007-2008.

Proposals were submitted on behalf of PIMSER to the AT&T and Toyota Foundations to support the expansion of the PEP programs in 2008. The AT&T Foundation proposal was funded at \$35,000 and the \$500,000 Toyota proposal is pending. PIMSER is also a partner (25%) in a recently submitted (2008) proposal to the NSF for a \$25 million Science and Technology Center (STC).

VI. Outreach and Engagement Faculty

The PIMSER's programs in several of its outreach and engagement units, are dependent upon disciplinary and education expertise of UK faculty in the STEM areas.

The Provost and PIMSER Director wrote a proposal (2008) to the President for five mathematics and science education positions to serve as P-20 outreach/engagement faculty with 50% appointments in the PIMSER. The President has agreed to fund these positions and initial searches are underway. In

addition, the Provost transferred the 50% component for K-12 engagement activities of the two AMSP Outreach Professors in the College of Arts and Science to the PIMSER. These initiatives have very greatly strengthened the coordination of STEM education activities, the capability for external funding, and the state and national visibility and reputation of the PIMSER. As evidence of this potential, the current two Outreach Professors in PIMSER, with colleagues in the Colleges of Arts and Science and Education and other UK units, have been awarded \$7.5 million from the NSF for five STEM education projects through 2009-2010 and \$1.71 million from the U.S. and Kentucky Departments of Education for another two projects.

VII. Mathematics and Science Computing and Distance Learning Unit

Basic Mission

The primary mission of Math Sciences is to provide computing support to the Arts and Sciences mathematical science faculty, graduate students, and staff. The department operates a large Windows network serving the desktop needs of math faculty, staff, and graduate students and a smaller UNIX research network serving approximately 25% of the faculty, and graduate students. All of the central computing resources for Arts and Sciences faculty and graduate students and all non-routine hardware design, configuration, and local maintenance of those critical systems are provided by Math Sciences.

Math Sciences provides the IT support for Inslab which houses the Geography Department GIS laboratory in CB 311/313 and for the Math House which supports Math Excel. It maintains and operates the Math Department's student Mathskeller student support center.

Research and Development

Beyond the basic support services, Math Sciences conducts a very active program of applied research and development in the technical support of mathematics instruction and partnerships. For the last ten years the central focus of this program has been a "meta system" called the Kentucky Partnership System (KPS) whose current major implementation is the web site <http://www.mathclass.org>. A draft document describing the higher-level functionality of KPS is at <http://www.mathclass.org/WebPages/Pages/200/KPS.pdf>. The principal application in KPS is WHS (Web Homework System) and the project was originally developed and implemented in January 1999 as a system for automated homework checking for multiple-section math courses. In the interim it has grown to a very large platform supporting a wide variety of instructional, partnership, and general outreach functions. It currently supports, on a daily basis, the majority of the UK math instruction, providing online homework services for all of MA 109, MA 110, MA 113, MA 123, and MA 162 and a for ad hoc sections of other courses such as MA 322, MA 213, and MA 361. It is not uncommon for the system to record a million transactions in a week and the size of the primary server has been doubled twice in fall 2008. It now has, for instance 32 gigabytes, of memory and its backup server is being upgraded to that level.

In the last year, the following are among the most significant enhancements to the WHS system which have been put in place in direct response to the needs of the UK community:

- A **dual authentication** system was created which complements the course account creation system.
- A **syntax checking** system was added that reduced the amount of student startup assistance required by over 50 percent, resulting in a huge saving of faculty, TA, and staff time spent on non-mathematical errors.
- An **attendance system** has been added which teachers can use to keep track of student attendance and which is displayed when students check their test grades and homework scores.
- An **early alert** system has been added which provides a page on which the instructor can view the attendance and test and homework grades and on which checkboxes are provided which correspond to the considerations on the university early alert system.
- A **derived homework** system was added which permits instructors to assemble new homework assignments by selecting individual items from other homework sets in the system.
- An **instructor hints** system has been added which allows a teacher who uses problems created by another to add hints (text, video, or graphic) to the versions that he/she is using without having to re-install the problems.
- **Asciimath** has been added to the system which permits problem authors to write problems in a simple, intuitive syntax which the server will display as formatted mathematics.
- A **feedback system** has been implemented through which students can, upon receiving a report from the computer, submit “feedback” questions to the instructor or designated assistants.

In addition to the basic IT support services and its active program of applied research and development for instruction and educational partnerships, this unit conducts the PIMSER’s major online or distance learning outreach and engagement activities.

For a brief overview of the current outreach activities of Math Sciences see <https://www.mathclass.org/WebPages/Pages/174/MaSciSp08.pdf> The most significant of the outreach/engagement activities and their outcomes over the 2007-2008 year are:

A. Cyberlearning

KPS has developed into what an NSF task force calls an “Open Source Cyberlearning Platform” http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf08204 That is, a mechanism or vehicle with a basic functionality which can be independently adapted, employed, and disseminated by diverse teaching and learning communities. The open nature of such systems leads to continually expanding functionality for the entire user base

as an increasing number of developers contribute intellectual capital and an expanding user base generates new and interesting applications. Indeed, the NSF task force report urges the foundation to identify, develop, and disseminate a number of such platforms. The Math Sciences experience shows that such platforms can, while directly contributing to the primary institutional mission, anchor wide-reaching, high impact outreach programs at essentially no additional cost. The following are some of the principal activities from the preceding year which serve to illustrate this capacity.

- **Access to Algebra**

Access to Algebra is an AMSP-sponsored partnership among UK and a number of Appalachian secondary schools which is developing new models for teacher support and professional development, distance learning, dual credit, and differential teachers compensation. In the program, participating teachers work with University colleagues and pre-service teachers both to analyze and to directly assist (small numbers of) their own high school students to master and receive college credit for a challenging college algebra course. The school students, mentored by their teacher and assisted by pre-service teacher tutors using interactive distance learning tools, take a regularly scheduled University of Kentucky College Algebra course in parallel with on-campus sections populated both by general UK students and Appalachian college students participating in the UK AMSTEMM¹ project. See https://www.mathclass.org/WebPages/Pages/190/AccAlg_07_08_June18.pdf for more details on the Access to Algebra program.

- **Open Response Mathematics Examinations in a Distance Learning Environment**
Employing KPS/WHS makes it possible for all students in Access to Algebra courses to use the same text, do the same (online) homework problems, and take the same open response examinations which are uniformly graded at UK. Developing this capacity has been one of the most important R&D outcomes of the last year. The Access to Algebra program both identified the needed capacity and has served as a platform to implement and test it. With this ability it is now possible to coordinate the offering of the same course in both on- and off-campus settings and to administer and commonly grade the same open-response, full mathematics notation examinations to all students in the same time frame. The following is a link to a set of slides prepared for an invited seminar on the Access to Algebra program which was given on Oct. 7, 2008 at the NSF http://www.mathclass.org/WebPages/Pages/196/talk_slidesLf.pdf provides more details on the actual course and the way the technology is employed to teach it.

¹ An NSF STEP program

B. The KYOTE Placement Testing System

The Kentucky Early Mathematics Testing Program (KEMTP) (<http://www.mathclass.org/kemtp-info/>) is a long-standing outreach program, sponsored by the Kentucky Council on Postsecondary Education (CPE) which uses the KPS/WHS platform to provide free, online college readiness assessment to Kentucky secondary school students. In February 2007 this unit completed the conceptual design of the secure testing system for the Access to Algebra program and at a meeting of the Kentucky Early Mathematics Testing Program (KEMTP) a group of regional and community college faculty asked if a secure version of the KEMTP could be developed to serve their mathematics placement needs.

A senior faculty researcher in the unit agreed to see what could be done and had a prototype system up within a few months and the service was provided at no cost to Kentucky educators. The program has grown into a large, statewide consortium project, now called KYOTE, which provides free, secure, online placement testing resources. See <https://www.mathclass.org/WebPages/Pages/173/KYOT.pdf> for more details on the project.

