OKLAHOMA LOUIS STOKES AMP

Oklahoma Louis Stokes Alliance for Minority Participation in Science↔ Technology↔ Engineering ↔Mathematics

2005 Report for
Performance Effectiveness Review

To
Division of Education and Human Resource Development
Alliances for Minority Participation
at
NATIONAL SCIENCE FOUNDATION
ARLINGTON, VIRGINIA

15 December 2005

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Oklahoma Alliance for Minority Participation
"PERFORMANCE EFFECTIVENESS" REVIEW (P.E.R.)
October 31, 2005
The National Science Foundation
4201 Wilson Blvd. ROOM 815
Arlington, VA 22230

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PERFORMANCE EFFECTIVENESS REVIEW

Introduction

During the past year (which was the first year of Phase III), the Oklahoma Louis Stokes Alliance again exceeded its goal of an annual 15% increase in the number of students receiving baccalaureate degrees in STEM fields. While the Alliance is pleased with achievements during the 2004-2005 academic year, the program is frequently evaluated to determine the effectiveness of strategies employed to meet specific goals.

Eleven (11) institutions comprise the third phase of Oklahoma Alliance. They are:
Cameron University
East Central University
Langston University
Northeastern State University
Northwestern Oklahoma State University
Oklahoma State University (Lead Institution)
Southeastern Oklahoma State University
Southwestern Oklahoma State University
University of Central Oklahoma
University of Oklahoma
University of Tulsa

These eleven partner institutions include 1) *Oklahoma's three research universities* which are Oklahoma State University, University of Oklahoma, and University of Tulsa; 2) *the state's only Historically Black College/University* which is Langston University); 3) *one metropolitan urban institution*- University of Central Oklahoma; and 4) *six regional universities* of the state system.

As the Oklahoma Alliance primarily targets Native American program participants, it is important to note that *Northeastern State University* enrolls some 26% American Indian and Native Alaskan students, and ranks as a top awarder of Native American undergraduate and graduate degrees. The institution, found as the Cherokee National Female Seminary in 1851, is located in Tahlequah, OK, which is the capital city of the Cherokee Nation and the United Keetoowah Band.

The Oklahoma Alliance has positively impacted student achievement for eleven (11) consecutive years. Phase I began in 1994 with a baseline number of 214 underrepresented STEM graduates. The Phase II (1999) baseline was 438; and Phase III (2004), 676.

Many factors underlie the success of the Oklahoma AMP program. These include:

- Participation and supplemental financial support from the Oklahoma State Regents
- Participation of faculty, staff, and graduate students from STEM academic departments
- Frequent meetings with scholars
- Broad-based academic support
- Career counseling
- Organized programs (Research Internship Program, Summer Bridge Programs, Research Mentoring Program)
- Availability of program staff

Graduation Data: 1994-2005

Table 1 below shows the progression of OK-LSAMP STEM graduates. Between 1994 and 2005, annual STEM graduation rates from underrepresented populations increased progressively from 214 to 847. This growth is consistent with original projections. The 847 STEM graduates in 2005 establish an excellent baseline for a critical mass of graduate students.

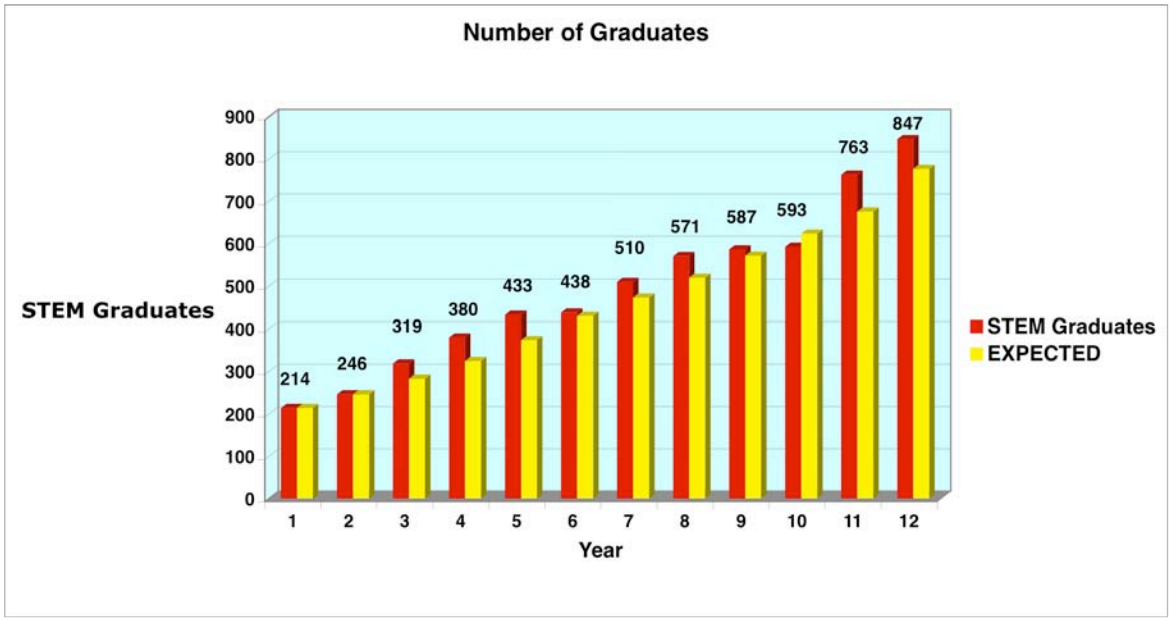


Table 1. OK-LSAMP graduation rate from 1994-2005

Table 2. Ethnic Distribution for 2005 STEM graduates. Oklahoma leads the nation in the number of Native Americans receiving baccalaureate degrees in STEM disciplines. Compared to 2004, Native American and Hispanic degree recipients increased by nearly 24%, while African Americans remained relatively the same.

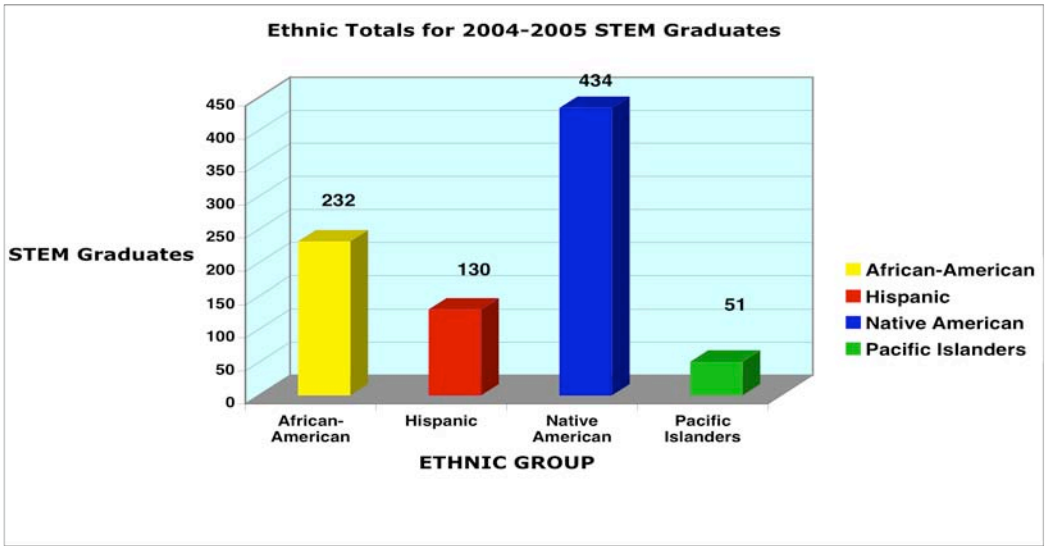


Table 2. Ethnic distribution of 2005 STEM graduates

Participants and Activities

For the most part, the 77 students in the first year of Phase III were juniors and seniors with minimal GPA's of 3.0, and aspiring for graduate programs. Because the program entered into a new phase, continuing students at some partner institutions were required to complete new applications with updated personal and academic information, educational and career goals, community involvements, official transcripts, and letters of reference. Students, however, may opt to participate as *unfunded scholars* in order to reap the benefits afforded by the elements of academic support incorporated into the program. Both funded and unfunded scholars are required to participate in the annual research symposium.

Scholars' meetings were held either on a regular basis or as needed and usually included interactive seminars pointing to academic success as well as personal and professional development. Some of the topics highlighted were: *Effective Research Presentations, The Indispensable Intern/Employee, Choosing your Advisor/Mentor, Research Topic, and Investing as a Life Strategy.* Students are continuously encouraged to participate in campus-wide workshops and symposia aimed at influencing academic success. Sessions most highly recommended for OKAMP scholars were *Reading Texts, Note Taking, Time Management, Stress Management, Test Taking, and Test Anxiety.*

In seeking to attract and retain students from Native American, African American, Hispanic, and Native Pacific Islander populations, Phase III objectives emphasized five (5) major areas:

1) *Intense recruiting*
2) *Expanded retention efforts*
3) *Research experiences*
4) *Increased participation in professional meetings*
5) *Graduate School Preparation*

1) <u>Intense recruiting:</u> Over the past year, increased emphasis was placed on one-on-one contacts based on recommendations by faculty, matriculating scholars, and former participants. Additional recruitment efforts included:

a) Dissemination of program information (via electronic communication, postal mail, kiosks, and direct contact) to STEM departments, high school administrators and teachers; tribal educational offices; civic, religious and social organizations; organized programs such as AISES (American Indian Science and Engineering Society); community colleges; community leaders and other individuals, and former students;
b) Collaboration with community college faculty and staff - including Seminole State College, Eastern Oklahoma State College, Oklahoma City Community College, and Tulsa Community College;
c) Collaboration with various campus entities such as High School and College Relations, Enrollment and Financial Aid, Multicultural Engineering Programs, Multicultural Student Services, student organizations, and faculty/staff organizations;
d) Participation in recruitment fairs.

