

Louisiana State University and Baton Rouge Community College – A Partnership for STEM Student Success

Ms. Summer Dann , Louisiana State University

Dr. Jo Dale Ales,

Dr. Karim Elkholy, Baton Rouge Community College (BRCC)

Karim N. Elkholy, Ph.D.

Professional Preparation: Arab Academy for Science and Technology and Maritime Transport (AASTMT), Egypt, Mechanical Engineering, BS 9/1994, MS 7/1999 Louisiana State University, Mechanical Engineering, Ph. D. 12/2007

Professional Appointments: 8/2011 – Present Engineering Program Manager / Assistant Professor, STEM Department (Science, Technology, Engineering & Mathematics), Baton Rouge Community College 9/2007 – 4/2011 Supervisory Mechanical Engineer, Southern Regional Research Center, Louisiana 8/2000 – 9/2007 Research Assistant, Louisiana State University, Mechanical Engineering Department 8/2005 – 7/2007 National Science Foundation Fellow, K-12 Program, Louisiana State University (NSF GK-12) 1/2001 – 12/2005 Teaching Assistant, Louisiana State University, Mechanical Engineering Department 10/1996 – 8/2000 Teaching Instructor, Arab Academy for Science and Technology and Maritime Transport, Egypt 3/1995 – 10/1996 Assistant Barge Engineer, Santa Fe International Drilling Company

Relevant Publications: James Rodgers, Karim Elkholy, Xiaoliang Cui, Vikki Martin, Michael Watson, 2009, "Improved Spectrophotometer Fiber Sampling System for Cotton Fiber Color Measurements," Beltwide Cotton Conference, San Antonio TX

Iordanoff, I., Elkholy, K. N., and Khonsari, M.M., 2008, "Effect of Particle Size Dispersion on Granular Lubrication Regimes", Journal of Engineering Tribology – V. 222, pp. 725-739

Elkholy, K. N., and Khonsari, M.M., 2008, "On the Effect of Enduring Contact on the Flow and Thermal Characteristics in Powder Lubrication", Journal of Engineering Tribology – V. 222, pp. 741-759

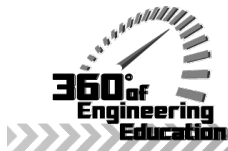
Elkholy, K. N., and Khonsari, M.M., 2008, "Experimental Investigation on the Stick-Slip Phenomenon in Granular Collision Lubrication" , ASME Journal of Tribology – V. 130, pp. 1-7

Elkholy, K. N., and Khonsari, M.M., 2007, "Granular Collision Lubrication: Experimental Investigation and Comparison with Theory," ASME Journal of Tribology – V. 129, pp. 923-932

Synergistic Activities: Engineering Program Manager, Baton Rouge Community College, August 2011 – Present:

LA-SiGMA EPSCoR - collaborate with LSU engineering and mathematics faculty to develop modules to train community college students to use sophisticated materials research instrumentation, assist with the Beowulf Boot Camp for high school students and teachers and facilitate the participation of BRCC students in the research experiences for undergraduates (REU) programs focused on computational and experimental materials science

NSF S-STEM Scholarships – collaborate with faculty in the LSU College of Engineering to select students for scholarships to LSU who have completed the AS degree in pre-engineering at BRCC Managing the engineering program at Baton Rouge Community College to make AS Engineering transition to a 4-year college as smooth as possible and to support and enhance the chances of students' academic success Develop new engineering courses, strategies, and activities to increase the student population in STEM disciplines Emphasis critical thinking in all courses and increase the tutoring sessions, and have well-structured teachers for advising engineering students Improve ability to communicate science to a vast number of students by bringing real science and research problems and by working with them in tutoring sessions which will stimulate their interest in the STEM disciplines Identify community needs and establish partnerships by conducting meetings with 4-year colleges as well as K-12 schools to maximize the impact of the education and outreach efforts



NSF GK-12 Fellow, K-12 Program, Louisiana State University, 2005 – 2007: Established great relations with all faculty, other Scholars, and high school teachers/students and served the community to better prepare the students of the public schools to meet the high standards of the Science, Technology, Engineering, and Mathematics (STEM) disciplines colleges