- Dr. Dianne Bazelle of the Council on Postsecondary Education (CPE) reported on the KYOTE partnership, its genesis and progress in a talk at the 2008 National Association of System Heads (NASH) summer institute. The slides from her talk are at <https://www.mathclass.org/WebPages/Pages/192/NASH072108.pdf>
- Eastern Kentucky University and Northern Kentucky University now give the KYOTE placement test as part of their spring and summer advising programs. ECU uses KYOTE to detect potential problems for incoming students and brings them to campus for summer bootstrap programs to avoid remedial placement.
- Math Sciences is working with faculty at Western Kentucky University to implement a trigonometry KYOTE exam which WKU would use to qualify students to take courses which have a trig requirement.
- Dr. Steve Clements, director of the Institute for Educational Research (IER) received a teacher professional development grant from CPE of which one component was to be a training program for school personnel on implementing the KYOTE exams. Math Sciences agreed to take on the challenge of developing a new Math Sciences capacity to produce very high quality technical training materials in an extensible, modular, scripted video format. The initial modules are installed on the IER web server but can otherwise be viewed at the "Placement Tutorials" link at <http://www.mathclass.org> or directly at <https://www.mathclass.org/mc/placementTutorials.aspx>. The production expertise developed in producing these now affords Math Sciences an entirely new dimension in which to produce and disseminate high quality training materials.

C. Synchronous Instructional Capacity within KPS/WHS

Although the goal is a completely open-source system, the AMSP and PIMSER distance learning and other web-based, synchronous learning programs have depended on a very expensive CENTRA video conferencing system. While the CENTRA system has worked well, its initial costs have meant that the full adaptation of the Math Sciences models such as Access to Algebra would not soon be feasible for “production” instructional environments. During the last year, researchers in the unit have developed a powerful *open source* conferencing system within KPS/WHS. Currently called “Chat2, “the operational prototype has the primary functionality of CENTRA and provides a clear path to an affordable “cyberlearning” instructional environment, available to every segment of the community. In particular, it makes the implementation of the Access to Algebra model feasible.

A NSF proposal is currently being developed with a consortium of KY community colleges and the University of Tennessee at Chattanooga which would demonstrate the capacity to disseminate the Access to Algebra program to those institutions. In this case it will actually be “Access to Calculus” but would not be feasible were it dependent upon the kind of commercial conferencing technology through which Access to Algebra was developed. In addition, a graduate math distance learning course employing Chat 2 has been scheduled for spring 2009.

VIII. PIMSER Website

Consistent with the Provost’s and Director’s intentions that the PIMSER be an umbrella institute for the STEM educational research, reform, and engagement projects at UK and that it be a locus of coordinated efforts to enhance its national and international visibility, a website was created in 2007-2008.

The website, www.uky.edu/PIMSER, is a portal for acquisition and exchange of information on UK STEM educational research and outreach activities as well as a clearinghouse for STEM state, national, and international activities. The website features the mission, history, and goals of PIMSER as well as current organizational and governance structures, program units, and links to UK, regional, state, and national STEM related websites. The STEM educational partners throughout the Commonwealth have already expressed their appreciation for this organized source of information.

PIMSER Unit Reports

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Report for K-12 Curriculum and Professional Development Outreach

The PIMSER P-12 Mathematics & Science Outreach Unit provides high quality training and support for improvements in mathematics and science education that is responsive to the needs of educators at all levels. The unit provides ongoing professional development that models research based practices for classroom teachers, instructional coaches, principals, district and university administrators, university instructors, and state level education consultants. It is through these multi-tiered partnerships at the local, state and even national level that the unit maintains a pulse that responds to the needs and priorities of math and science education.

The P-12 Mathematics & Science Unit of PIMSER is available to provide support services throughout the Commonwealth. The unit currently works with educators in 100 Kentucky counties to improve teacher practice and ultimately impact student achievement in mathematics and science.

During 2007-2008, teachers and administrators in 98 counties/districts across the Commonwealth took part in the following programs sponsored by the PIMSER P12 Math and Science Outreach Unit:

- ACT Workshops
- One-to-One Math
- Developing Algebraic Thinking
- Partnering to Progress
- Rational Number Project
- Making Non-Linear Algebra Accessible
- Science Alliance
- Math and Science Leadership Institute
- Math Leadership Support Network: Locations: Lexington 1 & 2, Madisonville, Elizabethtown
- Science Leadership Support Network
- Network for New Math Teachers

Below is a listing of grants that have been awarded to the P-12 Math and Science Outreach Unit of PIMSER during the 08-09 academic years.

- Putting All Students on Track: A Partnership to Ensure Success in College Level Mathematics funded by the Council on Postsecondary Education Improving Educator Quality Program Year 6: Total funding: \$140,000
- Number Properties and Operations: A Key to Student Success on EPAS funded by the Council on Postsecondary Education through the Improving Educator Quality Program Year 7: (approved pending acct. number and award total): Total funding will range between \$140,000 and \$150,000
- Developing Algebraic Thinking funded through the Kentucky State Department of Education Title II Part B Math and Science Partnership fund: Year 2: Total funding: \$200,000
- Partnering to Progress funded through the Kentucky State Department of Education Title II Part B Math and Science Partnership fund :Year 2: Total funding: \$200,000

- MLSN/SLSN partial funding for the Networks provided through the Kentucky Department of Education: Total funding: \$360,000
- Master Teacher Program. This unit will administer this program funded by the National Science Foundation for the Appalachian Mathematics and Science Partnership (ASMP) in 2008. Total funding: \$599,000

Total grant funding received in 2008-09 thus far under the P-12 Math and Science Outreach Unit of PIMSER : \$1,040,000

Districts Contracted for On-Site Work

Jan. 1, 2008 - Oct. 23, 2008

<u>District</u>	<u>Total Invoiced</u>
Hopkins	\$ 18,284.31
Lincoln	\$ 5,000.00
Johnson	\$ 18,200.00
Bell	\$ 772.87
Magoffin	\$ 3,004.33
Pikeville Ind.	\$ 741.40
Knott	\$ 4,388.14
Boyd	\$ 4,373.40
Russell Ind.	\$ 175.50
Lee	\$ 3,600.00
Fayette	\$ 8,115.58
Floyd	\$ 2,090.16
Harlan Co.	\$ 4,687.81
Pike Co.	\$ 2,061.43
Bath	\$ 1,250.00
Madison	\$ 665.10
Franklin	\$ 2,357.78
Frankfort Ind.	\$ 551.62
Total	\$ 80,319.43

Contract Rates

Facilitation Fee: \$600/day (teacher trainings)
 \$400/day (leadership trainings)

Facilitator Expenses:

Mileage: \$0.505/mile
 Lodging: Actual expense reimbursement
 Meals: Reimbursed at the rate of
 \$9.00/day (breakfast)
 \$10.00/day (lunch)
 \$20.00/day (dinner)

Project Expenses: Reimbursement for materials
 required by the facilitator such as
 as photocopies, folders, and books.

Funding Sources for the Science and Math Leadership Support Network Programs		
(2007 - 2008)	SLSN	MLSN
Districts Participating	28	56
Participant Fees	\$60,000.00	\$160,000.00
KDE Contributions	\$30,204.00	\$91,544.00
Total	\$90,204.00	\$251,544.00

Health Science Outreach Annual Report 2007-2008

Internet Grant Writing Program:

An Internet Grant Writing Workshop was held on May 7-9, 2007, on the University of Kentucky campus. Thirty six faculty participants, representing 22 different institutions attended the three day workshop. The attendees were selected on the basis of their high probability of submitting a proposal in the very near future. The workshop evaluations were extremely positive as our staff and Dr. Zlotnik, representing NIGMS, did an excellent job in their presentations. One significant suggestion was raised by the participants at the end of the workshop. They felt strongly that their institution would benefit greatly by having their research administrative staff exposed to the information and support model that we had presented. They uniformly requested that we consider offering such a workshop that would help improve the research environment on their individual campuses. Our staff felt that this was an excellent idea and requested a supplement to our existing grant to offer two research administrative workshops, one in year 09 and one in year ten of our award. The request was approved and a supplement was issued for \$117,000.

On March 10-12, 2008, we presented a research administrative workshop on our campus. Forty-two research staff from 22 Institutions attended the three day workshop. We utilized our past participants from the 2006 and 2007 faculty workshops in the recruiting process. Without question, the program presented was viewed as an extremely valuable experience by the participants. In fact, the formal evaluations revealed that on a scale of 1 to 4 (with 4 being outstanding) the mean score was 3.91 for the workshop staff. The overall mean value of the workshop to their support skills was 3.63. We were well pleased with the interactions and see great merit in repeating this program.

GS 640 Graduate School

A related activity involved a request by the University of Kentucky Graduate School for Dr. Frazier to present a grant-writing course to upper level graduate students on our campus. Fifteen graduate students were enrolled and as part of the course were given access to our modules to not only study but critique. This has proven to be a very valuable exercise as they were extremely thorough in their review pointing out errors (spelling, links that are not working, etc.) as well as suggestions for improving the overall quality of the modules. Without question they felt that the internet course would be very helpful to graduate students in any area of research.