2) Expanded Retention Interventions: Retention efforts are continuously magnified and modified as necessary. Campus coordinators and staff are cognizant that a gamut of problems can affect academic success, therefore the array of services available to students are frequently reiterated. While efforts to retain students cover a wide range, they are condensed into 7 key categories:

a) Accessibility of program staff to students. At the Lead Institution (Oklahoma State), the program has a full time staff comprised of a Program Manager, Campus Coordinator, and Secretary located in two adjacent offices within the Department of Biochemistry and Molecular Biology. Located in close proximity are the Project Director, Program Data Manager, and Webmaster. Students get to know and interact with the entire staff. On Partner campuses, most coordinators are full time faculty assisted by part-time staff, other faculty, and students in order to maintain accessibility to LSAMP scholars;
b) Maintenance of a friendly, helpful, and professional environment that conveys a non-intimidating atmosphere, encourages informal interactions, provides support and a sense of community;
c) Regularly scheduled meetings with all participants that promote interaction with peers as well as with faculty and staff from STEM departments and support areas;
d) Selection of a pool of carefully selected, highly qualified tutors to assist students as often as needed;
e) Frequently scheduled academic, skill building, and personal enhancement workshops that relate to time management, study skills, selecting a major, selecting a mentor, financial management, campus support services, opportunities for training and additional financial assistance (i.e. scholarships, fellowships, internships); presentations by research faculty/mentors and former OK-LSAMP participants who are either in the workforce or pursuing graduate studies;
f) Evaluation and follow-up of feedback from faculty research mentors;
g) Interaction with graduate students serving as Graduate Liaisons and/or as presenters at scheduled meetings.

3) Research Experiences

The research experience is a program benchmark in which all students must participate. They are required to identify a faculty mentor, develop an approved research project, and devote time to research during the academic year. A large percentage of students participate in summer REU (Research Experience for Undergraduates) programs or intern with state and federal agencies, and corporations across the country. For students remaining at their home campuses during the summer, research projects that are in progress may continue without interruption. One student, in particular, has been researching with the same faculty mentor since fall 2003. By continuing to work on the same project and/or related projects, he has developed a respectable level of expertise, and has been afforded opportunities to participate in conferences along with graduate students.

The research experience helps to solidify the decision to pursue (or not to pursue) STEM graduate programs in preparation for research/teaching careers. By polling students informally, it appears that the research experience is highly valued because it provides great insight into the challenges and rewards of research. The experience requires critical thinking in the application of knowledge, builds confidence, encourages collaboration, broadens networking, and brings students in contact with outstanding researchers at some of the country's most renown institutions and agencies. We have observed also that students generally take advantage of every opportunity to attend conferences for the purposes of exposure and professional

development, presentation of research findings, visitations with graduate school recruiters, and networking.

4) <u>Participation in Professional Meetings and Activities:</u>

Alliance scholars attended and/or made presentations at the following professional meetings:

Annual Oklahoma AMP Research Symposium
Louisiana AMP
Louisiana CCZARS (Center for Coastal Zone Assessment and Remote Sensing) Conference
Annual meeting of the American Fisheries Society in Anchorage, Alaska
National Society of Black Engineers (NSBE) Region V and National Conferences
Southern Division of the American Fisheries Society
National Conference for Undergraduate Research (NCUR)
Oklahoma Research Day
American Association of Petroleum Geologists (AAPG)/Society of Exploration Geophysicists (SEG) Spring 2005 Expo
Southern Regional Education Board Conference (SLOAN, McNair, AGEP, etc. students)
Annual Meeting of Beta Kappa Chi Scientific Honor Society & The National Institute of Science
Langston University Research Symposium
Thurgood Marshall Leadership Institute
National Association of Mathematicians Undergraduate MathFest
Senior High School Counselors' Reception

5) <u>Graduate School Preparation</u>

Focal points on graduate school preparation included participation in the Graduate Preparation component of the program, interaction with matriculating graduate students, the Graduate Record Examination (or other appropriate exam), the application process, and research experiences.

Throughout Phase II and the first year of Phase III, regular meetings were scheduled for juniors and seniors with even a remote interest in graduate training. Spearheaded by the lead institution, interactive presentations were provided by the Oklahoma State University Graduate College as well as faculty, staff, and graduate students from the various STEM departments.

A series of Graduate Record Examination Preparation modules have been developed that provide learning activities to assist students in acquiring knowledge, practicing skills, and completing steps necessary to gain admission to graduate school with successful completion. *The modules focus on: a) what is the GRE, why it should be taken, how to prepare, contents and format, b) cost, c) where and when to take the GRE, d) test-taking skills relevant to computer aided test format e) practice tests, f) scoring and g) average score requirements for specific fields of study.*

The ***Kaplan Test Drive*** held at the University of Oklahoma Health Sciences Center (OUHSC) in Norman and the University of Central Oklahoma (February 2005) offered an opportunity for students interested in graduate programs at OUHSC to take a free practice GRE and other tests under simulated testing conditions. In addition to the above activities, OKAMP scholars at Langston University also participated in the ***Kaplan GRE Preparation Program*** sponsored by the Undergraduate Biomedical Education Program at Langston.

Activities Supported by OK-LSAMP

The OK-LSAMP program provided 1) **semester stipends 2) tutoring 3) conference travel and 4) summer internships.** These provisions were implemented as follows:

Semester Stipends: Program participants received stipends ranging from $1000 to $2500, depending on the number of students supported. Students must meet all established criteria, attend all scheduled meetings, and plan to enroll in STEM graduate programs. Failure to comply with regulations result in penalties and possible dismissal from the program.

Tutoring: Students experiencing difficulty with coursework are strongly encouraged to make this known to the Campus Coordinator as early as possible. If a suitable tutor is not included in the 'pool' that is maintained, the academic department will be contacted. Compensation provided by the program is competitive.

Conference Travel: Air travel, hotel, and related expenses are covered for scholars making presentations at conferences. Students attending the National Conference for Undergraduate Research (NCUR) are supported in full by Oklahoma EPSCoR.

Summer Internships. The Research Internship Program (RIP) offers 8-week internships for students working with a campus mentor during the summer semester. Students accepting an off-campus unpaid internship also qualify for RIP. OK-LSAMP stipends are $3,500 for the 8-week period. Usually, scholars with accepting external paid internships receive small OK-LSAMP stipends to offset travel expenses to and from the site.

Students interned at the following 18 sites during the summer 2005:
Oklahoma State University (Stillwater, OK)
University of Tulsa (Tulsa, OK)
Southeastern Oklahoma State University (Durant, OK)
University of Arkansas
Lockheed Martin, Atlanta, GA
University of Michigan
California Institute of Technology
University of North Texas Health Science Center
University of Kansas
Texas A & M University, Cyclotron Institute
Brigham and Women's Hospital, Harvard Medical School, Boston, M
East Central University
Mayo Clinic, Rochester, MN
Langston University (Langston, OK)
NASA Goddard Space Flight Center
Northeastern State University (Tahlequah, OK)
Freescale Semiconductor, Inc. (Austin, TX)
University of Oklahoma Health Sciences Center
Cameron University (Lawton, OK)
Burns and McDonnell (Kansas City, MO)

Student Awards and Recognitions

Deborah Snell, nominated for Outstanding Senior at Northeastern State University; active in Honors Society for Women in Chemistry;

Sophia Rodriguez (University of Tulsa), won **3rd place** in oral competition at the LS-LAMP and CCZARR Louisiana Research Conference, New Orleans, October 2004; and **2nd place** in the student paper competition at the NSBE Regional V Conference, Houston, November 2004;

Shernell Surratt (University of Tulsa), **3rd place** winner in paper competition at NSBE Regional V Conference, Houston, November 2004;

Dustin Little (Northeastern State University**)**, places great emphasis on 'giving back' to the community through volunteer service for Habitat for Humanity;

Elizabeth Saladin (Southwestern Oklahoma State University) received the National Collegiate Natural Science Award

Alliance Collaborations

Oklahoma EPSCoR, (***E**xperimental **P**rogram to **S**timulate **C**ompetitive **R**esearch*), in its efforts to provide opportunities for high achieving minority students, funded two LSAMP 8-week summer internships in the amount of $5,000 each that placed scholars with EPSCoR Functional Genomics Scientists. *In April, 2005, EPSCoR provided 100% funding for five (5) students and two (2) chaperones to participate in the National Conference for Undergraduate Research (NCUR) held in Lexington, VA. Two students made presentations.* In addition, free registration was provided for scholars participating in the annual EPSCoR *Women in Science* Conference held at Langston University.

Oklahoma State University Graduate College invites the participation of OKAMP scholars and staff during visitations of McNair Scholars, Upward Bound and other student groups. The OSU Graduate College presents workshops each semester pertinent to graduate school preparation and effective research presentations.

University of Oklahoma Health Sciences Center (OUHSC) has continually mentored OK-LSAMP summer interns for several years. Currently, some former scholars matriculate as graduate students at OUHSC.

Robert S. Kerr Environmental Center (Ada, OK), trains OKAMP scholars (largely from East Central University) during summer semesters as well as during regular semesters. The Kerr facility is EPA's first 'carbon neutral' laboratory.

US Army Corps of Engineers (Denison, TX), accepts OKAMP interns (from Southeastern Oklahoma State University) each summer as well as in spring and fall semesters.

US Fish and Wildlife Service (Tishomingo, OK), continually mentors OKAMP Wildlife majors (and those in related fields) attending Southeastern Oklahoma State University.

'Value Added' for Inter and Intra-Institutional Programming and Coherence

1. Partner institutions worked cooperatively in disseminating information regarding review sessions for the GRE and other graduate school entry exams held at University of Oklahoma Health Sciences Center, University of Central Oklahoma, and Langston University.

2. Graduate Prep modules, developed by Oklahoma State University, were shared with all partner institutions. The information benefits not only OKAMP students, but other students as well who are considering graduate study. These modules encompass, to some degree, implementations by partner institutions that provide guidance and encouragement for students to take the general part of the GRE at the beginning of the junior year and the advanced part in the early senior year.

Modules contain detailed information on preparation for the Graduate Record Examination and other relevant exams, such as GMAT, depending on STEM discipline.

3. Alliance meetings, scheduled in September, November, February, and April (at the Regents Building in Oklahoma City), allow for open dialogue on overall program operation and specific implementations on each campus. Periodically, fiscal affairs personnel from alliance institutions attend meetings to ensure compliance with NSF requirements.