Worked as a liaison between Mathematics and Science departments providing guidance and direct assistance to the teachers of Calculus, Math, and Physics to build bridges between subject matters providing a professional learning environment

Designed a laboratory manual for the physics course with several hands on activities and increased the science aptitude of teachers by providing some presentations in different science topics which had an immediate and direct impact

Improved ability to communicate science to a vast number of students by bringing real science and research problems and by working with them in tutoring sessions which stimulated their interest in the STEM disciplines

Collaborators Louisiana State University: Warren Waggenspack, Summer Dann, Kelly Rusch, Randall Hall, Dorel Moldovan, Su-Seng Pang, Frank Neubrandner Baton Rouge Community College: Jo Dale Ales, Monique Cross, Dennis Taylor

Dr. Warren N. Waggenspack Jr., Louisiana State University
Adrienne Steele, Louisiana State University

**Louisiana State University and Baton Rouge Community College –
A Partnership for STEM Student Success
NSF STEP Project # 1161311**

Introduction

This STEP Type 1B project enhances the existing partnership between Baton Rouge Community College's (BRCC) Science, Technology, Engineering and Mathematics Division and Louisiana State University (LSU) College of Engineering to foster STEM students' completion of two year Associates Degrees at BRCC and four year Bachelor of Science degrees at LSU. Particular emphasis is placed on Engineering and Construction Management (E/CM) disciplines for which BRCC-LSU have recently formalized articulation agreements.

The project proposed adapting the *ENG2* "sense of community" lessons learned to facilitate early retention and success of BRCC STEM and other transfer students. A list of papers and conference proceedings is provided in references (1-8). Both institutions adapted supplemental academic support models to foster success in foundational math/science and 2nd year "gateway" engineering courses (statics, circuits and thermodynamics). Concurrent and collaborative professional development in proven effective learning pedagogies will foster coordination between LSU/BRCC STEM faculty and better alignment of common course outcomes, student capabilities and faculty expectations. Lastly, expansion of effective peer-to-peer/protégé activities will improve students' abilities to confront the challenges of sophomore year as well as promote the successful transition of community college students to a larger research-intensive university.

One project goal is to increase the number of BRCC AS/AAS E/CM graduates by 5 per year to an annual rate of 25 students, all with strong academic foundations for further E/CM study at LSU. At LSU, the goal is to improve the overall 2nd-3rd year retention and ultimately improve the cumulative 6th year graduation rate by 2-3% per year so that it approaches the current university average for all entering freshmen (59%). Building upon the lessons learned from the first STEP grant, these goals will be accomplished through the following actions: 1) develop and implement a pre-engineering learning community at BRCC; 2) integrate supplemental instruction in core STEM/Engineering courses at both institutions; 3) provide opportunities for faculty development and engagement across institutions to improve student learning and to provide better faculty-student interaction; 4) provide the environment and training necessary to develop mentoring relationships between students (particularly transfer students), and 5) establish mechanisms for effective monitoring and continual improvement. Although the project just completed its first year, several program objectives have been met.

Staffing

In the first half of the year, the PIs and Co-PIs of both organizations worked primarily on establishing hiring committees and job descriptions for staffing the STEP project at both institutions. The staffing included the program coordinators for both organizations, an SI coordinator, and the transfer counselor who would be split between the community college and the university. First, the LSU STEP team hired an SI coordinator to work with the undergraduates who are implementing the peer led team leader problem sessions. This coordinator is training the undergraduate supplemental instructors at both institutions, managing the logistics for spaces and meeting times for LSU, and collecting data regarding the efficacy of SI sessions on students' grades.

Next, the joint team hired a new STEP coordinator to assist in the implementation of programs at LSU, followed by the hire of two new staff members at BRCC in March. Personnel at BRCC include a coordinator and a counselor to act as a liaison between LSU and BRCC; the counselor works directly with students providing curriculum advising and personal counseling.