University of Puerto Rico

In April, Dr. Frazier was invited to the University of Puerto Rico, Medical Campus, to present a program on grant writing to faculty. This was a full day seminar after which the participants were given access to the on-line grant writing modules. He utilized information provided by our entire grant-writing team.

PEPP and PEPP Step II Programs

The PEPP and PEPP II programs offer experiential learning to eligible students who are interested in a career in medicine or dentistry. This past summer, 76 students representing 45 designated or medically underserved counties, or areas, participated in the program. The Outreach Center was utilized by many of their activities. Some of their Seminars included: an Ethics lecture by Dr. Frazier, UK Dance Blue, Geriatrics, People with Disabilities, Autopsy/Pathology/Forensic Medicine, Alcoholism & the Health Professional, and Kidney/Organ Transplants just name a few! The students also participated in Clinical site visits. They visited the Shriners Hospital for Children, Cardinal Hill Hospital, Eastern State Hospital and several nursing homes in the immediate area. These students also had rotations in the UK and/or the VA Emergency Room, UK Operating Room, UK Labor and Delivery or the UK College of Medicine Free Medical Clinic at the Salvation Army.

Outreach Center

The Outreach Center was busy! We saw an excess of 2580 students, ranging from elementary through high school. The Outreach Center van was taken out to schools in the immediate area for visits or school fairs. Mr. Gary Ginn, from the Anatomy/Neurobiology Department, has proven to be a great combination with Dr. Frazier for the Tuesday Anatomy/Physiology Senior's only day. This then frees Dr. Frazier, or other presenters, to give programs on any other given day without conflict.

The Outreach Center also allows faculty to borrow models, machines and/or other specimens for classroom presentations. To date, 14 individuals have borrowed 38 items that have been shown to more than 600 students. We are very pleased to be able to share our resources with UK faculty, and other professionals, as we feel this is part of our Outreach mission.

In addition to sharing our resources, we also share our time. Carol Leslie and Margaret McConnell work with students who desire to attend medical or dental school. Both Carol and Margaret interview students for the University of Kentucky of College of Medicine and Carol also interviews for the University of Kentucky College of Dentistry. On many occasions we are asked to help students prepare for an interview, and this is a service we gladly provide.

Dr. Frazier is often asked to be the medical school recruiter for the University when student athletes come to campus. Swim/Diving, Soccer, Softball and tennis players are his special group when they come for a visit. He brings them to the Outreach Center for a brief orientation, then to the UK College of Medicine for a tour.

Dr. Frazier has a long history of mentoring at least one student each year in the Honor's Journal Program. This year he has the honor of mentoring Miss Daniele Boucher, who is a Patterson Scholar. These honor students volunteer to assist in a variety of Outreach activities.

Many times we are called upon to present programs that fall beyond the M – F, 8 – 5 normal work weeks. Dr. Frazier has presented programs for the Try-It program on numerous Saturdays during the academic year, as well as other civic groups, retirement homes and social organizations. Lisa Stevens, our Tour Coordinator, has been called upon to open the building for the HCOP presentations to be held on Saturdays, and must be there for the duration of the event. Each year, Margaret McConnell hosts the GEMS (Girls Enjoy Math and Science) event which comes to the Outreach Center for a Saturday of physiology exploration and fun.

Currently we are in the midst of writing a competing grant proposal for the Internet Grant Writing Program that we have had funded for the past 10 years. The Program Officers at NIGMS have asked us to include in this new proposal Training Grant workshops along with our highly successful programs we now offer. Currently we base our model on the R01 grant proposal, but with our new initiative, we will include the MARC, RISE, IMSD, and Bridges To The Future. We will submit the first of December 2008.

Miscellaneous:

As Dr. Frazier is the Executive Secretary Emeritus for the Kentucky Academy of Science, the Outreach Center continues to be its home headquarters. The archives for the Academy are housed in Room 101 of our building.

Renovation

The renovation on the first floor of the Outreach Center is completed. Two additional offices were constructed and Dr. Edward DeMoll has taken possession of one of them. The second office remains unoccupied. The offices have gotten a lot of compliments from our visitors, and many have noticed a change, but could not tell exactly what the change was. Cudos to the construction crew!

Central Kentucky Regional Science & Engineering Fair

Edward DeMoll, Director

Annual Report October, 2008

The Central Kentucky Regional Science and Engineering Fair (CKRSEF) is an Intel affiliated fair. Students from 32 Kentucky counties are eligible to attend this Regional Fair if they have been deemed qualified to go on by either placing in approximately the top 5-10% in the Fayette County fair or if outside of Fayette County, in the top 5-10% within a school or local fair. The CKRSEF covers the following 33 counties of Kentucky: Bell, Bourbon, Breathitt, Casey, Clark, Clay, Estill, Fayette, Franklin, Garrard, Harlan, Jackson, Jessamine, Knott, Knox, Laurel, Letcher, Lee, Leslie, Lincoln, Madison, McCreary, Menifee, Montgomery, Owsley, Perry, Powell, Pulaski, Rockcastle, Scott, Whitley, Wolfe, and Woodford.

A major rationale for the Science and Engineering fair is to promote the educational and scientific development and the needs of students in the above counties. The fair is affiliated and cooperates with Society for Science & the Public (SSP), Washington, D.C., the non profit agency that oversees the Intel Fair and the SSP Middle School Program.

The CKRSEF has for five years been hosted by the University of Kentucky. Except for a portion of the Director's salary which is paid from the Office of the Provost (\$30,000), almost all of the expenses of the fair were paid through a \$5000 donation from the Kentucky American Water Co., a \$3000 donation from a non profit Kentucky Science Fair group in Louisville, and an \$8 fee charged to those entered. A one-time contribution of approximately \$6500 was added to our account from the non profit corporation that provided the umbrella of supervision for the CKRSEF prior to UK assuming that role this past year. The expenses paid with these acquired funds include the cost of affiliation with the Intel Fair, prizes and snacks for the students, catering for judges and volunteer's breakfasts and lunches, the cost of holding open a UK parking garage, the cost of using the lecture room in T.H. Morgan 107 for our scientific talk and awards ceremony, the cost of sending four students, three teachers, the Director and former Director to the Intel International Science & Engineering Fair, and the cost of various materials (pencils, ink cartridges, etc.). This year costs exceeded the approximately \$9000 of regular income by about \$2600. That was due primarily to inefficiencies at the State level in which we were expected to participate -- in particular transportation costs to the International Fair. Plus, our official party to the International Fair included the former Director who will not attend future International Fairs. Next year, we should be under budget providing we continue to receive contributions from our two corporate patrons.

The CKRSEF is an important UK outreach activity that allows our faculty, postdocs, and graduate students to interact with some of the best students in the 4th- 12 grades from the region our fair covers. It is our responsibility as the flagship university of Kentucky to encourage these students in their endeavors. The judging at the CKRSEF provides a medium through which this interaction can take place

through discussions with the students about their research. Additionally, the CKRSEF provides a means by which the University of Kentucky can recruit some of the best students in the state to do their undergraduate work here. In the past some students have gone on to work in the labs of faculty who they met as judges at the CKRSEF. Lastly, the CKRSEF is an important public relations element for the University of Kentucky initially on a local level in newspapers and on television, then on an international level as Kentucky students progress to the International Fair. Consequently, one of our most important tasks is the recruitment of qualified judges to participate in the fair. This year, thanks in large part to a note to the faculty from the Provost, we were able to have 67 highly qualified judges. This was an increase of more than 50% over the total of the previous year. Also, this year I have received periodic help in various administrative tasks from individuals in the PIMSER office.

The CKRSEF was held on March 1st. We hosted eighteen 4th grade students, 92 student in the 5th-8th grade section, and 38 high school students. The younger students represented fifteen elementary schools in Casey, Fayette, Scott, and Woodford Counties. Sixteen middle schools from those four counties were also represented. Five high schools, all from Fayette County, were also represented. Many of those students qualified to go on to the Kentucky State Science & Engineering Fair in Richmond in April. The Overall winning high school team and two high school individuals were sent by our Regional Fair to the Intel International Science & Engineering Fair in Atlanta in May. Our second place overall high school winner placed first at the State Fair, so she became part of the State official party and the third place finisher at our CKRSEF was then added to our official party. The individual high school winner at CKRSEF, Ann Cooper, was awarded 2nd place (and \$1500) in the Animal Sciences section at the Intel International Fair. That was the best placing of any of the students from Kentucky. Three of the middle school participants in the CKRSEF were chosen as National semifinalists by the SSP Middle School Program. Those three students were the only ones from any of the Kentucky Regional Intel affiliated fairs who were selected as semifinalists.

