CUES year 1-2 update

June 22, 2015

Alan Zehnder
Outline

• Review each of the 3 interventions
  – Spatial visualization
  – Enhanced tutoring
  – Engineering summer math institute
• Updates on retention
• Challenges with program operation
  – Data collection
  – Data management
  – Consistency with staff turn over
• Hand off to Magnia for evaluation report
ENGREG 1070: Spatial Visualization

• Participants
  – 64 Ryan Scholars to date (pre-freshman summer scholars)

• Course structure
  – 6 week summer session
  – MW 90 min.
  – Mon in classroom working on classical spatial vis skills (reflection, sketching, rotation)
  – Wed in computing facility learning Matlab, SolidWorks, ImageJ, PowerPoint, Poster Design
  – Students worked with “faculty client” to visually present and analyze biomedical data
  – Students gave final presentations to their clients and to each other.
Spatial Visualization Course
Purdue Spatial Visualization Test
Fall 2013

Test Score vs. Student Number - sorted by pre-test score

- Pre test
- Post course
Purdue Spatial Visualization Test
Summer 2014

Test Score

Student Number - sorted by Pre-test score

Pre Test

Post test
Student Projects

• Small groups worked with faculty clients, taking some of their data and presenting it in a talk and poster in a visually compelling way.
• Exposed students to faculty and to research
• Early practice with technical communications
• Opportunity for application of skills developed during the course
Enhanced Tutoring

• Basic math & science courses have other tutoring resources

• We cover sophomore and junior courses needed to affiliate to an engineering major or to stay on track in the major
  – F13, S14, F14, S15

• Tutors are current undergrads who earned > B+
  – Trained through Engineering Learning Initiatives

• Typically 10-20 tutors, 20+ students, 100+ hours of tutoring
## Enhanced Tutoring

<table>
<thead>
<tr>
<th>Term</th>
<th>Number of students tutored</th>
<th># passed with C+ or better</th>
<th># with C-,D,F, W, LOA, Drop</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2013</td>
<td>19</td>
<td>19</td>
<td></td>
<td>Grades A- to C+</td>
</tr>
<tr>
<td>Spring 2014</td>
<td>21</td>
<td>16</td>
<td>5</td>
<td>1 LOA</td>
</tr>
<tr>
<td>Fall 2014</td>
<td>16</td>
<td>14</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Spring 2015</td>
<td>17</td>
<td>9</td>
<td>8</td>
<td>4 dropped</td>
</tr>
</tbody>
</table>
Engineering Summer Math Institute (ESMI)

• Goal:
  – Participants (rising sophomores and juniors) will stay on track to affiliate

• First offering summer 2014 (10 Students). Summer 2015 program will start early June (18 Students).

• Approach:
  – Students take Math 1920, 2930, 2940 in the summer session
  – Connect students to faculty and research (a known positive factor in retention)
    • Most rising sophomores participate in group project
    • Most rising junior perform research with faculty
  – URM and FGC students, US citizen or permanent resident are eligible
  – Students identified through individual advising meetings and spring semester LSC scholarship application process.
ESMI budget is largest part of CUES

- Students are provided with
  - Summer session tuition scholarship
  - $2000 stipend to provide summer earnings that are assumed as part of financial aid
  - On-campus housing
  - Twice weekly, peer facilitated workshops (collaborative learning groups)
  - Academic development seminars with CU LSAMP
  - Weekly lunch seminars with Cornell Sloan Program
  - Community development programming
2014 Program Flow

Week 1
- Reading of *The Joy of X* and discussion with Steve Strogatz
- Read parts of Langville and Meyer’s book *Google’s Pagerank and Beyond: The Science of Search Engine Rankings*.

Week 2
- Introduction of projects
  - NCAA sports Rankings
  - Algorithm for S & P 500
- Build Framework for computer code for project

Week 3-8
- Summer Math Courses begin
- Project continues in Afternoon meetings
- Twice Weekly Facilitated Study groups

Other Activities
- Poster Presentation
- Weekly Lunch with other DPE Summer Programs
- Completion of a Resume and E-portfolio
2014 ESMI Project

• Ian Pendleton (Ph.D. student in Math) supervised the project
• **Project 1:** Sports Rankings  
  – Guiding problem: Given a data set comprising a season’s worth of information about the teams in some (or multiple) league(s), rank the teams and be able to project the winner of a match between any two of the teams.
• **Project 2:** Search Engine Team  
  – Guiding problem: Given a data set comprising of the daily stock prices for all of the stocks in some index (S&P500 for example) over some time period, can an algorithm pick out some subset of stocks which will out-perform the average of the index over some future time period?
• Students worked in groups under Ian’s supervision for 3 hours per day
• Presented interim results at Sloan lunches
• Involved Matlab and Java programming
• Learning to present their work and findings
2014 Outcomes

• 10 students (target was 14)
• Courses taken
  – 8 in linear algebra (Math 2940)
  – 1 in differential equations (Math 2930)
  – 1 in multi-variable calculus (Math 1920)
• Research
  – 6 in group project
  – 4 in faculty research labs
  – Students presented research posters and talks at the end of summer research symposium – combines ESMI, LSAMP and other programs
• All students earned grades needed to affiliate. Range A+ to B-
• Ian reports that he struggled to keep students interested enough to develop the drive to explore their research questions further – suggests that we work to find problems more in line with students’ interests.
# Early Retention Indicators

<table>
<thead>
<tr>
<th>Cohort</th>
<th>Demographic Group</th>
<th>Number in cohort</th>
<th>Number made it to sophomore</th>
<th>% made it to sophomore</th>
<th>Number made it to junior</th>
<th>% made it to Junior</th>
<th>Cum GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012 (baseline)*</td>
<td>Overall</td>
<td>778</td>
<td>759</td>
<td>97.6%</td>
<td>708</td>
<td>91.0%</td>
<td>3.30</td>
</tr>
<tr>
<td></td>
<td>URM</td>
<td>128</td>
<td>123</td>
<td>96.1%</td>
<td>112</td>
<td>87.5%</td>
<td>3.00</td>
</tr>
<tr>
<td></td>
<td>FGC</td>
<td>83</td>
<td>79</td>
<td>95.2%</td>
<td>73</td>
<td>88.0%</td>
<td>3.21</td>
</tr>
<tr>
<td></td>
<td>Ryan Scholars/PSP</td>
<td>27</td>
<td>26</td>
<td>96.3%</td>
<td>25</td>
<td>92.6%</td>
<td>2.91</td>
</tr>
<tr>
<td>2013 (CUES Year 1)</td>
<td>Overall</td>
<td>752</td>
<td>710</td>
<td>94.4%</td>
<td>3.28</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>URM</td>
<td>109</td>
<td>101</td>
<td>92.7%</td>
<td>2.98</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FGC</td>
<td>76</td>
<td>67</td>
<td>88.2%</td>
<td>3.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ryan Scholars/PSP</td>
<td>30</td>
<td>26</td>
<td>86.7%</td>
<td>2.97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014 (CUES Year 2)</td>
<td>Overall</td>
<td>757</td>
<td></td>
<td></td>
<td>3.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>URM</td>
<td>111</td>
<td></td>
<td></td>
<td>3.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FGC</td>
<td>82</td>
<td></td>
<td></td>
<td>3.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ryan Scholars/PSP</td>
<td>33</td>
<td></td>
<td></td>
<td>3.02</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Note that some of the 2012 cohort may have also accessed CUES tutoring intervention