Five upper-class students in the LSU College of Engineering were hired for the spring to be supplemental instructors (SI) for sophomore level courses; two additional SIs were hired for the summer as understudies. Initially only three courses were proposed for the first year; however, given the need the team quickly adapted and trained peer mentors from other programs. Currently the courses covered in supplemental instruction include the large size high DFW courses that the majority of students need. The courses include statics, dynamics, thermodynamics, circuits for majors and non-majors, and CE fluids. Two more SIs will be hired spring of 2014 to cover ME fluid mechanics and the second physics course; CE fluids at LSU will be dropped after spring 2014.

Peer tutors are providing tutoring at BRCC for students in math and science courses. These students attended trainings and meetings with other mentors as described below in the Fall of 2013. Learning assistants, upper level students at LSU, were hired to work in four of the freshmen courses at LSU: ENGR 1050 (Introduction to Engineering), EE 1810 (Introduction to Electrical and Computer Engineering), BE 1550 (Introduction to Biological Engineering) and IE 1003 (Introduction to Industrial Engineering). Graduate students were hired to work in the CSC 1250 and 1350 freshmen courses (computer science). These students worked with the faculty in a variety of roles in order to provide opportunities and resources for freshmen.

Training

In 2013, the new undergraduate SIs and learning assistants were incorporated into the peer mentor program. In the spring, the LSU STEP hosted 12 hours of Peer Mentor training for new mentors; training included boundaries, appropriate behavior, leadership, mentoring, cultural awareness and intergenerational communication differences. Course specific training for all the undergraduate SIs and learning assistants from both institutions was held on the Friday prior to the start of the Fall semester. This training will be hosted

each spring and fall.

The coordinator hosted weekly sessions at LSU for peer learning assistants, SI leaders and peer tutors in order to provide networking and collaborative opportunities; he also observed SI sessions at different points during the semesters. This allowed the coordinator time to coach and to provide feedback to these students on an ongoing basis.

In addition to the students being trained in active learning techniques, faculty and instructors from both organizations also had the opportunity for development through the Faculty Development Workshop (FDW). The 7th annual FDW was hosted in the spring of 2013. Twenty participants including three of the SI's and the coordinator attended the workshop. Drs. Richard Felder and Rebecca Brent facilitated the workshop. Topics included active learning techniques such as think-pair-share, group projects, problem based learning and appropriate learning objectives.

Transfer Programs from BRCC to LSU

The grant calls for a “bridge type program” for transfer students. A survey of the current transfer students at BRCC and the potential students at both institutions indicated that the students wanted more information about classes, course transfers and scholarships, as well as opportunities for meeting other students, finding jobs and learning about career options. Instead of a 3-day bridge program, the collaboration hosted two 1-day programs to meet the needs of the students and to maintain the spirit of the “bridge program” as outlined in the grant. In following years, there will be a third 1-day program added (see Transfer Career Day below).

The two programs included the Peer2Peer Talks and Shadow Day. Current LSU students, who transferred from BRCC to LSU, return to the engineering and math classes at the community college to answer future transfer students’ questions during Peer2Peer day. Potential students are recruited to also attend the LSU Shadow Day. On this day interested students attend a class at LSU and follow an upperclassmen around campus. In order to provide more opportunities for transfer students to learn about career options, the first LSU Transfer Career Day was hosted January 2014. The schedule included meeting with current peer mentors (most of whom began LSU as transfer students themselves); learning about internships and co-ops, study abroad programs, and undergraduate research opportunities; having lunch with local industry representatives; and getting resume advice from the LSU Olinde Career Center.

Additionally, the LSU STEP teamed has worked with the University’s First Year programs and orientation to provide lunches for the students transferring into the College of Engineering at all of the summer and fall orientations for transfer students at LSU. Current LSU peer mentors and the transfer counselor also attended these lunches to meet with the new transfer students and to help them become familiar with the opportunities available to them. Approximately 40 out of 75 engineering transfer students attended the lunches.