4. The *Oklahoma State Regents for Higher Education* provided funding to enhance the Residential Summer Bridge Programs at Alliance Institutions. These funds increased the number of participants supported and made possible additional enrichment activities.

5. Some alliance partners implemented modifications of the *Ethics and Professional Behavior* course that University of Tulsa developed for summer bridge students.

6. National Science Foundation funds have been - and continue to be utilized - to enhance realization of educational goals, provide tutoring as needed, host research symposia, fund conference participation, print and disseminate program information, engage adequate staff, and fund participation in annual LSAMP meetings.

7. The *Annual Research Symposium* provides an opportunity for professional and social interaction of the entire alliance. In September 2004, more than 100 students, faculty, staff, and visitors were in attendance at the *OK-LSAMP eleventh Annual Research Symposium* held at Oklahoma State University.

8. The Program Evaluator provides periodic reports on the correlation between program goals/objectives and outcomes.

Alliance Greatest Accomplishments

1) Increased participation and quality of presentations at annual research symposium.

The involvement of scholars in summer research experiences at corporations, medical centers, space centers, and a large number of higher education institutions has heightened research interest and generated an admirable eagerness to exchange information. It is evident that research experiences not only fine-tune research capabilities, but also broaden networking opportunities, build self-confidence, generate enthusiasm, and greatly impact the decision to pursue STEM graduate programs.

2) Implementation of graduate school preparation program.

GRE preparation modules were developed at the Lead Institution (Oklahoma State University) and are utilized across the alliance. Modules emphasize the following: what is the GRE, format and contents, why it should be taken, when and where to take the GRE, cost, how to prepare, test-taking skills relevant to computer aided tests, practice tests, scoring, and average

score requirements for specific fields of study. Throughout Phase II, regular meetings and workshops with Graduate College representatives and OKAMP staff were scheduled for juniors and seniors (as well as underclassmen desiring to attend) with even a remote interest in graduate training. Students are required to complete and submit at least two graduate school applications to institutions of their choice. A tremendous amount of emphasis is placed on the application process, including following instructions, neatness, accuracy, thoroughness, letters of reference, and personal statements.

ALLIANCE OBSTACLES

- *A major obstacle that has existed for several years is the decline in the state budget that prevented us from completing the institutionalization of the Summer Bridge program and also meeting some of the Cost Sharing supported by the Oklahoma state Regents as matching to our partner institutions.*
- *A second obstacle is the decreased NSF funding for Phase III. A number of students who are no longer funded continue to participate in some phases of the program, particularly the graduate preparation component.*
- *A third continuing obstacle is the lack of sophistication and difficult management within the partner institutions in sending in vouchers in a timely manner to provide support to students.*
- *A fourth is the financial sacrifice that many engineering graduates feel they make by entering graduate school rather than the workforce at an attractive entry level salary.*
- *And a fifth is the high interest in non-STEM disciplines. While the alliance has retained an impressive number of outstanding students, a considerable number make the choice to change majors, or continue in the chosen major with a career focus in the health sciences. It is deeply engrained in some cultures that a successful career means being a 'lawyer or doctor.'*

GRADUATE SCHOOL PARTICIPATION (Partial Listing)

**Jennifer Mann McCloud, Ph.D.
Ph.D. 2002, U of AR, Mathematics
**Suzanne Tunnel Estees, Ph.D.
Ph.D. 2003, U of OR, Biological Sciences
**Edward Daniel, Ph.D.
Ph.D. 2003, OSU, Electrical Engineering
**Daniel Wilson, Ph.D.
Ph.D., 2005, Carnegie Melon, Computer Science

*April Hendley
M.S., University of Oklahoma, Astrophysics
*Loretta Rush
M.Ed., Secondary Education
M.S. in progress, Oklahoma State University, Plant Pathology
Heather Hannah
Ph.D. Candidate, Notre Dame University, Mathematics
Justin Wilks
Graduate Student, UNT (Denton)
Stevens Kitchens
MS in progress, U of AR, Chemistry

*Byron Quinn
PhD Candidate, OSU, Biochemistry & Molecular Biology
*Billy Gaston

PhD Candidate, OSU, Computer Science
*Bobby Gramblin
M.S., OSU, Biochemistry & Molecular Biology
Latricia Fitgerald
PhD Candidate, Meharry Medical, Biochemistry
*Chris Lee
M.S., UCO, Forensic Science
*Barry Trotter
M.S., Johns Hopkins University, Chemistry
Nicole Singleton
Ph.D. Student, OSU, Physiological Sciences
Lila Peal
PhD Student, OSU, Biochemistry & Molecular Biology
Erma Sims-Gaston
M.S. Student, OSU, Computer Science
Adrian Sherman
M.S. Student, OSU, Biosystems & Agricultural Engineering
Victor Harris
M.S. Student, UAL (Huntsville), Biological Sciences

Kelly Blehm
PhD Student, University of Houston, Biochemistry
*Valorie Strange
M.S., University of AR, Biology

*Adrias Casias
M.S., Stanford University, Chemical Engineering
*Bruce Williams
M.S., University of OK, Engineering
*Brett Cowan
PhD Student, OSU, Civil Engineering
*Cara Cowan
PhD Student, OSU, Biosystems & Agricultural Engineering
*Joseph Jones
M.S., OSU, Civil Engineering
*Kristi Perryman
M.S., OSU, Environmental Science
*Ryan Birkenfield
M.S.
*Thomas Patten
PhD Student, OSU, Electrical Engineering
Marty Heppler
MS in progress, OSU, Entomology/Plant Path.
Brek Wilkins
Graduate Student, OSU-CHS, Biomedical Sciences
Jacob Manjarrez
PhD Student, OSU, Biochemistry & Molecular Biology

*Athena Dawson
M.S., Tuskegee University, Chemistry
Dominic Barrett
MS Student, OSU, Fisheries and Wildlife Ecology

Joanne Gonzalez
PhD Student, University of Oklahoma, Biochemistry

Crystal Redden
Graduate Student, Rice University, Chemistry
Michelle Stevenson
Graduate Student, OU, Physics

Eleazar Madrid
Graduate Student, UT, Mech. Engineering
Britney Grayson
Graduate Student, Vanderbilt University, Biology

BRIDGE TO DOCTORATE PHASE III SUPPLEMENT

The Oklahoma Bridge to Doctorate (BD) Program at Oklahoma State University was incepted in fall 2004, with 7 matriculating students and 5 pending for Spring '05. For the most part throughout the first year, the Project Director and Project Coordinator scheduled meetings at 2-week intervals to monitor overall adjustment and performance (particularly of students just entering graduate school and new to Oklahoma State University), and to provide opportunities for students to interact with each other. An open door policy is maintained by the Project Director and Coordinator, and students are strongly encouraged to utilize academic and social support resources provided by various institutional entities.

GUIDELINES FOR BRIDGE TO DOCTORATE STUDENTS

Eligibility for Admission and Continued Participation

1. Baccalaureate degree earned in a STEM (Science, Technology, Engineering, Mathematics) discipline
2. Undergraduate participation in the Louis Stokes AMP program
3. U.S. citizenship
4. Maintenance of a minimal 3.0 overall GPA
5. Full admission to the Oklahoma State University Graduate College and a STEM academic department
6. Continuous matriculation as a full-time graduate student
7. Maintenance of required GPA set forth by the Graduate College and the academic department
8. Participation in scheduled BD meetings and activities
9. Successful progress towards the degree

Participant Expectations

1. Active participation in a research project that leads to published results
2. Frequent communication with the faculty advisor/mentor
3. Willingness to seek academic and/or personal assistance as needed
4. Participation in professional meetings and other graduate school-related activities
5. Diligence in academic pursuits
6. Demonstration of dependability and the utmost integrity
7. Demonstration of professional and mature behavior
8. Ability to work independently as well as with a team
9. Clear understanding that the academic department administers the participant's graduate program
10. Live in close proximity to Stillwater

Expectations of Faculty Advisors/Mentors

1. Provide academic advisement and research mentoring
2. Be accessible to students
2. Demonstrate a friendly and encouraging attitude
3. Provide adequate information to help students understand academic requirements and expectations
4. Encourage students to participate in local, regional, and national professional organizations
5. Encourage involvement in departmental, graduate school, and university organizations and activities

6. Provide guidance and assistance in professional writing
7. Provide assistance in oral and poster presentations
7. Provide ethical guidance
8. Demonstrate awareness and sensitivity to cultural differences
9. Encourage evaluation of career options

Expectations of the Oklahoma Louis Stokes AMP Program

1. *Selection of highly competitive students to seek admission to the Graduate College and a STEM department*
2. Completion of forms required for receipt of the BD stipend
3. Monitor the academic progress of students
4. Provide academic and social support aimed at easing the transition from undergraduate to graduate school through a series of interactive workshops
5. Maintain important personal and academic information
6. Provide a friendly and helpful atmosphere
7. Provide interactive activities

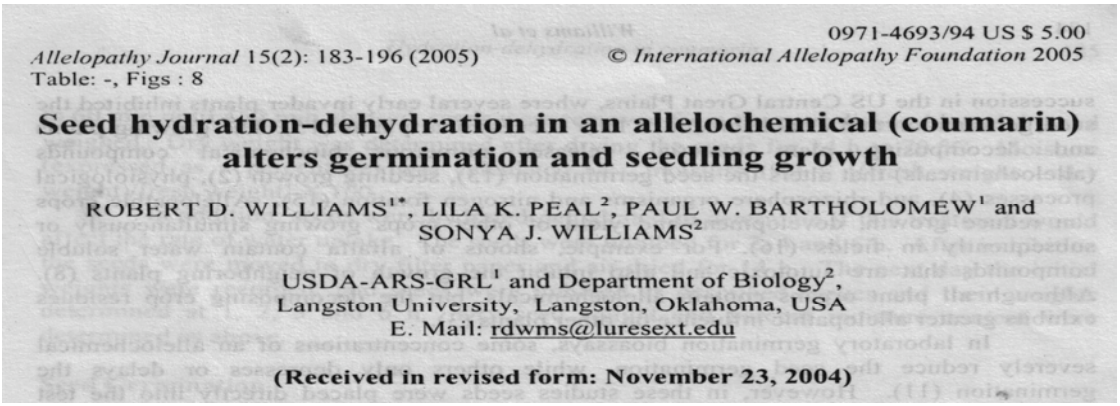
General Profile of the 12 BD students at Oklahoma State University