This past year marked the acquisition of an office in Medical Center Annex #5 for the CKRSEF Director. The office was furnished with used furniture (desk, file cabinets, and a chair) thereby not incurring the expense of purchasing new furniture. However, the office did not come with a computer, so when the director is in his office he must transport the laptop computer from his lab so that he can conduct his science outreach work. The computer guru from the Department of Microbiology, Immunology, and Molecular Genetics assisted the Director in setting up the internet connection in his outreach office.

The web site for the CKRSEF is maintained by Robin Cooper, the former Director. The web site is the most efficient means of communicating with the various interested individuals in the relevant portion of Kentucky. He is also an invaluable resource, having directed the fair in the past. Plus he is a seemingly untiring advocate for science outreach. Bruce Walcott of the College of Engineering was also very helpful to me in my first year as director. Sylvia Daunert (Chemistry Department) volunteered her entire lab to help us set up the display tables the day before the fair.

KY-WV LSAMP PIMSER Annual Report

A. Alliance Goals and Objectives

The primary mission and goal of the KY-WV LSAMP is to increase the number and quality of burgeoning population students earning baccalaureate degrees in science, technology, engineering, and mathematics (STEM) and the number of burgeoning population students enrolling, succeeding, graduating, and ultimately pursuing graduate programs in STEM, substantially. To accomplish this we have identified several process objectives, which include expansion and reinforcement of systemic mentoring, including research participation and guidance to graduate school. We are growing our collaboration with other systemic programs, national resources, and industry partners that have a need and interest in the STEM enterprise. The KY-WV Alliance continues to sponsor and expand the Annual LSAMP Student Symposium that provides students with an opportunity to give scholarly presentations, network with faculty and students from Alliance institutions, and participate in workshops and seminars.

This event has become one of the region's premier academic activities focused on student participation. To this end, we work to enhance the science, technology, engineering, and mathematics infrastructure of KY-WV LSAMP institutions in a fashion that promotes total institutionalization of the gains of the KY-WV-LSAMP. In doing all that has been referenced we expect to produce and disseminate new knowledge in discipline areas by scholars and mentors, new knowledge in teaching, learning and mentoring that is presented and/or published in/at scholarly journals, conferences/meetings. Ultimately, we expect to disseminate the KY-WV LSAMP approach for replication purposes at the local, regional, national, and international levels.

To continue to manage and administer LSAMP Phase I we now have a staff complement along with the Executive Director, we have hired an Administrative Coordinator, We have also brought aboard a Senior Accountant, Dorothy Ferguson who has several years experience working with federal contracts and grant accounts in the higher education environment. We believe that we have a team with the abilities and skill sets to assist each KY-WV Alliance institution in carrying out the objectives of the LSAMP partners individually and collectively. We actively promote and engage the Campus Leadership at each of the partner institutions in the KY-WV-LSAMP. We continue to engage proactively the KY-WV LSAMP governing board. We effectively utilize findings of the external reviewer and will utilize a valid, reliable, comprehensive evaluation to guide programmatic adjustments. We are attempting, through our implementation of support constructs, to transfer the KY-WV LSAMP function to campuses (institutionalization) gradually. Throughout phase 1 of the KY-WV LSAMP, we work to ensure effective documentation including identifiable metrics for each objective.

The KY-WV LSAMP has established guidelines for Level one (1), students that we define as those that the program spends funds on directly, i.e. for research experiences, class materials/books, support for training, attendance at conferences, presentation forums, etc. The Level two (2) student are students

who participate in the activities and/or constructs that are, in most cases required for the level one student, on an optional basis and those activities wherein no direct funds are expended for that student specifically. Level two students are comprised of every student impacted by any LSAMP activity, which include the full range of cultures, ethnicities, and disciplines at the KY-WV Alliance institutions.

B. KY-WV Alliance Supported Activities

The following is a sample of activities that occur under the aegis of KY-WV LSAMP on Alliance Member campuses.

1. Hispanic Association of Colleges and Universities (H.A.C.U.) Conference (BCTC)

Activity Description: Two Bluegrass Community and Technical College-LSAMP students attended the Hispanic Association of Colleges and Universities Conference in Chicago. They attended several informative workshops and networked with hundreds of other students and faculty from across the U.S.

Activity Goals and objectives: Assist in developing student leadership involving the Latino/Hispanic community students by providing opportunities for leadership workshops and skills through H.A.C.U. for the BCTC campus.

Activity Outcome: Students gained much information and knowledge from the experience in addition they brought info back to other students in the college.

2. Pre-Freshman Student-Faculty Collaborative Research (Centre)

Activity Description: Incoming first-year students will be involved in authentic scientific research under the close supervision of a faculty mentor.

Activity Goals and objectives: Students interests in science are stimulated. Their familiarity with campus and college life will is increased.

Activity Outcome: The science interests of participating pre-freshman students are reinforced. Their success as first-year students is enhanced.

3. Summer 2008 Bridge Program - Rising High School Juniors and Seniors (KSU)

Activity Description: these activities are designed to not only enhance student learning in science, math, engineering, and technology, but will also foster familiarity with current research and generate further interest in STEM disciplines.

Activity Goals and objectives: The main goal of the program is to motivate young students from underrepresented minority groups to pursue degrees and careers in STEM disciplines by:

1. Selecting Kentucky high school minority students with superior academic standing for on-campus 3-week summer program to attend workshops, seminars, and field trips;
2. Providing on-hand laboratory experience in sciences;
3. Proving latest information on developments in STEM areas through special lectures;

4. Providing opportunity to visit KSU aquaculture Center (program of distinction), KSU Land Grants laboratories, KSU Environmental Center, KSU Research Farm, State Game and Fish Park

Activity Outcome: Student participants:

- Gain knowledge about the need of well qualified personnel in STEM areas – nation wide
- Improve knowledge about the latest developments in Sciences
- Improve college skills
- Improve laboratory techniques
- Enhance ability to retrieve information from computer usage

4. KY-WV LSAMP Knowledge Café (UK)

Activity Description: The University of Kentucky established the “Knowledge Café” as a social, academic enhancement resource for peer-led tutoring, instruction, and study environment to help create a “sense of community” for STEM students on campus. Resources available in the center include laptops, printer, study-guides, calculators, and dry-erase boards for group instruction. Tutoring focused on STEM classes.

Activity Goals and objectives: Students will develop and enhance study skill sets, become well acquainted with material in STEM classes, and increased networking for group study sessions.

Activity Outcome: Produce better academically prepared students.

5. One-on-One, Research (UofL)

Activity Description: This was an Intensive, 10-week, summer undergraduate research experience for LSAMP students.

Activity Goals and objectives: Provide a Research experience in a department that offers a graduate degree in a STEM field.

Activity Outcome: One LSAMP student participated. Ms. Lecia Brown; mentored by Dr. Steve Ellis; Project: Investigating the molecular basis of the bone marrow failure syndrome, Diamond Blackfan anemia.

6. LSAMP Scholar Research (WKU)

Activity Description: Undergraduate research for three LSAMP scholars. One student in astronomy, another in chemistry and the third in the geological sciences.

Activity Goals and objectives: To introduce the students to original research under intense supervision.

Activity Outcome: The students learn skills required in research including presentation of results.

7. Weekly Meetings (MU)

Activity Description: The LSAMP student met as two groups just about every week. The first group is last year’s students that are funded by an EPSCoR grant that is dedicated to LSAMP students. There are six students in this group.

Activity Goals and objectives: The substance of the weekly meetings in this first group was to get updates on student research efforts, and finding out what concerns these students had about school

and life in general. These students have formed bonds within the science community here at Marshall and with themselves through LSAMP participation.

Activity Outcome: These students have formed bonds within the science community here at Marshall and among themselves through LSAMP participation.

8. Critical Thinking Seminars (WVSCTC)

Activity Description: Critical Thinking Seminars were offered to modify a student's way of thinking particularly about STEM.

Activity Goals and objectives: these specialized educational classes were designed to help students in STEM to make use of whole brain thinking.

Activity Outcome: Helped students understand the necessity to become aware of their thinking behavior and, provided approaches to change their thinking processes to better accommodate a STEM curriculum at the college level.

9. MANNRS (WVSU)

Activity Description: This project consists of bi-monthly meetings to recruit and mentor university students, planning activities with middle and high school students, and attend seminars and workshops focused on STEM careers, research, and national scholarship opportunities.

Activity Goals and objectives: To explore opportunities that will improve retention, academic and financial support.

Activity Outcome: All current students participating in MANNRS are maintaining their enrollment in STEM majors at WVSU and some students received supplementary financial support.

