ALAMO COLLEGES

SAN ANTONIO COLLEGE

2014 SAC CCLI Phase 3 6th Annual Report

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Activities and Findings (2009 – 2013)

- SAC engineering math course: ENGR 1377
  - *Introductory Math for Engineering Applications*
  - Free, not for credit course
  - Course Materials:
    - WSU course notes with UTSA enhancements
    - Klingbeil/Rattan Textbook, Prelim. Ed. (since Fall, 2012)
    - WSU Labs w/Univ. of Toledo Enhancements (Labs 2, 3, 4)
  - Teacher: Klaus Bartels, adjunct engineering/math faculty
    - One student teaching assistant/tutor 2010 - 2012
  - Initial course offering in spring, 2009 semester
    - Offered every fall and spring semester thru spring, 2013

Activities and Findings (2009 – 2013)

Enrollment and Course Completion Statistics

Calendar Year	Students Initially Enrolled	Students Completing Course	Students Completing Course (Grades)
2009	9	3	3 (B, C, F)
2010	6	1	1 (C)
2011	4	3	3 (A, B, C)
2012	23	0	-
Spring, 2013	2*	0	-
Totals:	44	7	7 (1-A, 2-B, 3-C, 1-F)

Notes: 4 males and 2 females passed the course
* Two high school teachers (one math, one science)

Activities and Findings (2009 – 2013)

ENGR 1377 Completer Grades in Alamo Colleges Math Courses

Student #	ENGR 1377	Inter. Alg	Plane Trig	College Alg	Precal	Cal I	Cal II
1	B	B					
2	C		B		D		
3	F					B	C
4	C						A
5	A					C	A
6	B					C	B
7	C					C	

Totals (excl. ENGR 1377): 2 A's; 4 B's; 4 C's; 1 D
Passing Grades: 10 of 11 (91%)

Activities and Findings – The "Good"

- Student feedback from course completers
  - Universally positive
  - Rated course very high overall
  - Students strongly agreed the course:
    - was enjoyable, especially labs (difficult for some)
    - improved motivation/success in math/engineering classes
    - taught them a lot about engineering applications
    - was valuable to them and met their expectations
    - is one they would recommend to other engineering majors
- Textbook praised overall (2012/13 non-completers)
  - More & better descriptions of engineering examples desired
    - New 1st edition improves on this

Activities and Findings – The "Bad"

- Chronic low enrollment & retention
  - Average enrollment: 5 students/semester
  - 18% (8/44) retention rate
  - Techniques used to improve enrollment:
    - Lowered math prerequisite to Intermediate Algebra
    - Increased marketing (flyers, website banner ads)
    - Spring, 2010: Opened to all five Alamo Colleges
    - Fall, 2011: Opened to STEM high school teachers
  - Enrollment improved, then dropped; retention down
    - Enrollment: 9 in 2009; 23 in 2012; 2 in spring, 2013
    - Retention: 3 in 2009; 0 in 2012; 0 in spring, 2013

Activities and Findings – The "Ugly"

- Reasons for low enrollment & retention
  - Not an approved, for credit course
  - Course not part of 2 or 4-yr engr. curriculum
  - Course not transferable to 4-yr university
  - Not approved as substitute for math prerequisites in physics or engineering courses
  - First course dropped by students when conflicts arise with credited courses or personal issues

Activities and Findings – The "Lost Hope"

Conditions for ENGR 1377 success:

- ENGR 1377 would be a for credit SAC course
- ENGR 1377 would be transferable to Texas 4-year universities that are part of CCLI Phase 3
  - University of Texas at San Antonio (UTSA)
  - University of Texas at El Paso (UTEP)
  - Texas A&M-Kingsville (TAMUK).
  - SAC received transfer support letters for ENGR 1377 from TAMUK and UTEP in June, 2010 but not as a course leading to a degree.

Activities and Findings – The "Lost Hope – cont'd"

- SAC Curriculum Committee did not approve the course for credit
  - Reason: Equivalent course at 4-year institutions is not included as a required course in engineering curriculums
  - SAC requested course be approved/credited as a unique needs course by Academic Council.
    - Request tabled by Curriculum Committee in 2011
      - Lack of sufficient info. proving benefits to students.
- Incorporate elements in Intro to Engineering course
  - Problems:
    - Approx. 41% of engineering freshmen in remedial math
    - Very little room in course for adding topics

Activities and Findings – "New Hopes"

- Divide and Conquer – Approach #1:
  - Incorporated 2 ENGR 1377 labs in 6-week EDGE program
    - Algebra and System of Equations in Engineering Labs
  - EDGE program for HS students interested in engineering
  - Labs well received by students
  - Continue to use ENGR 1377 labs in EDGE this summer