- 6 are males and 6 females
- 7 Native Americans, 4 African Americans, and 1 Hispanic
- Baccalaureate degrees were earned between 1997 and 2005
- 11 BS degrees were earned at OK universities and 1 at a Louisiana university
- 4 have earned Masters degrees
- Areas of concentration:
  - Biochemistry and Molecular Biology (2)
  - Entomology and Plant Pathology (2)
  - Microbiology and Molecular Genetics (1)
  - Biomedical Medical Sciences (1)
  - Fisheries and Wildlife Ecology (1)
  - Electrical Engineering (1)
  - Physiological Sciences (1)
  - Biosystems and Agricultural Engineering (2)
  - Civil Engineering (1)

Activities of the BD Students

- All 12 BD students served as hosts, presenters, and/or facilitators for the 2004 and 2005 Annual Research Symposia
- **Brett Cowan, Marty Heppler, Lila Peal, Nicole Singleton, Brek Wilkins, and Cristee Wright**, attended the April 2005 NSF Annual Joint Meeting of the Division of Human Resource Development; **Cristee Wright** and Dr. Gilbert John (faculty mentor) presented an e-poster entitled *Searching for the azoreductase gene in anaerobic bacteria of the human intestine;* Cristee also made presentation at the Missouri Valley Branch of the American Society of Microbiologists in April 2005 at Kansas State University (Manhattan, KS)
- **Thomas Patton** participated in the January 2005 IEEE Computer Society meeting in Breckenridge, CO; and meetings with Aerial Data Services in summer ’05, Tulsa, OK
- **Loretta Rush** attended an NSF Grant Writing Workshop in Ardmore, OK

- **Marty Heppler** attended meetings of the Entomological Society of America (ESA) and the American Phytopathological Society (APS) she is a member of the Joint Committee of Women in Plant Pathology and the Cultural Diversity Committee for APS until 2008
- **Lila Peal** participated in the annual Symposium on Frontiers in Plant Science and Agriculture, Ardmore, OK; co-authored an article that was published in a 2005 volume of *Allelopathy Journal* (see below)



0971-4693/94 US $ 5.00
Allelopathy Journal 15(2): 183-196 (2005) © *International Allelopathy Foundation* 2005
Table: -, Figs : 8

Seed hydration-dehydration in an allelochemical (coumarin) alters germination and seedling growth

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Select Articles on Graduate School Success

(Bridge to Doctorate students were encouraged to peruse the articles below)

- ***Mentor and Graduate Student: Strategies for Success***
  (http://graduate.louisville.edu/prog_pubs/mentorhandbook.htm)

- ***Mentoring Within A Graduate School Setting*** *by Shalonda Kelly*
  (http://www.findarticles.com/p/articles/mi_m0FCR/is_1_33/ai_62894066

- ***How to Get the Mentoring You Want***
  (http://www.rackham.umich.edu/StudentInfo/Publications/)

- ***In the Minority in Graduate School***
  (http://chronicle.com/weekly/v49/i11/11b01401.htm)

- ***R*etaining Students in Your Graduate Program**
  (**http://nextwave.sciencemag.org/cgi/content/full/2002/06/13/12**)

- ***A Day in the Life of a Grad Stude****nt (in GRAD SOURCE,* The Magazine for Graduate Students, www.GradSource.com)

- **Graduate Students Ethics Code (Standards of Conduct)**

- ***The Effect of a Research Ethics Course on Graduate Students' Moral Reasoning*** **(National Academy of Sciences, Washington, D.C. July 5-6, 1994).**

OKLAHOMA LOUIS STOKES ALLIANCE FOR MINORITY PARTICIPATION
BRIDGE TO THE DOCTORATE (BD) PROGRAM
Earl D. Mitchell, Jr., Ph.D., Program Director
Oklahoma State University
Stillwater, Oklahoma

BRIDGE TO DOCTORATE FELLOWSHIP APPLICATION

Date of Application _____

Legal Name: ___Mr. ___Ms. (Please check one) _____

Social Security Number _____ Date of Birth_____

Local Mailing Address: _____
Street Address City
State Zip

Permanent Mailing Address: _____
Street Address City
State Zip

Email Address: _____Residence Telephone: ( )_____

Cell Phone ( )_____

Emergency contact person: Name _____ Telephone ( )_____

Relation of above person to you _____

In order to better assist you in your academic pursuits, do you have a chronic illness or recurring health problem that you feel the BD staff should be aware of?

_____(Yes or No). If 'yes', please explain _____

Ethnicity: ____American Indian, Tribe _____
____Alaskan or Pacific Islander
____African American
____Hispanic/Latino
____Other _____

Have you received the baccalaureate degree? ____Yes ____No

If yes, from what institution? _____ Year_____

If no, what is your institution and expected graduation date_____

Major _____ Overall GPA _____ GPA in Major _____

In what LSAMP program are/were you a participant? _____

Academic department in which you are/were enrolled _____

Undergraduate Faculty Advisor/Mentor _____

If you have pursued graduate study, please provide the information requested below:

Name of institution_____
Department_____

Mentor/Advisor _____ Mentor's Email_____

Indicate degree earned, if any: _____ Research emphasis:_____

Briefly comment on your special interests and/or hobbies _____

_____

_____

List past/present academic and community involvements. _____

List past employment positions: _____

_____

_____

Please attach the following:

1) ***1 to 2-page, typewritten summary [1-inch margins, 12 font] of your academic plans and career goals at this time;***
2) ***Description of previous research experiences (1-to 2 pages, using the above specifications);***
3) ***A copy of your Graduate Record Exam (GRE) scores (if taken);***
4) ***Two letters of recommendation from faculty members who have worked with you and can speak to your general character, academic performance, dependability, and ability to work with others.***

Please read the following statements carefully and sign as indicated, if you agree.

1. I fully understand that continuous participation in the Bridge to the Doctorate Program depends on meeting the academic requirements set forth by the Oklahoma State University Graduate College, the academic department in which I am enrolled, the National Science Foundation, and the Oklahoma State University BD Program.
2. My academic/career goals include pursuit of the Ph.D. degree.

_____ _____

Signature Date

BRIDGE TO DOCTORATE PROGRAM
Oklahoma State University
Earl D. Mitchell, Ph.D., Program Director
Zola J. Drain, Ph.D., Program Coordinator

RESULTS OF BRIDGE TO DOCTORATE QUESTIONNAIRE (YEAR 1)

June, 2005

Questionnaire Directions: Using the scale provided below, please rate your graduate school experience as a participant in the National Science Foundation's *Bridge to Doctorate Program* at Oklahoma State University.

Rating Scale: 1 = Poor; 2 = Fair; 3 = Good; 4 = Very Good; 5 = Excellent

GRADUATE COLLEGE	
1. Quality of available information about graduate school from the OSU Graduate College	**3.80**
2. Quality of assistance received from OSU Graduate College Staff	**3.70**
BRIDGE TO DOCTORATE PROGRAM	
3. Recruitment process for the Bridge to the Doctorate Program	**4.50**
4. Clarity of polices and procedures of the Bridge to Doctorate Program	**4.40**
5. Availability of Bridge to Doctorate Program Staff	**5.00**
6. Adequacy of assistance received from the Bridge to Doctorate Program Staff	**5.00**
7. Adequacy of financial resources provided by the Bridge to Doctorate Program	**4.90**
FACULTY MENTOR AND ACADEMIC DEPARTMENT	
8. Quality of academic advisement received from advisor/mentor	**3.90**
9. Friendliness of faculty mentor	**4.60**
10. Availability of faculty mentor	**4.40**
11. Feeling that you 'belong' within your department	**4.10**
12. Overall quality of course instruction received	**4.40**
13. Availability of faculty	**4.20**
13. Adequacy of research facilities within your department	**4.00**
14. Formal/informal training received in oral and poster presentations	**4.20**
15. Experience received through collaborative work	**4.20**
16. Experience received through participation in proposal writing	**3.38**
17. Participation in departmental seminars	**4.40**

17. Participation in professional meetings **3.70**

PERSONAL ASSESSMENT

18. Degree of satisfaction with your living accommodations **4.40**

19. Management of your time **3.70**

20. Quality of your study skills **3.80**

21. Academic and/or social interaction with other graduate students **3.90**

22. Social interaction with faculty and/or administrators **3.50**

23. Participation in graduate student organizations **3.40**

24. Participation in Bridge to Doctorate meetings **4.70**

To more fully assess you graduate experience thus far, please respond to the questions below with as much detail as you deem adequate:

1. Thus far, what has been your *most challenging* graduate school experience(s)?
   a. Time management
   b. Adjustment to lab work
   c. Choosing a graduate advisor
   d. Lack of ethnic diversity
   e. Classwork; rapid pace of graduate school; level of difficulty in coursework; getting work completed
   f. Getting used to working everyday; adjusting to long days of 8 am to 5 pm and longer
   g. Writing the research proposal
   h. Developing appropriate protocols
   i. Preparing for field work
   j. Trying to carry out research in lab with limited funds
   k. Being the target of 'lowered expectations' in some areas

2. Do you feel that you are pursuing the 'right' discipline? Why or why not?
All felt they are pursuing the 'right' discipline, with the following comments:
   a. Love for the discipline; excited about discipline
   b. Passion for research and science has been retained over a considerable period of time
   c. Extremely concerned with wildlife conservation and preservation
   d. Preparation for career long dreamed about
   e. Field combines the disciplines that I love
   f. Not necessarily pursuing the right research project within the discipline because of limited faculty

3. Do you feel that you are *academically, socially, and emotionally* prepared to pursue graduate study? Elaborate.

   a. Absolutely; was academically and socially prepared for graduate study before joining the BD Program; now feel more emotionally prepared with the help of the BD Program
   b. Well prepared as a result of personal achievements
   c. Have been in school for a long time and know how to handle it
   d. Not initially prepared, but now feel better prepared to pursue graduate degree; takes time to adjust
   e. Prepared academically and socially, but presently experiencing events in personal life that leave me less emotionally prepared for the rigorous research and study
   f. More work experience as a technician would enhance preparation for this opportunity

g. My undergraduate institution provided excellent preparation in each area listed; this preparation has been significantly valuable to the success and enjoyment of my graduate experience
h. Possibly the weakest area is 'socially' because of the tendency to isolate myself to my research
i. Well prepared; feel more at home in academe than at work