10. Guaranteed 4.0 Seminar (WVU)

Activity Description: Guaranteed 4.0 Seminars worked with students to teach them study skills in a workshop setting five times throughout the semester and through coaching from faculty mentors.

Activity Goals and objectives: The goal of the program was for students to learn valuable study skills and earn a 4.0 Grade Point Average during the fall 2007 semester.

Activity Outcome: Seventy-eight students participated in at least one seminar. Forty-five participated for most of the semester. A variety of student groups, participated that included students in STEM fields, health science fields, and business fields. The average G.P.A. of all students in fall 2007 increased 0.1 from the average G.P.A of all students in the spring 2007 with the STEM students increasing .23.

C. KY-WV Alliance Faculty/Staff Development Activities

1. Monthly Coordinator Meetings

Each of the members of the KY-WV LSAMP hosts a coordinator meeting at their campus, and this activity presents a unique networking occasion. This meeting affords the Alliance members an opportunity to talk about concerns, problems, and activities. Here too is where the group can explore best practices, share ideas, and resources and discuss faculty, staff, and student concerns. The monthly meetings build camaraderie amongst the KY-WV LSAMP family.

2. Board of Governor's Meetings

As directed by NSF, the Governing Board consists of Provosts or Presidents of each of the member institutions, as well as other community/industry members. Dr. Lee Todd chairs the Governing Board. His role as the President of the University of Kentucky and the Principal Investigator of the program makes him ideal for this position. In this role, he holds annual meetings with the Principal Investigators or their designee of all the KY-WV Alliance schools and is able to raise important KY-WV LSAMP related issues as the KY-WV LSAMP formulates and implements its plans. The Governing Board had one meeting during the 2007/08 term.

3. Spring 2008 Promoting College Success Web Cast (BCTC)

Promoting College Access and Success among Latino Males – An Internet training session to suggest ways college recruiters and transfer staff can recruit and work with Latino males by building on students' strengths. The program also helps to devise counseling programs for counselors from different backgrounds.

4. Guaranteed 4.0 Faculty/Mentor Training (WVU)

Donna O. Johnson presented the guaranteed 4.0 program to faculty and staff to prepare them for a semester long implementation of the program. The Training included approaches to activate the learning potential, managing stress, and insights to the classroom environment and the professor. It familiarized the trainees with the G4.0 comprehensive learning system and provided understanding and insight into how to ensure that the program works for the students.

D. KY-WV Alliance-Interface with other Programs/Activities

1. 2007/2008 KY-WV LSAMP Partners

- Kentucky EPSCoR
- West Virginia EPSCoR
- Georgetown College
- UK College of Engineering
- Cincinnati Bengals Football Organization
- National Society of Black Engineers
- UK President's Commission on Diversity
- "Bucks for Brains" Program
- UK Center for Academic Resources & Enrichment Services (CARES)

- UK Office of Student Multicultural Affairs
- UK College of Engineering Development Office
- West Virginia University Provost’s Office

E. KY-WV Alliance highlights (top four)

1. Student Research Symposium

Activity Description

The second annual Kentucky-West Virginia LSAMP Research Symposium was held on Friday, February 29, and Saturday, March 1, 2008 at the Radisson Plaza Hotel, Lexington, KY. Of the fifty-eight pre-registered individuals, forty-three attended. Of the ten alliance institutions, nine sent representatives. Approximately, eighty-five guests, including speakers, coordinators, mentors, and staff attended the symposium. Students from all ten-partner institutions presented their research in both oral and poster form. The students attended workshop sessions on interviewing skills, and attending graduate school. The participant breakdown is as follows:

Institution/Affiliation	# of attendees
Bluegrass Community & Technical College	6
Centre	2
Kentucky State University	3
University of Kentucky	9
University of Louisville	0
Marshall University	14
Western Kentucky University	3
West Virginia State University	5
West Virginia State Community & Technical College	3
West Virginia University	6
Winburn Middle School	12
Southern Elementary	1
Morton Middle	1
Antioch Baptist Church	1
KY EPSCoR office	1
GEM Consortium	1
NASA Goddard	1
Quantum Talent	1
Total	70

There were two oral presentations, six poster presentations and four individuals who did both an oral and poster presentation. The oral, poster, and dual presentation breakdown is as follows:

Oral Presentations

Individual/Team	Institution
Khyra Fullen	Marshall
Alexander Salazar	Marshall

Poster Presentations

Individual/Team	Institution
Santhi Chilukuri & AvinashTope	<i>Kentucky State University</i>
Marc Harik & Loretta Kwan	University of Kentucky
Deysi Hernandez	Centre College
Dominic Lewis	University of Kentucky
Karen Petty	University of Kentucky
Michael Somuah	Kentucky State University

Individual/Team	Institution
Catherine Bozio	<i>University of Kentucky</i>
Phylicia Brisco	Marshall
Jamar Grayson, Marvyn Grayson & Brent Frederick	Marshall
Jahi Palmer	Western Kentucky



Overall, the symposium received good reviews from all in attendance.

2. “STEMulating Emerging Minds” Recruitment Program

Activity description

The STEM Recruitment Program established at the University of Louisville to assist African American youth in their pursuit of holistic educational development in the Science, Technology, Engineering, and Math disciplines is called STEMulating Minds. The program intends to accomplish the goals of the KY-WV LSAMP through Synthesizing college awareness and preparation through a new educational opportunity that has been developed to expose students to targeted academic disciplines while

providing them with supplementary college preparation resources and support throughout the junior and senior high school years. The moniker for this construct is the STEM College. Additionally, participating students will attend the activities sponsored by the STEM College on the main campus of the University of Louisville where they will engage in mock experimental learning components. Furthermore, there are complementary benefits to Stem College participants, which include:

- Learning about the STEM disciplines and related career opportunities
- Becoming an honorary UofL student for the duration of their participation
- Meeting and interacting with college students who will then serve as their STEM mentors
- Attending college classes and special events and engaging in student leadership and civic activities
- Participating in and assisting faculty with real time research projects
- Enjoying overnight stays in the UofL residence halls for selected program events
- Joining college student organizations
- Receive participation incentives and STEM “bucks” to spend on campus

The invitation to participate in the STEM College encouraged approximately 5000 African American rising high school juniors and their parents in the Jefferson County, City of Louisville area to act in response. Of those, 115 students and 97 parents responded affirmatively and expressed interest in a follow-up meeting. To date there are 44 students scheduled with interviews for entry. Indeed this effort exemplifies the UofL motto and challenges the STEM College participants to "DARE TO BE GREAT."

3. C.A.R.N.E.G.I.E.-H.A.L.L. Institute

Activity description

Challenging America, Re-engineering National Education Gains Including fresh Epistemology - Holistic Approaches to Learning and Leadership is the acronym for a powerful new approach to empowering young rising high school juniors to prepare for the rigors of a science, technology, engineering, and mathematics (STEM) curriculum for their college/university experience in Kentucky and West Virginia called C.A.R.N.E.G.I.E. - H.A.L.L. The Institute began in the summer of 2008 with its orientation camp, which is a collaborative among Georgetown College, the National Football League’s (NFL) Cincinnati Bengals Football Organization, and led by the KY-WV LSAMP’s Bluegrass Community and Technical College (BCTC). This intersection in and of itself is the creation of a new paradigm for financial support of STEM education opportunities that expands to entities that traditionally are not viewed as a resource, professional sports, and STEM higher education.

The CARNEGIE HALL effort is a yearlong/summer-after school-week end construct concerning the production and dissemination of new knowledge through intense immersion, preparation, and research by student scholars and their mentors; utilizing the Laws of Human Performance and Practice, targeting the emergent/burgeoning populations of Kentucky and West Virginia with a focus on Science, Technology, Engineering and Mathematics (STEM). The Institute’s designers have refined approaches to studying mathematics and science such that they will affect the current generation of students and the next. Founded on the knowledge that one learns by doing the project posits that as each participant learns by doing a task repeatedly, practice makes perfect, no matter whether that task is charting the heavens or nailing shingles to a roof. As each one of the CARNEGIE HALL students practices and specializes in STEM activities they are empowered to trade the programs final product – the Burgeoning

population human resource - with the KY-WV LSAMP institutions thus, we all become better off. How does one get to C.A.R.N.E.G.I.E.-H.A.L.L.? Practice, Practice, Practice!

