CornellEngineering

# CUES year 1-2 update

June 22, 2015

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# Outline

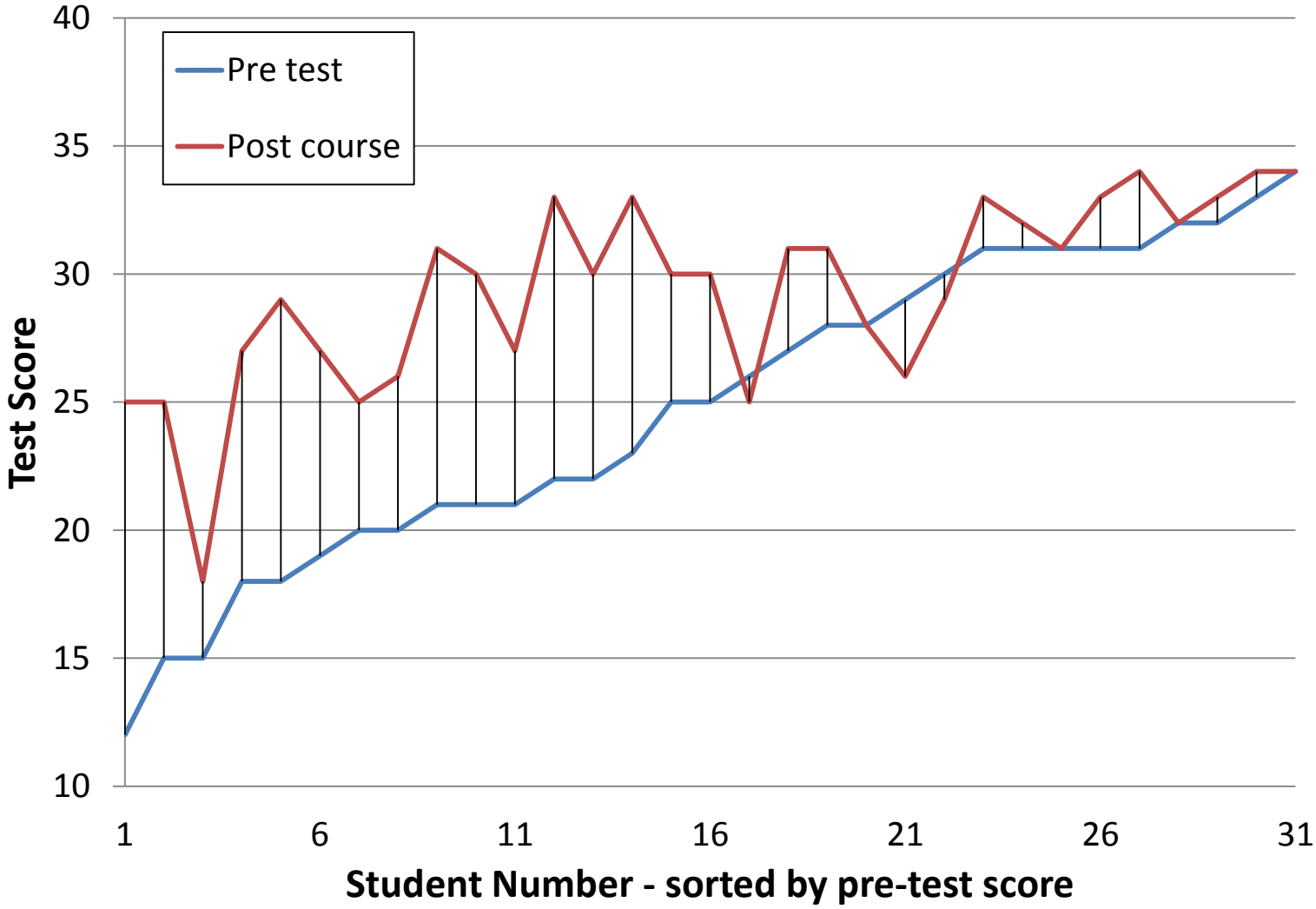
- Review each of the 3 interventions
  - Spatial visualization
  - Enhanced tutoring
  - Engineering summer math institute
- Updates on retention
- Challenges with program operation
  - Data collection
  - Data management
  - Consistency with staff turn over
- Hand off to Magnia for evaluation report