Activities and Findings – "New Hopes"

- Divide and Conquer – Approach #2:
  - Incorporate selected science and engineering applications from Engineering Math (EM) course/textbook in math courses at SAC
    - Algebra (remedial and college-levels)
    - Pre-calculus
    - Calculus I and II
    - Differential Equations
  - Collaborating with Math Department faculty
  - Strong support from Math Department Chair

Activities and Findings – "New Hopes"

- Divide and Conquer – Approach #3:
  - Engineering applications prof. development seminar
  - Developed in collaboration with ESC-20*
  - 6-hour Saturday session doing 9 hands-on activities
    - Structures, geometry, fuel cell car, circuits, rockets, and more
    - Learn how engineers use STEM to creatively solve real-world challenges as well as exploring a variety of ways for students to understand and get excited about engineering
  - Provided to MS math/science teachers in March, 2014
    - Highly positive feedback from participants & ESC-20
  - Working with ESC-20 to offer seminar periodically

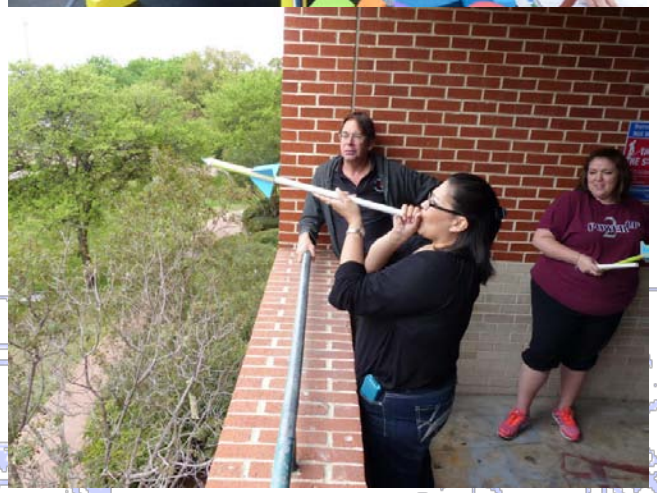
*Education Service Center, Region 20

Activities and Findings – "New Hopes"

- Divide and Conquer – Approach #3 - Photos:
- Engineering is FUN!!









Activities and Findings – "New Hopes" – Approach #4

- Created EGR 1001 - EM Continuing Education Course
  - 'Introductory Math for Science & Engineering Applications'
  - Targeted at High School math and science teachers
  - College students could attend as well (paid by CCLI)
- Primary benefits:
  - Improve teacher's understanding of how to apply scientific principles and mathematical concepts/methods to analyze/solve practical application problems in science and engineering, which they can pass on to their students
  - Improve math skills and motivation for and support of engineering
- ENGR 1377 vs EGR 1001
  - Contact hours reduced from 78 hours to 48 hours (3 hours, once per week)
  - Eliminated differential equations topics
  - Reduced number of examples covered – reduced labs from 9 to 6
  - Focuses on problem solving and labs & reduced lecture time
- Course offered for Fall, 2013 and Spring, 2014
  - Courses did not make – only a few persons showed interest
  - Teachers too busy during regular school semesters and students want credits.

Activities and Findings – "New Hopes" Improved Approach #4

- Restructure EGR 1001 EM CE course
  - Tailor better to suit STEM HS teachers availability, interests and "**professional development**" needs
  - Offer the course to college students that need help with remedial math (CCLI funded)
  - Collaboration with:
    - ESC-20
    - SAC CE Dept.
    - SAC Math Dept.
    - School districts from our area

Activities and Findings – "New Hopes" Improved Approach #4

- Restructure EGR 1001 EM CE course
  - First Possibility:
    - Offer as all day, 1-week summer course
    - Market to STEM HS teachers as "**professional development**"
    - Offer to college students (CCLI funded)
    - Eliminate calculus topics and associated labs
  - Second Possibility:
    - Break EGR 1001 course into two smaller "chunks"
    - Ex: Algebra topics in fall, pre-calculus topics in spring
    - Offer on weeknights or Saturdays (3 – 4 per semester)
    - Offer to college students (CCLI funded)
    - Market to STEM HS teachers as "**professional development**"

Conclusions

- ENGR 1377 no longer offered in original format
  - Very low enrollment and completion rate due to hopelessness of resolving crediting/transferability issues
- Continue using some labs in EDGE program
- Incorporate EM examples in SAC math courses
- EGR 1001, 16-week CE course initially failed
- Restructure EGR 1001 to better suit STEM teachers availability, interests and prof. development needs
- SAC remains a strong advocate of CCLI project and continues its efforts to expand the concept in new directions.

To be continued…



Let's Keep Brainstorming Ideas and Go Spurs Go!