The C.A.R.N.E.G.I.E.-H.A.L.L., objective is to create first class scientists, technicians, engineers, and mathematicians from the populations referenced, who are middle range educational performers. It is a given that students who complete academic immersion during a summer and/or after school program dramatically improve their grades and standardized test scores. The program continues with a “high tech” mentoring component wherein the students have continuous access to their STEM mentors from the participating institutions via e-mail. Additionally, the students come together in “high touch” bi-monthly meetings where the students are challenged with STEM co-curricular materials and assignments. The students will also be paired with research opportunities in their communities. There is also additional benefit in that the participating students are encouraged to reach down and pull up middle school students from their communities. The initial recruitment effort reached out to students through the KY-WV LSAMP institutions and the Kentucky Community and Technical College System (KCTCS). These institutions brought forward fifteen students from all over the Commonwealth of Kentucky who made up the inaugural class of THE C.A.R.N.E.G.I.E.-H.A.L.L. Institute.

The students participated in an extensive immersion of mathematics, science, and most importantly communication and language skills, as well as many hands on activities.



4. Science Technology Program

Activity description

Pre-Freshman Mathematics and Chemistry courses we offered to LSAMP students at West Virginia University to prepare them for their first year at WVU. Students elect to take either a mathematics course along with an orientation class for seven (7) hours of college credit or a chemistry course along with an orientation class for six (6) hours of college credit. An introduction to the pace and expectations of college courses was included, to help students majoring in a STEM field, especially the ones that required a lot of mathematics, enter into calculus at the beginning of their college career. Student participants earned between six and seven credit hours toward graduation and completed a course in Mathematics or Chemistry. In addition, students gained a better understanding of study habits, college life, and a general sense of how to be successful in a STEM academic environment.

F. KY-WV Alliance Accomplishments

1. Strategic Implementation and Management Plan

Developed and disseminated the Strategic Implementation and Management plan for the KY-WV Alliance Institutions. The Strategic and Implementation plan is a detailed systematic procedure manual that addresses the goals and objectives for the KY-WV LSAMP. The document provides the core values for the Alliance, which include Motivation, Character, Holistic Development, Resourcefulness, Sustainability, Accountability, and Scholarly Virtues. The document further provides detailed directions for the campus coordinators in the procedure to accomplish the Alliance objectives with comprehensive matrixes establishing where the output and outcome responsibilities rests in terms of individual campus administrations, coordinator's offices and/or LSAMP Central office.

2. Monthly Program Assessment Reporting Tool (PART)

The LSAMP Central office developed a Logic Model/Theory of Action reporting tool with which to gather monthly input from the KY-WV institution coordinators. This tool formalizes our effort to help establish KY-WV Alliance benchmarks and/or readdress our efforts in directions that are better suited to achieve our Alliance and institutional goals; so that we can be sure that, we are in a position to assess our performance to ensure success of our efforts. The document assesses campus outputs and measures outcomes. We will use this tool to measure the efficacy of the institutional approaches to achieving the institutional goals and objectives and their relation to the KY-WV LSAMP program. We are also evaluating assessment methodologies that will distinguish the effectiveness of the LSAMP Alliance and institutional goals and objectives through the LSAMP Central Office.

3. KY-WV LSAMP Central Office Activities

In addition to being the Arbiter of constructs designed to build, and institutionalize academic and financial support infrastructure for the ten KY-WV Alliance institutions and the communities they serve the KY-WV LSAMP Central Office has been a resource to the communities by being involved with community, state, and national concerns, which include:

- Member of UK the President's Commission on Diversity
- Guiding Coalition Affiliate of the Georgetown College Diversity Steering Committee
- Associate of the Lexington Fayette Urban County Government/University of Kentucky (LFUCG/UK) Martin Luther King Holiday Committee
- Member of the UK "Bucks for Brains" Scholarship Advisory Committee
- Constituent of the NSF's MS/PHD program Advisory Committee (University of South Florida)
- Member of the Bluegrass Multicultural Affairs Advisory Committee
- Member of the Latin American and Caribbean Consortium of Engineering Institutions (2007)

Presentations at:

- The Kentucky Community and Technical College System – Diversity Director's Peer Mentoring Team

- The University of Louisville Upward Bound Program,
- Keynote for the Third Annual African Cultural Expressions and Celebration of Our Youth Conference (ACE/ICY)
- Office staff has been responsible for making presentations to several schools, civic organizations, churches and other grassroots organizations.

Participant

- Kentucky Girls Stem Collaborative
- Inaugural member (70) of the Medici Summit (new kind of executive training program designed to educate, illuminate, and inspire breakthrough insights at the connections of fields, disciplines and cultures that are applied to the STEM enterprise for LSAMP. Shared KY-WV LSAMP information with other conferees from across the United States and several other countries including Costa Rica, Ecuador, France, Germany, Mexico, Singapore, Sweden, and the United Arab Emirates

G. KY-WV Alliance Obstacles

1. Financial Aid Issues

The major Alliance obstacle given the restrictions in terms of how the LSAMP grant funds may be expended is common today in many areas around the nation, and powerfully affects our Alliance. Due to the actions of the Kentucky Commonwealth's General Assembly, the state funding for public colleges and universities has been cut and in the state of Kentucky, for example, is less than the current year (FY08) budget, which already received a 3 percent cut earlier this year. This measure retards the contribution that we would otherwise expect to leverage from the state in the form of scholarships for students that would allow the LSAMP to build structural elements that allow for the management of performance and infrastructure development. The budget cuts have a similar effect on travel, which can often lead to interactions with possible funding sources that allow the expansion of the program support base with subsidiary funding. Additionally, ancillary support for items like books, equipment, and study aids, for operations such as our LSAMP drop-in centers, and minor elements approximating refreshments for recruitment activities, extended study, or training sessions is severely limited. The budget cuts also preclude the KY-WV Alliance from providing as much student travel assistance or of having the ability to implement new support constructs in a timely fashion. Additionally, the tuition increases approximately four times faster than the rate of inflation and the growth of Kentucky's median family income. A recent Lexington Herald-Leader newspaper story according to a report by the Education Commission of States, drawing on research from other higher education organizations, "the purchasing power of the Pell Grant decreased by half, and more importantly loans have supplanted grants as the primary form of financial aid for postsecondary students."

To attempt to remedy this state of affairs for our Alliance Institutions the KY-WV LSAMP intends to redouble its effort to conscript additional corporate and philanthropic funding through untraditional

intersection building. The LSAMP Central Office will work with Development Offices at each institution to ensure inclusion in opportunities from their contact for funding for the LSAMP and STEM enterprise.

**AMSP Outreach Professors:
Additional External Funds Brought to University of Kentucky
as of June 30, 2007**

Outreach Involvement in Expansion of Resources			
Unit Receiving	Source	Amount	Year
AMSP Mathematics Outreach Professor "Algebra Cubed" Science Professor, Co-PI	National Science Foundation	\$1.83 million	2006-2009
AMSP Mathematics Outreach Professor: "Integrating the Assessment Principle into Mathematics Content Courses for Pre-service Elementary Teachers"	Kentucky Education Standards Board	\$100,000	2004-2006
AMSP Science Outreach Professor "Assessing How Distance Learning for Teachers can Enable Inquiry Science in Rural Classrooms"	National Science Foundation	\$1.98 million	2005-2010
"Kentucky Science Alliance" AMSP Science Outreach Professor, Co-PI	Kentucky Department of Education	\$570,000	2006-2009
"Recruiting, Retaining, and Graduating UK Appalachian Science, Technology, Engineering and Mathematics Majors (AMSTEMM)" AMSP Science Outreach Professor, Co-PI	National Science Foundation	\$2 million	2005-2010
"Teaching the Logic of Scientific Method in the 4th Grade" AMSP Science Outreach Professor, Co-PI	Department of Education	\$1.14 million	2006-2009
"A Genome Sequence for the Model Hemibiotroph Colletotrichum graminicola" AMSP Science Outreach Professor, Co-PI	National Science Foundation	\$951,260	2006-2008
Robert NOYCE Scholarship Program	National Science Foundation	\$750,000	2007-2009
		Total: \$9.32 million	

Mathematics and Science Computing and Distance Learning Unit Annual Report 2007-2008

Basic Mission

The primary mission of Math Sciences is to provide computing support to the Arts and Sciences mathematical science faculty, graduate students, and staff. The department operates a large Windows network serving the desktop needs of math faculty, staff, and graduate students and a smaller Unix research network serving approximately 25% of the faculty, and graduate students. All of the central computing resources for Arts and Sciences faculty and graduate students housed in Patterson Office Tower are located in the Math Sciences machine room on the ninth floor and all non-routine hardware design, configuration, and local maintenance of those critical systems are provided by Math Sciences.