# ENGRG 1070: Spatial Visualization

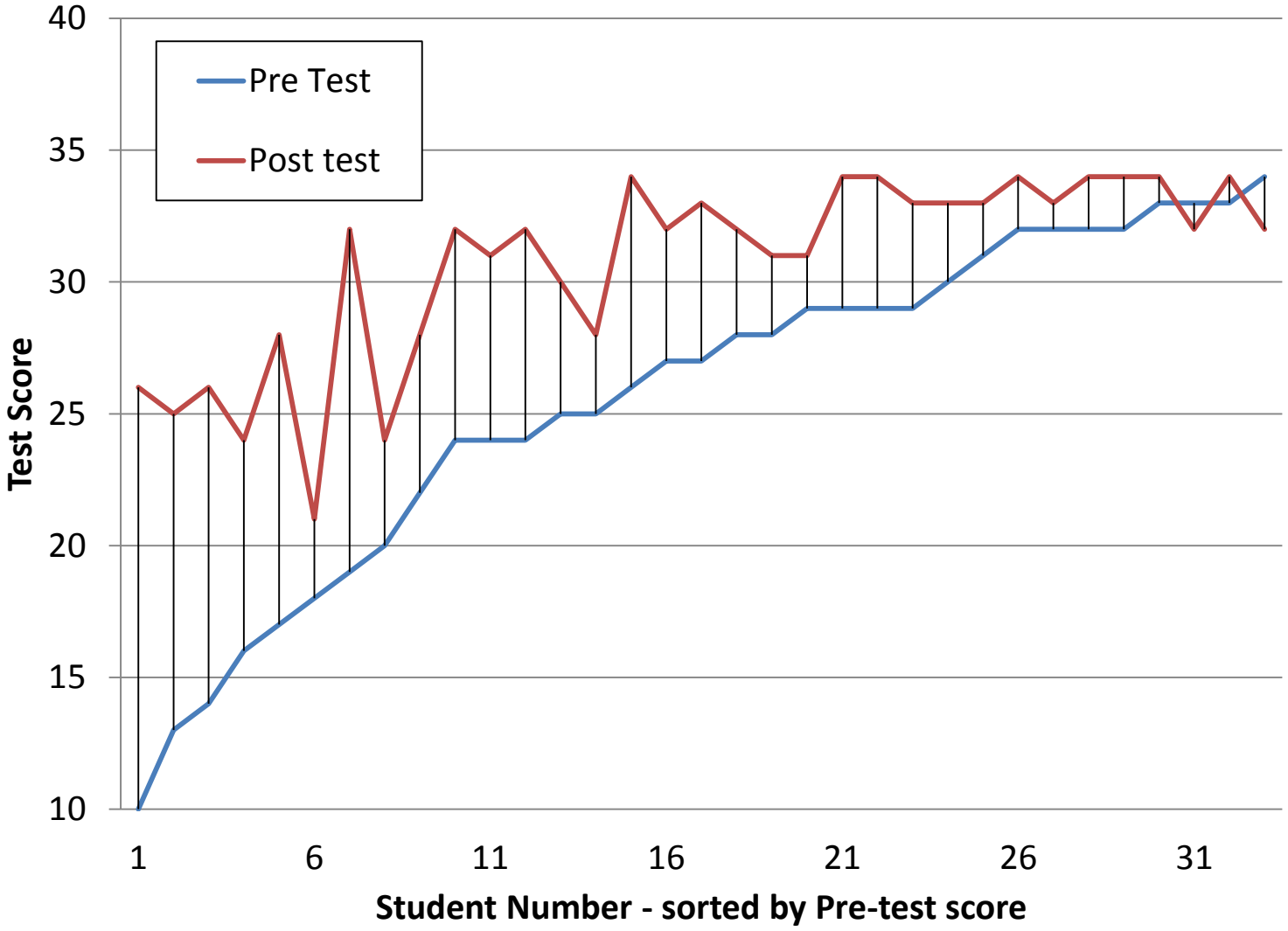
- Participants
  - 64 Ryan Scholars to date (pre-freshman summer scholars)
- Course structure
  - 6 week summer session
  - MW 90 min.
  - Mon in classroom working on classical spatial vis skills (reflection, sketching, rotation)
  - Wed in computing facility learning Matlab, SolidWorks, ImageJ, PowerPoint, 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



# Purdue Spatial Visualization Test Summer 2014



# 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

| Term | Number of students tutored | # passed with C+ or better | # with C-,D,F, W, LOA, Drop | Notes |
|---|---|---|---|---|
| Fall 2013 | 19 | 19 | | Grades A- to C+ |
| Spring 2014 | 21 | 16 | 5 | 1 LOA |
| Fall 2014 | 16 | 14 | 2 | |
| Spring 2015 | 17 | 9 | 8 | 4 dropped |

# 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

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

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