



**Early Undergraduate Research
Opportunities (EURO)**
*Comparing three research skills
delivery methods*

Support: NSF DUE TUES Program

*David Bahr
Amy Bickel
Susan Burkett
John Lush
Shelley Pressley
Kim Schneider*



UNIVERSITY OF CENTRAL FLORIDA

Getting undergrads involved in research as early as possible

- Participation in undergrad research has several benefits
 - Increased retention in STEM
 - Increased understanding of material
 - Feeling of “belonging” to the major
- Clearly retention increases work best when applied as early as possible



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

Faculty often present conflicting messages to students about UGR

- Faculty often say “I want an older/more developed/mature student” working with me on research.
- Faculty also report “The best UG researchers I had worked with me for 3 years...”
- Surveys of faculty at WSU report students become “useful” in their research groups after 50-200 hours of work/training
- So if you wait until they are seniors, low payoff for faculty



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

To remove hesitation for getting students into research groups earlier, *EURO!*

- Can we, as undergraduate research programs, provide students research skills and understanding that will help them
 - Find a faculty mentor?
 - Integrate into a lab?
 - Hone presentation skills?
 - Develop skills that make them more attractive to active research groups?



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

3 Existing Models of Research Skills Training programs

- Week long “boot camp” (WSU)
 - First week after the freshmen year, voluntary for all STEM students, led by faculty
- Peer mentored short course (UCF)
 - Majority of participants are transfer students, voluntary for credit, and led by peer mentors
- Semester long seminar course (U Wisconsin)
 - Historically targeted at juniors at UW within a specific program, and is required by some majors



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY
UNIVERSITY COLLEGE

Washington State University University of Central Florida University of Alabama

- Teamed to evaluate and implement EURO programs
- Adapt each of the three models to each of the three schools
- Work within existing structures where possible
- Assess effectiveness of the programs, as well as costs and yield



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY
UNIVERSITY COLLEGE

What's *Early*?

- So early means different things to different programs.
- For the EURO, *Early* means before students would usually get into a research environment.
- Depends on the student and school.
- In general, we aim to contact students about 3 semesters earlier than “normal” for a cohort research experience.



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

Remainder of workshop

- Common set of skills
- Describe the three programs
 - Week long, faculty led boot camp
 - Peer mentored short course
 - Semester long seminar course
- Provide our assessment of each program to date
- Highlight preliminary trends of what works between the programs so far



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

Skills Common Across UGR Training programs

1. Creating a resume geared towards research
2. Identification of faculty research areas
3. Understanding the difference between popular, textbook, and peer reviewed literature
4. Selection of sources and use of library resources
5. Long term career options for research, including how federal and state funding options impact research activities
6. Improving technical writing skills
7. Discussions of intellectual property and ethics in research and scientific integrity
8. Poster presentations: What's a good poster?
9. Oral presentations: How do you give a talk?
10. Improving laboratory notebook techniques



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

“Boot Camp” (CURE, WSU)

- Target rising sophomores, so immediately after they finish their freshman year
- Cohort size of about 20
- Led by Faculty and staff
- One week program with 9 or 10, ½ day sessions
- Lecture / hands-on activity / report model



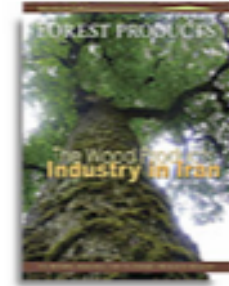
UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY

UNIVERSITY COLLEGE

The week in review: M-T

1. Creating research-oriented resumes
2. Identifying faculty research areas
3. Differentiating between popular, textbook, and peer-reviewed literature



The New York Times



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY

UNIVERSITY COLLEGE

Tuesday - Wednesday

4. Selecting sources and using library resources
5. Exploring long-term career options for research; understanding how federal and state funding options impact research activities
6. Improving technical writing skills

Library citation race

- Start with a common paper (2002)
- In 6 steps or less find the ...
 - ✓ oldest possible source you can hold a copy of in your hand that can be traced to that paper
 - ✓ newest paper that cites the initial paper
- Scoring: Steps* years ago + Steps* (12 - months ago)
- JSTOR usually “wins” oldest, recently Google Books (1840’s) wins out.
- Newest has been published within a week.