Math Sciences provides the IT support for Inslab which houses the Geography Department GIS laboratory in CB 311/313 and for the Math House which supports Math Excel. It maintains and operates the Math Department's student Mathskeller student support center in the basement of White Hall Classroom building.

Research and Development

Beyond the basic support services, Math Sciences conducts a very active program of applied research and development in the technical support of mathematics instruction and partnerships. For the last ten years the central focus of this program has been a "meta system" called the Kentucky Partnership System (KPS) whose current major implementation is the web site <http://www.mathclass.org>. A draft document describing the higher-level functionality of KPS is at <http://www.mathclass.org/WebPages/Pages/200/KPS.pdf>. The principal application in KPS is WHS (Web Homework System) and the project was originally developed and implemented in January 1999 as a system for automated homework checking for multiple-section math courses. As such it was a means of maintaining consistency across sections and saving instructor labor. In the interim it has grown to a very large platform supporting a wide variety of instructional, partnership, and general outreach functions. It currently supports, on a daily basis, the majority of the UK math instruction, providing online homework services for all of Ma109, MA 110, Ma 113, Ma 123, and Ma 162 and a for ad hoc sections of other courses such as Ma 322, Ma 213, and Ma 361. In addition, it provides the same services to Spanish 101 and 102. It is not uncommon for the system to record a million transactions in a week and the size of the primary server has been doubled twice in Fall 2008. It now has, for instance 32 gigabytes, of memory and its backup server is being upgraded to that level. Ninety nine percent of the transactions are for on-campus UK instruction.

These services are provided as a corollary of the basic mission and the R&D program at no additional cost to students. In particular, UK ownership of the system means that the Math Department is not dependent on commercial systems that publishers use to market textbooks. Beyond the fact that the

WHS is a full instructional environment and far superior to its commercial counterparts, the department is able to extract significant price concessions from publishers or to use UK-faculty texts and other “open source” materials that are provided to students at the cost of duplication and handling.

For instance the textbook for Ma110 costs students \$21, that for MA 123 costs \$17, and that for MA109, albeit commercial, costs \$70 since the publisher has no leverage to apply for use of its online homework. Taken over thousands of students this results in many hundreds of thousands of dollars that remain in students’ pockets and circulate in the local economy. It also means that students can afford to keep their texts and that the faculty has the ability to systematically improve the courses without the (ultimately futile) biannual search for a better text.

In the last year, the following are among the most significant enhancements to the WHS system which have been put in place in direct response to the needs of the UK community:

1. A **dual authentication** system was created which complements the course account creation system. Earlier, a system had been implemented which created student accounts and assigned them to their homework accounts in keeping with the registrar’s records. The effect of this is that students can immediately access their accounts using a homework system identifier or they can use their active directory or MyUK accounts from the outset.
2. A **syntax checking** system was added that reduced the amount of student startup assistance required by over 50 percent, resulting in a huge saving of faculty, TA, and staff time spent on non-mathematical errors. The problem is that, notwithstanding the ubiquitous calculator, most students have no facility at entering expressions of more than a few symbols into a calculator or computer. They consequently would often work a problem correctly yet be told by the computer that their answer was not correct because they had not entered a syntactically correct expression. The new system immediately displays an “ok” if the expression is syntactically correct and a “?” otherwise. Each of these is a link which the student can click to learn how the expression is being interpreted or where it thinks the syntax error lies.
3. An **attendance system** has been added which teachers can use to keep track of student attendance and which is displayed when students check their test grades and homework scores. Instructors can use the system to print out “sign in “ roll sheets which can be circulated for students to sign even in large classes. The sheets match an electronic form in the system on which the instructor can, for instance, check the names with no signatures and toggle the complement. It typically takes less than a minute to record a section and all of the records are in the system. The sign-in sheets provide an automatic way for students to report that previous absences were excused.
4. An **early alert** system has been added which provides a page on which the instructor can view the attendance and test and homework grades and on which checkboxes are provided which correspond to the considerations on the university early alert system. The instructor can select the problem cases in a class and download an Excel spreadsheet with all of the class, student, and instructor information and a link provided to email it to the early alert system.
5. A **derived homework** system was added which permits instructors to assemble new homework assignments by selecting individual items from other homework sets in the system. This is far

from trivial since the individual problems are actually collections of similar problems so that the new sets can also provide individual versions. Moreover, the new problems have to “remember” where they came from in case their original author makes corrections and so that the “children” can be updated.

6. An **instructor hints** system has been added which allows a teacher who uses problems created by another to add hints (text, video, or graphic) to the versions that he/she is using without having to re-install the problems. It also allows problem authors to globally add hints or corrections to problems without re-writing.
7. **Asciimath** has been added to the system which permits problem authors to write problems in a simple, intuitive syntax which the server will display as formatted mathematics. This makes it possible to author problems for the system in standard word processors such as Microsoft Word
8. A **feedback system** has been implemented through which students can, upon receiving a report from the computer, submit “feedback” questions to the instructor or designated assistants. Students can use asciimath to ask their questions in full math notation. The feedback messages are presented to the feedback readers in an “on the fly” web page. Clicking on a problem opens a page on which the instructor sees the original problem, any response the student entered, the expected response from the computer, and the student’s query in the same editor. Typically the instructor is able to edit the question to provide enough information to get the student “on track”. All of the student’s feedback is organized in a page accessible only to the student.

Outreach

For a brief overview of the current outreach activities of Math Sciences see

<https://www.mathclass.org/WebPages/Pages/174/MaSciSp08.pdf> In what follows we will discuss particular developments in some of these but in doing so may need to refer to others.

Cyberlearning

KPS has developed into what an NSF task force calls an “Open Source Cyberlearning Platform” http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf08204 That is, a mechanism or vehicle with a basic functionality which can be independently adapted, employed, and disseminated by diverse teaching and learning communities. The open nature of such systems leads to continually expanding functionality for the entire user base as an increasing number of developers contribute intellectual capital and an expanding user base generates new and interesting applications. Indeed, the NSF task force report urges the foundation to identify, develop, and disseminate a number of such platforms. The Math Sciences experience shows that such platforms can, while directly contributing to the primary institutional mission, anchor wide-reaching, high impact outreach programs at essentially no additional cost. The following are some of the principal activities from the preceding year which serve to illustrate this capacity.

1. Access to Algebra

Access to Algebra is an AMSP-sponsored partnership among UK and a number of Appalachian secondary schools which is developing new models for teacher support and professional development, distance learning, dual credit, and differential teachers compensation. In the program, participating teachers work with University colleagues and pre-service teachers both to analyze and to directly assist (small numbers of) their own high school students to master and receive college credit for a challenging college algebra course. The school students, mentored by their teacher and assisted by pre-service teacher tutors using interactive distance learning tools, take a regularly scheduled University of Kentucky College Algebra course in parallel with on-campus sections populated both by general UK students and Appalachian college students participating in the UK AMSTEMM² project. See https://www.mathclass.org/WebPages/Pages/190/AccAlg_07_08_June18.pdf for more details on the Access to Algebra program.

Open Response Mathematics Examinations in a Distance Learning Environment

Employing KPS/WHS makes it possible for all students in Access to Algebra courses to use the same text, do the same (online) homework problems, and take the same open response examinations which are uniformly graded at UK. Developing this capacity has been one of the most important R&D outcomes of the last year. This development differs from items 1-8 above as it arose not in response to the conventional on-campus instruction program but through an outreach instructional activity. The Access to Algebra program both identified the needed capacity and has served as a platform to implement and test it. With this ability it is now possible to coordinate the offering of the same course in both on- and off-campus settings and to administer and commonly grade the same open-response, full mathematics notation examinations to all students in the same time frame. All students typically get their corrected tests returned within 48 hours. Mechanisms are in place to resolve grading inconsistencies, guarantee “chain of custody”, protect student identity, etc.

The following is a link to a set of slides prepared for an invited seminar on the Access to Algebra program which was given on Oct. 7, 2008 at the NSF

http://www.mathclass.org/WebPages/Pages/196/talk_slidesLf.pdf provides more details on the actual course and the way the technology is employed to teach it.

The KYOTE Placement Testing System

The Kentucky Early Mathematics Testing Program (KEMTP) (<http://www.mathclass.org/kemtp-info/>) is a long-standing outreach program, sponsored by the Kentucky Council on Postsecondary Education (CPE) which uses the KPS/WHS platform to provide free, online college readiness assessment to Kentucky secondary school students. In Feb. 2007 Dr. Kubota had just completed the conceptual design of the secure testing system for the Access to Algebra program when, at a meeting of the Kentucky Early Mathematics Testing Program (KEMTP) where a group of regional and community college faculty asked if a secure version of the KEMTP could be developed to serve their mathematics placement needs. These faculty were using a variety of expensive commercial placement services (e.g. COMPASS, Maple/MAA), what they

² An NSF STEP program

felt were poor results and very substantial under placement. In some cases 75% of their incoming students were being placed in remedial courses.