4. Do you feel additional stress by being identified as a *Bridge to the Doctorate Student* at Oklahoma State University?

    a. Yes, in some areas; some faculty and staff project the feeling that they expect you not to do as well as other students;
    b. Sensed strong resentment in the first semester (fall '04) of the program; has somewhat abated over time, however, some persons continue to be condescending
    c. No additional stress.
    d. Attending BD meetings can be a stress
    e. Feel stress because the amount of the stipend is known; students and faculty seem to expect more
    f. No stress felt within department; wish others did not know the amount of the stipend
    g. Little additional stress felt; feel closely watched by others
    h. None – treated no differently within department; people outside the department probably do not know I am in the program

5. Additional comments:

- *Extremely grateful to have been selected as BD student; it's a wonderful opportunity that I never expected to have; grateful to Program Director and Program Coordinator for advice and support when needed most*
- *Graduate school is difficult, especially when designing my experiment and writing my proposal, but realize the program is an excellent opportunity; I have support from the program and an excellent faculty member (my advisor); I know I will succeed!*
- *No stress; still a member of OKAMP*
- *Everything in the BD Program is running smoothly; appreciate all of the support from the staff and am grateful to be a part of the program*
- *Thanks!*

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LS-OKAMP Program Phase III Evaluation

Rosemary Hayes, Ph.D.
The University of Oklahoma
NSF LS-OKAMP Program Evaluator

This evaluation process began in November 2004 with the revision of the goals instrument. An individualized instrument was then forwarded to each LS-OKAMP institution in January 2005. Data collection for the spring report began in June 2005 and continued through Oct 2005.

The following section of the report addresses the goals and outcomes reported by the LS-OKAMP partners.

Alliance-wide Goals

The LS-OKAMP program proposes to significantly increase the number of targeted students entering into graduate programs over the next five years, preferably to earn doctorates. To this end, the goal of the Alliance is to have a minimum of 10% of the available baccalaureate degree graduates over the next five years eligible for graduate school for admission and subsequently enrollment.

Graduate School eligibility has been defined as defined as:
- Min 3.0 GPA
- Two full summer internships
- Annual presentation of research
- Taken GRE by fall of Senior Year
- Minimum 5 applications to graduate school

Phase III of the LS-OKAMP program focuses on junior and senior underrepresented STEM majors. Despite the focus on these students, The Oklahoma Alliance partners also have reported continued involvement with freshman and sophomores. This continuing involvement demonstrates institutional commitment to LS-AMP and the understanding that the continuing development of this group of students is necessary to have upper division students who a qualified for admission to graduate programs in STEM fields.

Of the 121 students who are participating at various levels in the Oklahoma Alliance, 77 students made up the Phase III cohort of upper classmen. The students are classified by race/ethnicity and class standing as shown below in Table 1. As is typical with participation in STEM fields, there are more male participants (68%) than female participants (32%). Table 2 shows a further breakdown of participants by partner institution. It should be noted that two institutions, Northwestern and Northeastern, did not have upper division students eligible for participation in Phase III at the beginning of Spring 2005. They continue their work with lower division students however, and will contribute to the cohort base as those students advance through their degree program.

Table 1: Class Standing and Ethnicity

Standing	A I	Black	Hisp	Total
Junior	17	8	4	29
Senior	18	17	10	45
Not identified		3		3
Total	34	26	14	77

Table 2: Participants by Partner Institution

Institution	Junior	NA	Senior	Total
CU	3		4	7
ECU	8		8	16
LU	4	3	6	13

OSU	1		5	6
OU	6		9	15
SEOSU	3		2	5
SWOSU	1		2	3
Tulsa	1		4	5
UCO	2		5	7
Total	28	3	43	77

Alliance wide Strategies:

The Alliance as a whole engaged in a number a strategies to help ensure that at a minimum 10% of the students would meet the definition of graduate school eligible. Some of the specific strategies engaged in by the individual partners will be discussed later. However, all worked to see that students maintained grade point averages, were encouraged to participate in meaningful research, achieve useful GRE scores, and make applications to graduate college.

The record shows that as a result of these activities large percentages of student participants were receiving the preparation needed to be graduate school eligible.

- 87% of the 74 students for whom GPAs were reported carried a GPA of 3.0 or above (no data available on 3 students)
- 100% of the 77 cohort members participated in research during the Spring Semester
- 46% of the cohort participated in summer a summer internship

Persistence towards the goal of completion within STEM

One measure of looking at the favorable performance of a cohort is to look at persistence of the cohort toward graduation. Persistence is defined as the percentage of a cohort that graduates plus the percentage of the cohort that continues in the pursuit of graduation. With the support of the Oklahoma Alliance 98% of minority STEM participants either graduated or remained in school and continued with their studies.

- 31 of the 77 cohort members graduated in the Spring or Summer of 2005 (40% graduated)
- 44 of the 77 cohort members continued their studies and registered the following Fall 2005. (58% continued). These 44 continuing students constituted 96% of the remaining 46 cohort members (1 student did not re-register and 1 student had no data available)

As has already been discussed, 31 of the Phase III cohort (40%) graduated during the Spring and Summer of 2005. Table 3 shows the partner institutions from which these students graduated.

Table 3: Graduates by Partner Institution

Institution	Graduates
CU	4
ECU	7
LU	2
OSU	1
OU	6
SEOSU	2
SWOSU	2
Tulsa	3
UCO	4
Total	29

In addition to successfully completing a baccalaureate program with a GPA and research background to support graduate school admission, LS-OKAMP students are encouraged to take the GRE. Thirty-eight percent of the LS-OKAMP graduates took the GRE.

Alliance overall goal achieved

The goal of the Alliance is to have a minimum of 10% of the available baccalaureate degree graduates over the next five years eligible for graduate school for admission and subsequently enrollment. Given the GPAs and research experience of the group, many students have the potential to move on to graduate STEM work. Of the 31 graduates during the Spring and Summer of 2005, *42% (13 students) were identified as having been admitted to graduate school. An additional 4 students (14%) indicated that they were in the process of applying.* This means that between 42-56% of the LS-OKAMP graduates are graduate school bound.

Table 4: Graduate School Admission by Institution

Institution	Applying	Admitted	Total
CU		1	4
ECU	2	3	7
LU		1	2
OSU			1
OU		4	6
SEOSU			2
SWOSU		2	2
Tulsa		2	3
UCO			4
Total	2	13	31

Institution Specific Strategies

In the following section, some of the specific research activities and institutional strategies used over the past year will be identified.

Cameron University Strategies for Spring 2005 Semester:

Research:

Sabrina (Rubio) Sotelo completed and summarized her research and made the presentation listed below.

> **Sabrina Rubio** and Dr. Dragan Jankovi , "On a Stronger Triangle Inequality", Department of Mathematics and Computer Science, Cameron University, TORUS Regional Mathematics Conference, Cameron University, Lawton, Oklahoma, 73505, February 26, 2005.

Joseph Vazquez completed and summarized her research and made the presentation listed below.

> **Joseph Vazquez** and Dr. Dragan Jancovic, ***"SACRED GEOMETRY***", Department of Mathematics / Computer Science, Cameron University, TORUS Regional Mathematics Conference, Cameron University, Lawton, OK 73505, February 26, 2005.

Itoro Akpan completed and summarized her research and made the presentation listed below.

> **I. Akpan**[1,2], C. Guthridge[1], H. Xu[2], B. Poole[2], G. Roberts[2], J.A. James[2,3], J.M. Guthridge[2], J.B. Harley[2,3,4] "Searching For New Polymorphisms in the Epstein-Barr Virus EBNA-1 Protein", [1]Cameron Univ. Lawton, OK and [2]Oklahoma Medical Research Foundation, [3]Univ. of Oklahoma Hlth. Sci. Ctr., [4]Dept. Veterans Affairs, Oklahoma City, OK , Federation of the American Societies of Biology, April 2-6, 2005, San Diego, CA.

Adrian Chavez continued his work on "Putative Arborescent Lyginopterid from the Fayetteville Formation (Upper Mississippian) of Arkansas"

Valerie (Robinson) Toodle started reading for her summer research effort.

Local, state, regional and national meetings, and name of conference/meeting attended by students.

- TORUS Regional Mathematics Conference, Cameron University, Lawton, OK 73505, February 26, 2005 was attended by Sabrina Sotelo, Joseph Vazquez, and Michael Conard
- Federation of the American Societies of Biology, April 2-6, 2005, San Diego, CA, was attended by Itoro Akpan and Valerie Toodle.
- Student Research Day at West Texas A & M University, Canyon, TX, April 14-16 was attended by David Newman.
- The February 23, 2005 meeting of the Wichita Fall – Duncan Section of the America Chemical Society was attended by Valerie Toodle and Adrian Chevaz. The Speaker was Dr. Patrick MacCarthy, Colorado School of Mines, Golden CO, who spoke on the topic "Inventing and Patenting for Scientists and Engineers: The Need for a Defensive Strategy".

Meetings held with students during the spring

Cameron hosted several meetings for LS-OKAMP scholars during the Spring Semster. They included:

- February 1, 2005 attend by 2 CU Stokies and 11 guests. The program was Itoro Akpan's PowerPoint presentation of her research. Dr. Guthridge and others were present and it was good practice for her. Sabrina was the President and we could never find a day and time when we could meet this semester. Information was exchanged by email.
- February 26, 2005 several Cameron students carpooled to Norman and Edmond to participate in Kaplan's offer of a free practice GRE, MCAT, DAT, PCAT, etc. Valerie Toodle was the only member that made the trip as several were presenting that day at the TORUS Conference.
- February 23, 2005 five of the seven LSOKAMP Scholars and attended one or more of the presentations in a Symposium entitled "Graduate Opportunities and Careers". This was a full day symposium sponsored by the Physics Club and the Chemistry Club to introduce undergraduates to graduate education and educational requirements for industry. Several guest speakers (Dr. MacCarthy above) from universities and industry were invited to present talks and discussion about graduate school requirements and career requirements. The local section of the ACS cooperated in this effort with some funding and then used one of the guest speakers for a section meeting.
- Several LSOKAMP Scholars had planned to attend the Student Research Conference in Canyon and as the sponsor I made arrangements to go. While we ended up with a good group only one was an LSOKAMP Scholar. The other seven that attended with us were Biology and Chemistry majors. Speech and English departments also had representatives attending.