Dissemination

The joint team hosted a project kick off meeting in January 2013 with the joint internal and external advisory boards; both institutions have hosted their own separate internal advisory board meetings as well. The internal advisory board meetings include other stakeholders from the respective institutions. The strategic planning team that includes the two PIs, two Co-PIs and program coordinators meet on a regular basis to provide feedback and to hold brainstorming sessions on the implementation of the program at both the community college and at the university. A new website with the transfer programs at LSU is live and two conference papers have been accepted at the ASEE 2014 annual conference.

Assessment

Surveys have been developed in conjunction with a PhD student in psychology and an outside evaluator. Pre-program surveys have been given to the supplemental instructors, peer mentors, current transfer students and students at LSU. BRCC surveyed continuing and graduating STEM students in April 2013. These surveys helped to develop topics and components for trainings and the transfer programs. Feedback after the program will also be used in the planning of the next year's programs. Additionally, pre-training surveys were given to the SIs and peer tutors to obtain a baseline of their self-efficacy, attitudes towards supplemental instruction, and why they were interested in the role. The majority of the students believed that they would be able to give back to younger students, that it gave them a better idea of what it is like to be a teacher or instructor, and that it helped them better understand the course material themselves. Their concerns were mainly regarding classroom management and professionalism.

An outside evaluator held focus groups at both institutions. Focus groups included students in the peer led courses and the supplemental instructors or tutors. Results of the focus groups indicated that the students in the courses that attended SI or peer tutoring sessions were overall very satisfied with the sessions. They reported some SIs were more effective than others and their attendance of the SI sessions depended on the difficulty of the course material and the timing of exams. From the feedback report it appears that the newer SIs and peer tutors had more "less effectiveness" than the students who have previous experience in tutoring and supplemental instruction.

Annual retention and other pertinent data will be gathered and reviewed on the 14th day of fall each year at each institution. A system of coding the students as either mentor, leader, or transfer student is being developed with the University Registrar office for tracking students at LSU.

Conclusions

Overall, the STEP IB project is on course and meeting the expectations for hiring and program implementation. Preliminary feedback and surveys of students show a good start with areas for improvement. In general the team has worked well together to hire new

staff, to host joint advisory board meetings and to implement initial program components such as the Transfer Career Day and supplemental instruction.

References

1. "Peer Mentors in Freshmen Programs," First Year Engineering Experience (FYEE) Conference, August 8-9, 2013, University of Pittsburgh, Sean King, Jordan Favret, Garrett Otis, Summer Dann, Warren Waggenpack.
2. Peer Mentor Workshop, STEP PI Meeting, March 2013, Washington DC, James Parker, Heather Pickering, Summer Dann, Warren Waggenpack.
3. "Implementing a Bridge Camp and Intro Course, Lessons Learned from a Phase 1 STEP Grant," *ASEE Annual Conference, June 2012*. San Antonio, TX. Summer Dann, Warren Waggenpack, Kelly Rusch, Laura Ikuma, David Bowles and Paige Davis.
4. "Encounter Engineering in Europe, Equipping Students to be Successful in the Global Market Place," *ASEE Annual Conference, June 2011*, Vancouver, CAN, Paige Davis, Harold Leder, Warren Waggenpack, Emma Allain.
5. "Peer Mentoring, A Transition Program to Improve Retention in the College of Engineering," *ASEE Annual Conference, June 2011*, Vancouver, CAN, Summer Dann, Warren Waggenpack, Kelly Rusch, Paige Davis.
6. "Engineering Knowledge, How We Acquire Knowledge and Determine What is Relevant," UNST 3900, August 2011, February 2012, Summer Dann .
7. "Overview of Louisiana State University's STEM Talent Expansion Program, Engineering Engagement for Student Success, ENG²," *ASEE Annual Conference, Kentucky, June 2010*. Summer Dann, Warren Waggenpack, Kelly Rusch, Roger Seals and Gerry Knapp.
8. "ENG²: Engineering Engagement for Student Success- Building a Community for First Year Freshmen in the College of Engineering, Presentation," *ASEE Annual Conference, Austin TX, June 2009*. Summer Dann, Warren Waggenpack, Kelly Rusch, Roger Seals, Sarah Jones, and Gerry Knapp.