Dr. Kubota agreed to see what could be done and had a prototype system up within a few months and the service was provided at no cost to Kentucky educators. The program has grown into a large, statewide consortium project, now called KYOTE, which provides free, secure, online placement testing resources. See <https://www.mathclass.org/WebPages/Pages/173/KYOT.pdf> for more details on the project.

- Community college faculty at multiple institutions, Elizabethtown and Ashland in particular, who immediately began testing students both with commercial systems and KYOTE, reported that with KYOTE they placed very significantly smaller numbers of students in developmental math than with the commercial system with which KCTCS contracts. Subsequent comparison of grade distributions showed no differences in the distributions of grades between students who had been commercially placed developmental but placed higher on the basis of KYOTE scores. The preliminary data suggest the possibility both of enormous potential savings of financial and human resources and that some portion of entering freshman mathematics deficiencies may be artifacts of measurement. The results led the chancellor of KCTCS to authorize all KCTCS math faculties to, at their discretion, use KYOTE in place of the COMPASS exam (except in the extreme case dictated by law of adult students not having a high school diploma or GDE). Dr. Dianne Bazelle reported on the KYOTE partnership, its genesis and progress in a talk at the 2008 National Association of System Heads (NASH) summer institute. The slides from her talk are at <https://www.mathclass.org/WebPages/Pages/192/NASH072108.pdf>
- Eastern Kentucky University and Northern Kentucky University now give the KYOTE placement test as part of their spring and summer advising programs. EKU uses KYOTE to detect potential problems for incoming students and brings them to campus for summer bootstrap programs to avoid remedial placement. NKU is working with a consortium of 18 districts in its region to have math teachers and counselors administer KYOTE exams to students. Seniors are guaranteed their KYOTE placement if they attend NKU. Juniors would be required to take an appropriate course to maintain it. Juniors whose scores indicate likely remedial placement will be directed, as seniors, to a transition course being developed by NKU.
- Math Sciences is working with faculty at Western Kentucky University to implement a trigonometry KYOTE exam which WKU would use to qualify students to take courses which have a trig requirement.
- Dr. Steve Clements, director of the Institute for Educational Research (IER) received a teacher professional development grant from CPE of which one component was to be a training program for school personnel on implementing the KYOTE exams. Marc Heft of Math Sciences agreed to take on the challenge of developing a new Math Sciences capacity to produce very high quality technical training materials in an extensible,

modular, scripted video format. The initial modules are installed on the IER web server but can otherwise be viewed at the “ Placement Tutorials” link at <http://www.mathclass.org> or directly at <https://www.mathclass.org/mc/placementTutorials.aspx> . The production expertise Mr. Heft developed in producing these now affords Math Sciences an entirely new dimension in which to produce and disseminate high quality training materials.

2. Synchronous Instructional Capacity within KPS/WHS

Although the goal is a completely open-source system, the AMSP distance learning and other web-based, synchronous learning programs have depended on a very expensive CENTRA video conferencing system. While the CENTRA system has worked well, its initial costs have meant that the full adaptation of the Math Sciences models such as Access to Algebra would not soon be feasible for “ production” instructional environments. However, during the last year Dr. Kubota and Lana Kaliko have developed a powerful *open source* conferencing system within KPS/WHS. Currently called “ Chat2 “ , the operational prototype has the primary functionality of CENTRA and provides a clear path to an affordable “ cyberlearning” instructional environment, available to every segment of the community. In particular, it makes the broad implementation of the Access to Algebra model feasible.

- A NSF proposal is currently being developed with a consortium of Ky community colleges and the University of Tennessee at Chattanooga which would demonstrate the capacity to disseminate the Access to Algebra program to those institutions. In this case it will actually be “Access to Calculus” but would not be feasible were it dependent upon the kind of commercial conferencing technology through which Access to Algebra was developed.
- A graduate math distance learning course employing Chat 2 has been scheduled for spring 2009

3. Other Research

Math Sciences always has a number of small outreach efforts which stem from some of its capacities. A group of researchers at U of L and the Bluegrass Technology Center, led by Preston Lewis, have a U.S. Department of Education grant to study applications of technology to learning disabilities related to mathematics. The group is interested in a particular disability in which sighted students are unable to parse algebraic expressions by sight but appear able to do so after hearing them read aloud. The group is employing a modification of a commercial text reader by an application called “MathPlayer” from Design Science Corp. which parses MathML, the most important mathematics markup language. As it happens, the WHS homework system is based primarily on MathML and uses MathPlayer as a plugin for Internet Explorer. We have therefore been able to help them evaluate the technology and to help them distinguish bugs

arising from the software from ones arising from coding errors in the translation of student texts into MathML. The project was recently written up in Education Week:

<http://www.edweek.org/ew/articles/2008/10/22/09software.h28.html?tmp=1314967587>

Notes on Math Department Staff and Funding:

Math Sciences has three regular employees: Mr. Mike McKenna (hardware specialist), Dr. Vidya Rangnekar (software specialist), and Mr. Marc Heft (administrator).

Mr. McKenna has over 25 years experience with IT systems. He configures and maintains computer and communications systems for math sciences. In particular, he designs, configures, bids, and implements all of the research and service environments installed in the Math Sciences machine room on the 9th floor of Patterson Office Tower. *This includes all of the systems used by Arts and Sciences departments in POT and White Hall Classroom building.* A large Arts and Sciences IT staff provides the desktop services dependent on those resources.

Dr. Vidya Rangnekar, who holds a Ph.D in Computer Science, is responsible for all Windows desktop, research, and instructional services provided by Math Sciences. In doing this she employs a small group of student assistants for desktop assistance but operates primarily through a sophisticated central environment which she largely designed and implemented. She has, for instance, integrated the WHS system with central registration so that approximately 5000 student accounts for web homework are automatically created and organized into classes with the appropriate instructors and associated materials as students enroll in the classes. Her system also adjusts the enrollments on a daily basis during drop/add.

Mr. Marc Heft serves as administrator for Math Sciences, maintaining all financial and personnel records and managing the various external grants and contracts.

In addition to the regular staff Math Sciences has for several years employed two senior employees with revenue from grants and contracts.

Ms. Lana Kaliko is a senior SQL programmer who works with Dr. Kubota on the program development of the WHS system. She has played a major role in developing each of the eight very important local improvements and the major new distance learning tools listed above.

Mr. Jack Schmidt provides the Unix operations support, operates the mail system and Unix web servers, and operates the CENTRA system for Math sciences.

In AY 2008-9 Ms Kaliko is being substantially supported by \$50,000 from the Provost's Office and Mr. Schmidt is being supported by carry-forward funds from AMSP, carry-forward from last year's contracts with the Kentucky Center for Mathematics at Northern Kentucky University, and funds from NKU for support for the KEMTP. These are all scheduled to expire at the end of the academic year. A

large proposal that had been under development for several years could not be submitted when Education was unable to hire senior math education faculty to support it and the dean of Arts and Sciences withdrew college funds and restricted the operation of the Mathskeller which was to be a critical component. In addition, the continued decline in the math faculty meant that UK no longer has the faculty resources to independently operate programs of that scope. The result has been a restructuring of the program to take advantage of faculty resources and priorities at other institutions.

A DR-K12 proposal, anchored on the “cyberlearning” theme above is currently in process with a consortium of a Tennessee university and several Kentucky Community colleges and with a submission deadline in the first week of January 2009. This project will be based on the preliminary research these institutions have generated through their work with the KYOTE program. It is driven the priority they have for reducing math remediation which is currently nearing 75%. Their results are consistent with the California (<http://www.mathclass.org/WebPages/Pages/201/jonesacr07.pdf>) and Texas experience and with other research that makes placement tests but one component of a systemic program that includes teacher PD and curriculum alignment. A second ATE proposal in collaboration with KCTCS is also under development for an October 2009 submission and others are in the development stages among EKV, NKU, and the Kentucky workforce cabinet and KDE Career and Technical Education department. These have reasonable prospects for replacing some of the funding for the two soft money positions. However nothing can be guaranteed in the current financial climate and it has to be emphasized that the current Math Sciences recurring funding is not sufficient to actually pay for the technical infrastructure and research and instructional support that is being provided by Math Sciences.