East Central University Strategies for Spring 2005 Semester:

Research Activities:

The following posters were presented at the Fourteenth Annual Internship Poster Display on the ECU campus May 5, 2005.

- Kara Chapman: "Air Sparging Enhancements Through Surface Tension Modifications"

- Levica Chapman: “Spectrophotometric and Thermal Analyses of Avian Eggshells and Nesting Substrates”
- Andrea Christy: “Scanning electron Microscope Analysis of Iron Filings from a Zero-valent Iron Permeable Reactive Barrier Used for Ground Water Retention”
- Kevin Burgess: “Use of Dendrochronology to Investigate Past Climatic Effects in East Central Oklahoma”

These students also made oral presentations of the same topics at the 10th Annual Rocky Mountain McNair Research Symposium and Graduate Education Conference in Broomfield, Colorado March 31-April 3.

Regular Meetings for LS-OKAMP Students

- February 14: Students met in snack bar for lunch and discussed plans for meetings the rest of the semester, as well ad the best meeting times. Five students attended.
- February 24: Met in the Tiger Den in the Student Union at 5:30 for pizza. Graduate school preparation was discussed and a group photo made. All seven funded members attended.
- March 23: The annual Ethics Lecture was held at 7 PM in the Estep room. About five students attended, although roll was not taken.
- March 27: Levica Chapman made a presentation of her experiences in getting accepted to graduate school at Texas A&M. Six students met for pizza in P&ES 216 at 5:30.

Counseling

In addition, East Central supports a counselor, Kathy Niblett on her work with the OK-LSAMP students. The following is a brief report on her activities

> *“As the Native American Counselor, I was involved in recruiting students, giving and receiving applications, and the selection process for ECAMP. Once they were selected, I arranged for tutoring, scheduled career guidance with the use of the "Discover" online program, and remained available for the students to visit with regarding their various needs. I have access to transcripts, schedules, and other paper work which I provided to them and to Dr. Rutledge as needed. I work with the Native American Student Association on a regular basis. I also assisted Dr. Rutledge in planning and hosting the student meetings*.”

Mentoring:

Each student in the LS-OKAMP program at East Central was to be assigned a faculty mentor in their major to give them advice about graduate schools, and the students were to serve two hours per week in the department and/or tutoring for lower classmen. All seven trainees and the one work study student who received funds and were active participants in the program. All of these worked at least two hours/week in their department under a faculty mentor and/or tutored lower classmen. Some of the honorary (non-funded) scholars also were involved in tutoring. Four honorary scholars were McNair Scholars and did research, as mentioned above.

Student Trips

There was to be at least one student trip to visit a graduate school during the 2004-05 school year despite the short time frame, ECU arranged for the Chapman twins to visit three schools and for Kevin Burgess visit OSU. All three are now attending graduate school.

Langston University Strategies for Spring 2005 Semester:

Research Activities

Name	Internship site	Internship mentor	Duration of internship	Research Topic
Anderson, Quincy	University of Arkansas	Dr. Koeppe, Professor Denise Greathouse	5/30-7/30/05	
Blythe, Derek	Lockhead Martin, Atlanta, GA	Dr. William Coleman	6/1/05 - 8/3/05	Software Assimilation
Brumfield, III, Leethaniel	UNT-HSC-Fort Worth, TX	Dr. Julian Borejdo Dr. Irina Akopova		Skeletal Muscle Properties, Rigor-MG, and Contracting Solutions
Griffin, Elise	Langston University	Dr. Abraham	1/05-4/05-NOT SUMMER	The Effect of Imodium AD on E. coli
Harris, Steven	University of Michigan	Dr. Anna K. Mapp	5/31-8/9	Unraveling the Factors that Play a Role in Transcriptional Activation Potency
Harvey, Desmond	California Institute of Technology, Pasadena, CA	Dr. James Heath	6/13/05-8/10/05	Molecular Electronics Characterization of Organic Molecules in Molecular Devices
Majors, Contessa	University of North Texas-HSC	Dr. Marianna Jung	5/23-7/29/05	Pharmacology and Neuroscience The Effects of Non-feminizing Estrogen against Ethanol Toxicity
Rowland, Marquita	University of Kansas-Lawrence	Lisa Timmons	5/25-8/03/05	Genetics ABC Mutants in *C. elegans*
Walker, Jon	N/A	N/A	N/A	
Williams, Nathan	Texas A&M University, Cyclotron Institute	Dr. Carl Gagliardi	did not provide info	Nuclear Physics Limits on Muon Decay From Recent Measurements

Regular Student Meetings

There was a change in the leadership of the LS-OKAMP program at Langston and therefore there was not available record on group meetings, however the former PI, Dr. Harkins met individually with the students.

Oklahoma State University Strategies for Spring 2005 Semester:

Research Activities:

Matthew Hamm, a Fire and Safety Technology conducted research under the guidance of Dr. Brenda Philips of the Political Science Department in the area of disaster management.

Rosa Madrid, Industrial Engineering major mentored with Dr. Charlene Yauch, Industrial Engineering. Her research was on the effects of inter-group cooperation, competition, and conflict on agile manufacturing. Dr. Yauch's project is funded by NSF.

Gerardo Myrin, Industrial Engineering major conducted research with Dr. Satish Bukkapatnam, Industrial Engineering department. His research project was to assist in the design, execution, and analysis of physical and simulation experiments as part of a collaborative NSF project on *Self-Supporting Wireless Sensor Networks for In-Process and In-Service Integrity Monitoring Using High Energy Harvesting Nonlinear Modeling Principles*.

Ashley Oulds, Biosystems and Agricultural Engineering major conducted research with Dr. Marvin Stone, Biosystems and Agricultural Engineering department. Her project involved the development of an algorithm to determine whether or not a particular control system was effectively collecting data.

Anna Spicer, Electrical Engineering major worked with Dr. Weili Zhang to learn about the procedures and equipment involved in microelectronic fabrication.

Donald Stutson II, Electrical Engineering major worked with Dr. Guoliang Fan, Electrical Engineering department on a project funded by the Department of Defense in the area of infrared imaging. His project included designing software that allows receiving video from two sources simultaneously and converting them to AVI formats.

Aniemi Umana, Electrical Engineering major, conducted research with Dr. Thomas Gedra, Electrical Engineering department in the area of power. His project included building a multi-lamp controller for an artificial light dome for the School of Architecture. This involved research on communication between microcontrollers, research on computer aided design and construction of printed circuit boards.

Paul Wright, Industrial Engineering major mentored with Dr. Charlene Yauch, Industrial Engineering. Her research was on the effects of inter-group cooperation, competition, and conflict on agile manufacturing. Dr. Yauch's project is funded by NSF.

Graduate Portfolio classes.

Eight LS-OKAMP students from OSU participated in a graduate portfolio development class

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Spring 2005 bi-monthly large-group meetings were held by OSU.

January 25 – 6 (3 excused)
February 1 – 5
February 2 (Grad Prep) 3 (1 excused) (Sophomore students not required to attend)
February 15 – 7 (1 excused)

March 8 – 6 (2 excused)
March 22 (Grad Prep) – 6 (1 excused)
April 5 – 4 (3 excused)
April 19 – 7

Cadre Meetings (Academic Success Seminars)

Feb 4 – 3 (all Cadre students)
Feb 10 – 1 (2 excused)
Feb 17 – 1 (2 excused)
March 7 – 1 (1 excused)
March 9 – 1 (2 excused)

Southeastern Oklahoma State University Strategies for Spring 2005 Semester:

Research Activities:

- James Morel assisted with aquatic ecology research under his mentor, Dr. Tim Patton. While participating in more than one research project, his primary research obligation was assisting a graduate student with research on sedimentation issues in Lake Texoma.
- Samuel Sanchez did not participate in any research.
- Ricardo Lemus began volunteering research in one of the chemistry labs under the supervision of Dr. Nancy Paiva.
- Stormy Shoopman assisted Dr. Doug Wood with ornithological research, with an emphasis on cavity nesting birds at a local wildlife refuge.
- Matt McFerran participated in research with aquatic ecology under the supervision of Dr. Tim Patton. He assisted a graduate student with research on sedimentation issues in Lake Texoma.

Attendance at Professional Meetings

SEOSU indicated a desire to increase attendance of, and presentations at, professional society meetings. They met this goal in the following way:.

- James Morel attended the annual meeting of the Southern Division of the American Fisheries Society in Virginia Beach, VA. He was co-author and co-presenter on a paper entitled “Effects of Sedimentation on Fish Communities and Limnological Characteristics of Lake Texoma, Oklahoma.”
- James Morel attended the annual meeting of the Oklahoma Chapter of the American Fisheries Society at Beavers Bend, OK. He was co-author and co-presenter on a paper entitled “Effects of Sedimentation on Fish Communities and Limnological Characteristics of Lake Texoma, Oklahoma.”
- Matthew McFerran attended the annual meeting of the Oklahoma Chapter of the American Fisheries Society at Beavers Bend, OK.

Regular LS-OKAMP Student Meetings

- February, 2005; Five attendees.
- April, 2005; Five attendees

Southwest Oklahoma State University Spring 2005 Semester:

Research Activities:

- **Trans-Neuronal Regulation Of Cortical Apoptosis In The Adult Rat Hippocampus**
  Grace Hassan**,** K. Pope, D. Isaak, and D.A. Wilson
  Department of Zoology, University of Oklahoma, Norman, OK 73019

  Presented at OKAMP research day at OSU
  Regional research fair at UCO
  SWOSU research fair at SWOSU

- ***Comparison of Cholinergic Neuron Gene Expression in Young and Aged Rats***

  Elizabeth Saladin, SWOSU
  Mayo Clinic Jacksonville
  Dr. Michael McKinney
  Dr. Karen Baskerville

  Presented at OKAMP research day at OSU
  NSTA national meeting Seattle,WA
  Regional research fair at UCO
  SWOSU research fair at SWOSU

- **Diabetic retinopathy**
  NANA AYESU

  Presented at OKAMP research day at OSU
  Regional research fair at UCO
  SWOSU research fair at SWOSU

Regular LS-OKAMP Student Meetings

We held three meeting before they were cancelled due to lack of funds. We did not receive funding until the last two weeks of the spring semester.