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY

UNIVERSITY COLLEGE

Thursday - Friday

7. Discussing intellectual property and ethics in research, and scientific integrity
8. Poster presentations:
“What’s a good poster?”
9. Improving laboratory notebook techniques



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

Summer Research Academy (Peer Mentor Short Course)

Kimberly R. Schneider

Office of Undergraduate Research

University of Central Florida

www.SRA.ucf.edu

KRS@ucf.edu



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

SRA History

- 2003- program developed for transfer students
 - UCF has high transfer rate (10,000/year)
- 2005- opened to rising sophomores and juniors at UCF
- 2007- became a 1 credit pass/fail course
- Currently accept 100 total students each year
 - 50% transfer, 50% current
 - 50% STEM
 - 2012 had 200+ applications



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

Overview of Program

- Students apply online in April
- Program runs between UCF's summer A and summer B sessions (late June)
- 2 ½ day event
- 100 students each year with 15 peer mentors
- Student receive 1 free credit (pass/fail)



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

Course Content

Mixed faculty led and peer mentor led

- What is Research?
- Writing and Expanding Your Resume
- UCF Undergraduate Research Opportunities
- Research Etiquette 101: Working with Faculty
- Finding a Faculty Mentor
- Information Fluency (discipline specific)
 - In the library, with reference librarians
- Research Ethics



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

Course Content (Con't)

- Graduate School
- Research Review (highlight)
 - Discipline specific visits to labs and research sites, meetings with faculty and graduate students
 - Student Poster Showcase (~30 research posters)
- Mini-workshops (highlight)
 - Students choose 4 of 15 short workshops on topics
 - Topics include:
 - Summer off-campus opportunities
 - Writing a thesis
 - Laboratory safety
 - Intellectual property



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY

UNIVERSITY COLLEGE

Peer Mentors

- Current researchers, 2+ semesters of research
- Often SRA graduates
- Paid
- Training sessions prior to event
- Role:
 - Each mentor works with a group of up to 9 students
 - Lead group of SRA Scholars before, during, and after the Academy.
 - Share experiences about research with the SRA Scholars.
 - Prepare and lead workshops, give assignments to group.
 - Collect and grade assignments from participants.



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY
UNIVERSITY COLLEGE

Class Assignments

- Pass/fail 1 credit course
- Pre-Assignments (15%)
 - Identify three faculty mentors and write about their research
- Academy (60%)
 - Reflective assignments
 - Worksheets
 - Attendance/Participation
- Post-Assignments (25%)
 - Information fluency
 - Mini literature review



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY
UNIVERSITY COLLEGE

Assessment

- One year and two year later survey (N=74)
- 60% moved into research
 - 30% had spent 4+ semesters involved in research
 - Many winners at on-campus showcase, grand awardees, national conferences
- 40% were not involved 1+ years after event
 - 30% realized they were not interested
 - 45% still plan to get involved
 - 25% had trouble finding a mentor, didn't understand the process → 10% unsuccessful impact of SRA



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY
UNIVERSITY COLLEGE

Costs

- One credit: \$0
 - Provided at no cost through our continuing education department
 - Many students might be willing to pay the one credit
- Peer Mentors: $\$350 \times 15 = \5250
- Food: \$2000*
- Bus Rental: \$600*
- Publicity: \$200
- Housing: \$500*
- Stipends (faculty): \$1500*
- \$10,000 or \$100/student



*Optional Expenses



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY

UNIVERSITY COLLEGE

Pros and Cons of Model

- Cons
 - Hard to incorporate discipline specific content
 - Cost
 - Must promote year round to get applicants
 - Need support from entire campus
 - Student do not start research projects during course
- Pros
 - Students learn about academic research early in career
 - Peer mentors gain experience in teaching and mentoring
 - Structured dissemination of research information
 - Short but intense experience works well for non-traditional students



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

Semester Long Seminar (SLS)