- 100% turnout for the meetings held.
- Meeting #1 to discuss semesters continued research, semester plans, and needs of the participants.
- Meeting #2 to discuss SWOSU research presentations and Dallas national presentation. Also discussed GRE and graduate plans.
- Meeting #3 to discuss lack of funds, cancellation of trip to NSTA meeting in Dallas (no travel funds), SWOSU research fair, GRE.

Tulsa University Strategies for Spring 2005 Semester:

Research Activities:

- Carpenter, Zachary Scott:
  - Presented at TU-STEM-UP research Seminar 4/8/05
  - Paper accepted to NCUR 05 for oral presentation
- Gary, Steven
  - Presented at TU-STEM-UP Seminar 4/22/05
- Surratt, Shernell
  - Presented at TU-STEM-UP Seminar 2/25/05
- Burks, Christa
  - Attended NCUR 05
  - Chaired two meetings of TU-STEM-UP Research Seminar
- Pollet, Cody
  - Presented at TU-STEM-UP Seminar 3/11/05
- Rodriguez, Sophia
  - Presented at TU-STEM-UP Seminar 2/25/05
  - Presented at AAPG/SEG Spring Student Expo 4/11/2005, Won 3rd Place.
  - Presented at NSBE National USTR Competition, 4/25/05. Won 3rd Place.
  - Persented at NCUR 05 -oral presentation
- Veit, Nicole
  - Presented at TU-STEM-UP Seminar 4/8/05
- Butler, Matthew
  - Attended NCUR 05

Regular Ls-OKAMP Student Meetings

TU-STEM-UP Research Seminars were held on: 01/14/05, 01/28/05, 02/11/05, 02/25/05, 03/11/05, 03/25/05, 04/08/05, 04/22/05. Attendance was 12-18. On average 15.

University of Central Oklahoma Strategies for Spring 2005 Semester:

Research Activities

- Frederick Brown II – Fred participated in an internship with the national Hertz Data Center (located in Oklahoma City, OK), a division of The Hertz Corporation, the world's leading vehicle renting organization. Fred also traveled to visit Clark University in Atlanta, GA as he was considering going to graduate school there.

- Corey Dean – Corey participated in an internship with General Motors Oklahoma Parts Division as an Analysis Intern. In his position, he assisted a R&D engineer with process capability and repeatability studies of automatic tire, fluid-filling, and frame-to-body-marriage equipment.

- H. Joseph Gunn, III – Joe traveled to visit Clark University in Atlanta, GA as he was considering going to graduate school there. Joe worked for Associated Wholesale Grocers in Oklahoma City.

- Amir Isbell – Amir was awarded a Research Assistantship with Dr. Wei Chen, Associate Professor of Biomedical Engineering conducting cancer research using MRI images.

- Lorenzo Banks – Lorenzo worked as a Supplemental Instruction mentor at UCO.

Regular LS-OKAMP Student Meetings nd individual meetings

UCO is primarily a commuter institution. Most of the UCO LS-OKAMP students had jobs and other responsibilities. Attempts to schedule monthly meetings were failures. Instead, each student met multiple times with Dr. John M. Garic to

discuss relevant matters. Each student was counseled about relevant matters such as current academic work, near-future academic plans, potential graduate school work as well as possible research, creative and scholarly activities.

University of Oklahoma Strategies for Spring 2005 Semester:

Research Activities:

- Holle McClenathan – Response Rates of Primary Auditory Cortex Neurons, Anesthetized versus Awake.
- Shawn McCarroll – Advanced OPUP System
- Jacob Henderson – Aviation Collision Risk Modeling
- Brad Porter – Video Games: The Future of A.I. Research
- Justin Woody – Photolithography and Nano-Photolithography
- Robert MClure – Aerospace Engineering Design Sequences
- Parker Berry – Neural Coding and Prosthetics
- Gary Gann – Distributed Warehousing in an ASP Environment
- Lauren Haller – Auditory Cortex Research: Positive Reinforcement Study
- Heyde Eileen Lopez – Dissolution of Soap Scum by Different Surfactant and Chelating Agents
- Claudio Ramos – Single Wall Carbon Nanotubes Production Dependency on the Catalyst Particle Sizes

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Graduate School Visits

Four students attend graduate school by the end of the summer semester. All researched several universities before deciding where to apply.

National Consortium for Graduate Degrees for Minorities in Engineering and Science, Inc. and the McNair Scholars Programs

OU had a goal to familiarize its students with this program. This was accomplished by emailing the students about McNair and GEM. Holle McClenathan – GEM Scholar - sent 2 emails explaining GEM and encouraging OKAMP Participants to apply. In addition to Holle, they had two more students named GEM Fellows, Quinten Hughes (past OKAMP scholar) and Jaime Erazo. Francey Freeman personally emailed about McNair and used OKAMP/McNair Scholar, Jaime Erazo as an example of how helpful the program is to students.

Regular LS-OKAMP Student Meetings

No formal meetings were held due to the late arrival of the stipends. Many individual meetings were held prior to the receipt of the funds discussing financial situations.

Examination of LS-OKAMP Retention and Graduation Rates

In August 2005, C-IDEA published the sixth annual national STEM retention study, 2004-05 STEM Retention Report. This report was based on data collected from 197 colleges and universities, including all nine of the LS-OKAMP public universities. The retention data for eight of the nine institutions was provided by Assistant Director of State System Research Laura Tyree at the Office of the Oklahoma State Regents for Higher Education. The data for Oklahoma State University was provided directly from its Institutional Research Office. The University of Tulsa is not included in the report of retention and graduation rates.

The STEM survey focused on retention and graduation data for freshman cohorts from 1997 through 2003. The following report is based on a subset of data obtained for the nine Oklahoma public institutions.

The executive summary information below addresses the issues related to gender and the status of underrepresented STEM students. It also includes observations on the status of STEM retention and graduation at the LS-OKAMP

institutions as compared to the overall status of STEM retention observed in the 2004-05 STEM survey of 197 higher education institutions. Unless otherwise noted, the rates in the following section are the overall rates for the period 1997-2003.

Demographics

During the survey period 1997-2003, underrepresented minority students (URM) comprised 19.4% of the first-time, full-time enrollments at LS-OKAMP institutions as compared to 18.3% of the enrollments across all of the 197 STEM survey institutions. Among STEM survey institutions, Hispanics accounted for 7.5% of the freshman enrollments during this period, and American Indian students accounted for 1.0%. In contrast, Hispanic students accounted for 3.0% of the freshman enrollments while American Indian students accounted for 9.2% of the freshman enrollments in the LS-OKAMP institutions.

Looking specifically at the enrollment of freshman STEM majors, one finds that a higher percentage of underrepresented minority students (21.1%) made up the freshman STEM cohorts at LS-OKAMP institutions than made up the freshman STEM cohorts at the STEM survey institutions (17.8%). It is interesting to note that at LS-OKAMP institutions, the percentage of URM students enrolling in STEM fields was greater than their percentage of representation in the general population of all first-time freshmen.

Women comprised a majority of the first-time, full-time freshman cohorts of both the LS-OKAMP institutions (53.2%) and the STEM survey institutions (54.3%). However, women made up a smaller percentage of the freshman cohorts who intended to major in a STEM field at both LS-OKAMP and the STEM survey institutions (37.2% and 37.1% respectively).

Continuation Rates

In studying the retention and graduation rates of STEM majors we looked at two issues, the percent of beginning STEM majors who graduated from the institution in any field (any major) and the percent of beginning STEM majors who actually graduated in STEM fields (STEM majors). This information provides insight into the frequency with which STEM majors change majors and/or leave the institution. On the whole, the 2nd year continuation rates were higher for URM students at the STEM survey institutions than at the LS-OKAMP institutions. The overall 2nd year continuation rate for the 1997-2003 URM cohorts starting in STEM and graduating in any field was 77.3% within the STEM survey institutions and 74.6% within the LS-OKAMP institutions. Looking at URM students who began as STEM majors and continued in STEM, the 2nd year continuation rate was 64.0% and 55.4% respectively.

The 2nd year continuation rates for URM students who began in STEM at LS-OKAMP institutions increased from 1997-2003. In 1997, the overall 2nd year continuation rate for URM students who began in STEM and continued in any field at their institution was 73.1%. By 2003 the rate had increased to 77.4%. Likewise, the 1997 continued to 2nd year continuation rate for URM students who began as STEM majors and continued as STEM majors was 49.0%. By 2003 the rate had increased significantly to 63.5%. This is in contrast with the continuation rates for URM students during the same period in the STEM survey institutions. In 1997, the overall 2nd year continuation rate for URM students at STEM survey institutions who began in STEM and continued in any field at their institution was 77.4%. By 2003 the rate had increased slightly to 78.0%. However, the 2nd year continuation rate for URM students who began as STEM majors and continued as STEM majors decreased from 1997 to 2003 (65.1% to 63.9%).

In the STEM survey institutions we find that 82.6% of freshman women who began in the STEM fields continued on to the 2nd year at their institution; and 65.7% of the initial class of female freshman STEM majors continued at their institutions and were still in STEM majors. The 2nd year continuation rates of URM students both within the institution and within the STEM field at LS-OKAMP institutions were lower than the STEM survey institutions, 78.3% and 55.2% respectively.

Graduation Rates

Those URM students who began as STEM majors and stayed enrolled at LS-OKAMP institutions graduated within four years and six years within STEM fields at a slightly lower rate than URM students enrolled in the STEM survey institutions. The four-year within STEM graduation rates for the 1997-2000 cohorts were 9.1% for the LS-OKAMP schools and 9.7% for the STEM survey schools. The sixth-year within STEM graduation rates for the 1997-98 cohorts were 24.2% for the LS-OKAMP institutions and 24.9% for the STEM survey institutions. However, the fifth year graduation rates were higher in the LS-OKAMP institutions than those in the STEM survey institutions. The fifth year graduation rate includes the 1997-99 cohorts. The within STEM five-year graduation rates for URM students in this class were 21.1% for LS-OKAMP schools and 20.4% for the STEM survey institutions.

Thirty-two percent (31.6%) of the women who initially began their college careers in STEM at LS-OKAMP institutions as part of the 1997 and 1998 cohorts graduated within a STEM major within 6 years. The six-year within STEM graduation rate for female students was 35.8% for the STEM survey institutions.

Comparison Tables

The tables below compare the most recent 6-year graduation rates and the most recent 2nd year continuation rates of underrepresented minority students for the individual LS-OKAMP institutions and the STEM survey institutions. In order to provide another perspective for comparison, these tables compare the individual institution to the overall rates of institutions with similar selectivity with regard to admissions requirements for ACT/SAT scores.

*Historically, as shown in **Table 6**, the 6-year graduation rates of URM STEM majors who begin in STEM and graduated within STEM while attending the LS-OKAMP public institutions have been greater than or equal to the national 6-year graduation rates observed in the CSRDE STEM studies for the URM cohorts of 1994 through 1998, except for 1997 when it was slightly lower.*

Table 6

6-year Graduation Rates for URM STEM Majors within STEM fields

	All STEM Participant Institutions	LS-OKAMP Institutions
1994	24%	24%
1995	25%	27%
1996	24%	27%
1997	24%	23%
1998	26%	26%

***Table 7** examines the six-year graduation rates of URM first-time full-time STEM majors in the cohort of 1998. Graduation rates in this table are reviewed in two ways.*

- ***Any Major** –Any Major identifies the percent of URM students who began as freshman STEM majors and graduated within six years in any major at their institution.*
- ***STEM Major**- The STEM Major column identifies the percent of the URM students who began as freshman STEM majors and graduated specifically within a STEM field.*

Table 7

1998 Freshman Cohort six-year graduation rates of underrepresented minority students who began as STEM majors and continued in ANY MAJOR or continued within a STEM major at institution

Comparison of LS-OKAMP institutions with overall STEM rates by selectivity

	Any major	STEM major
Highly Selective STEM Institutions	53.6%	32.7%
OU	44.9%	28.8%
Selective STEM Institutions	41.5%	23.0%
OSU	47.1%	41.4%
Moderately Selective STEM Institutions	34.4%	17.0%
Southeastern Oklahoma State U	25.6%	18.6%
UCO	32.3%	29.0%
Less Selective STEM Institutions	36.0%	23.1%

Cameron U	12.8%	5.1%
East Central U	20.7%	6.9%
Langston U	33.3%	30.3%
Northwestern Oklahoma State U	33.3%	0%
Southwestern Oklahoma State U	29.4%	5.9%
Overall 1998 STEM institutions	43.5%	26.0%
LS-OKAMP institutions	36.9%	25.5%

*As shown in **Table 7**, four of the nine LS-OKLAMP public institutions had higher six-year graduation rates for the 1998 cohort of URM STEM majors who remained in STEM than did all other institutions participating in the CSRDE STEM study with similar selectivity. These institutions included Oklahoma State University, Langston University, Southeastern State University, and University of Central Oklahoma.*

*The on-going challenge faced by the LS-OKAMP institutions has been retention. The LS-OKAMP institutions historically show lower retention of URM students within the STEM fields when compared with all other STEM participating institutions, as can be seen in **Table 8**. However, while the rates for the entire group of STEM participating institutions gone down slightly over time, the LS-OKAMP institutions have **improved from a low of 49% first year retention of URM students within STEM to 63.5%** first-year retention over the course of 1997-2003. This is a significant improvement overtime.*

Table 8

2nd Year Continuation Rates of URM STEM Majors continuing in STEM fields

	All STEM Participant Institutions	LS-OKAMP Institutions
1997	65.1%	49.0%
1998	64.8%	54.6%
1999	64.2%	56.7%
2000	64.7%	55.2%
2001	63.0%	57.0%
2002	62.9%	50.5%
2003	63.9%	63.5%

***Table 9** examines the retention of URM first-time full-time STEM majors in the cohort of 1998. Retention in this table is reviewed in two ways.*

- ***Any Major** –Any Major identifies the percent of URM students who began as freshman STEM majors and continued to the second academic year, regardless of their major.*
- ***STEM Major**- The STEM Major column identifies the percent of the URM students who began as freshman STEM majors and remained specifically in STEM fields as they moved into the second year.*

As can be seen in Table 9, the most recent retention rates indicate that many LS-OKAMP institutions lag behind the other STEM survey institutions both in retention of initial STEM majors in any field and of particular interest to this project, in retention with STEM fields. There are four partners however, that may have lessons to share with the rest of the group. The second year retention rate for underrepresented minority students at The University of Oklahoma, Oklahoma State University, The University of Central Oklahoma and Langston University who began as STEM majors and continued in either any major or in a STEM major at the university is considerably higher than the STEM survey institutions.

Table 9

2003 Freshman Cohort 2nd Year Continuation Rates of underrepresented minority students who began as STEM majors and continued in either ANY MAJOR or in a STEM major at institution

Comparison of LS-OKAMP institutions with overall STEM rates by selectivity

	Any major	STEM major
Highly Selective STEM Institutions	84.0%	68.1%
OU	89.8%	70.1%
Selective STEM Institutions	77.9%	63.3%
OSU	80.2%	67.9%
Moderately Selective STEM Institutions	75.2%	61.5%
Southeastern Oklahoma State U	67.3%	53.8%
UCO	87.5%	68.7%
Less Selective STEM Institutions	72.2%	60.8%
Cameron U	57.4%	55.3%
East Central U	67.5%	50.0%
Langston U	79.1%	74.4%
Northwestern Oklahoma State U	50.0%	50.0%
Southwestern Oklahoma State U	54.5%	40.9%
Overall 2003 STEM institutions	78.0%	63.9%
LS-OKAMP institutions	77.4%	63.5%

Summary

Underrepresented minority STEM students in the LS-OKAMP institutions graduate within STEM and within six-years at rates equal to or better than the average six-year graduation rates of all other institutions participating in the CSRDE STEM study. The first-year retention rate of URM students within STEM fields attending LS-OKAMP schools has risen from improved from a low of 49% for the cohort of 1997 to 63.5% for the cohort of 2003. This places the LS-OKAMP institutions in line with the overall average first year retention of all CSRDE STEM participants. It also represents a 13% increase over the retention rate for the cohort of 2004.

Interestingly, URM students who begin as STEM majors within LS-OKAMP institutions have higher first-year retention rates and six-year graduation rates than their URM peers who began in non-STEM fields. URM students who begin as STEM majors and then change to a non-STEM field appear to have the ability to perform college work. How can they be encouraged and supported to continue their work in a STEM field? Is it possible they could be re-directed into a different STEM field than the one they pursued originally?

URM students at the LS-OKAMP institutions who began as STEM majors graduated within six years and within STEM fields at rates comparable to the average rates of URM students attending all CSRDE STEM institutions. However, an average six-year graduation rate of 25% of URM students within STEM fields means that 75% of students who began as STEM majors either changed majors or left college. So here again, there continues to be work to do.

The LS-OKAMP project is specifically attempting to address these issues. Over the course of the project the LS-OKAMP institutions have attempted to support URM students as they move through their academic undergraduate careers as STEM majors. We are seeing the results of this sustained effort both in the graduation rates and in the improved first-year retention rates over time. Additional achievement can be seen within the cohort of LS-OKAMP Phase III students. Of the

31 graduates during the Spring and Summer of 2005, *42% (13 students) were identified as having been admitted to graduate school. An additional 4 students (14%) indicated that they were in the process of applying.* This means that between 42-56% of the LS-OKAMP graduates are graduate school bound. This is again a testament to the quality of the students and the faculty mentorship they receive in the program.

Recommended areas for improvement for the coming year

Despite the strong performance of the program, there are two areas which merit discussion and movement for improvement in the next year. The first area of concern has to do with graduate school and GRE preparation. Although some strategies such as participation in research are being implemented for 100% of LS-OKAMP participants, others such as GED preparation, GRE testing, the minimum suggested graduate applications and summer field research are not being implemented with as much success. For example, as shown in Table 5, only 13 or the 77 students (17%) took the online GRE prep course sponsored by the OSU-OKC campus. The cost of this course is covered by the LS-OKAMP program office, so this represents a little used support for students that might help dispel the anxiety of taking the GRE. Approximately one half of the students that took the GRE online prep were admitted or were in the process of applying to graduate school. Also, few students used the Graduate School prep modules developed by the Program office. Again, another resource available without cost to the participants that is going unused. It is apparent that the Alliance had achieved good success this past year in its attempt to develop STEM graduates and graduate school candidates. It is unknown whether these additional unused supports would have been useful to those students that did not apply for graduate school.

Corrective Action: It is recommended that the goals for the next year be modified to reflect specific targets for student participation in these supportive activities. A target of at least 50% participation does not seem unreasonable.

Table 5: Completion of Online GRE Prep Course

Institution	No	NA	Yes	Total
CU	6		1	7
ECU	12		4	16
LU	7		6	13
OSU	5		1	6
OU	15			15
SEOSU	5			5
SWOSU	3			3
Tulsa	4		1	5
UCO		7		7
Total	54	7	13	77

The second area of concern has to do with the financial support of the Alliance partners. Because of some procedural problems in coordinating budgets and sub-grant awards, money was not available to Alliance partner institutions and their students until mid-Spring semester 05. This lack of funds placed hardships on students who were expecting funding through their participation in the program. In some cases Alliance partners reported that students were not recruited and involved in the program until funds were in lace. In other cases, planned activities were dropped.

Corrective Action: The Alliance partners performed well, despite this difficulty. However, given that the funding cycle will be coming up again in the next couple months, it is strongly recommended that the Alliance Program Office begin steps now to ensure that the funding process runs more smoothly this next year. All budgets and contracts should be provided to Alliance Partners within in a timeframe to minimize gaps in funding.

I think these two issues can be handled in a straight forward way, making an excellent program even better.

BUDGETS