Susan Burkett, ECE faculty

John Lusth, CS faculty

The University of Alabama

sburkett@eng.ua.edu

lusth@cs.ua.edu



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

Logistics

- Spring 2012, SLS was implemented at the collaborating institutions
- Recruitment/enrollment:
 - UA sent program details by email to COE students, Physics, Chemistry, Biology, Math. 15 students enrolled in the 1 credit (graded) course; a mix of all class levels with several freshmen; all from Eng/CS.
 - UCF recruited through transfer services, freshmen advising, and through the Office of Undergraduate Research
 - 140 applications for 30 positions, wide variety of STEM disciplines
 - WSU recruited through ads and CAMP program, 27 students



UNIVERSITY OF CENTRAL FLORIDA



Course Content

- Modeled after University of Wisconsin course
- One class per week – 50 minutes
- Topics: Scientific method, finding a mentor, research opportunities (REU), resume building, library skills, how to read/write articles, research ethics, communicating results (presentations/posters), literature review
- Common assignments (mock email, resume, library scavenger hunt, analyzing an article, literature review)
- Bi-weekly conference calls to discuss class topics and assignments



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY
UNIVERSITY COLLEGE

Observations

- Most students secured a mentored research project (either summer or fall) due to mock email assignment/ awareness of REU programs, etc.
- In SLS, the literature review was a focus area because it emphasized several topics. Have students identify a topic of interest to them early in the semester, do the lit review in stages (“super” outlining) so that you can provide feedback.
- Students thought a seminar course would not require so much outside work.
- Suggest more active learning techniques in the future to engage students. Classes were rather passive.



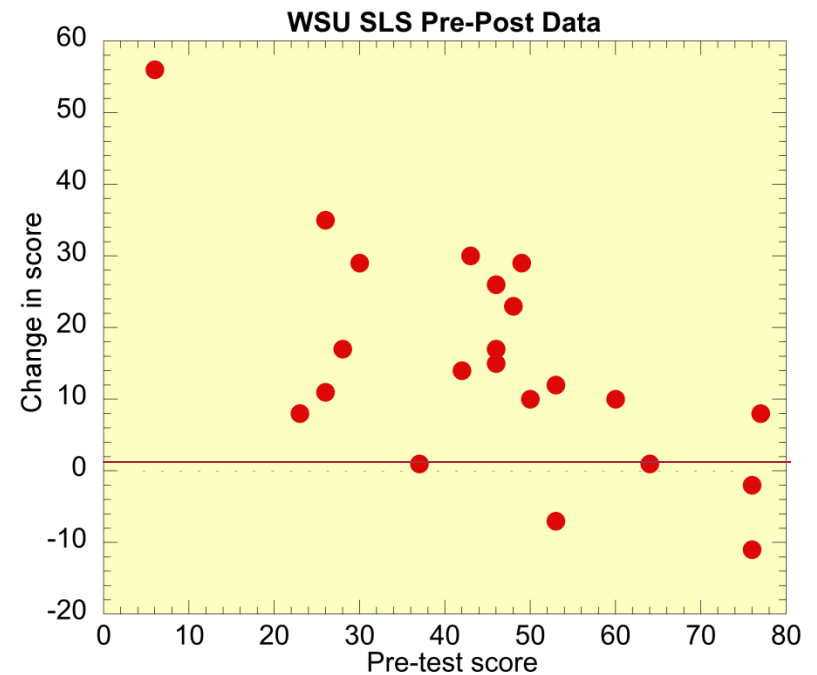
UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY
UNIVERSITY COLLEGE

Pre/post Testing

Each institution used a common test with a mix of multiple choice, T/F, and open-ended questions to assess increased awareness and understanding of topics associated with research skills. Pre-test was given on the first day of class, Post-test was given at the final exam.

	Pre	Post
UA	52.4 ± 18.4	64.6 ± 12.6
UCF	58 ± 11.5	72 ± 8.9
WSU	46.3 ± 17.6	60.8 ± 13.4



Focus Group

UA: 6 participants

- Mock email and resume writing assignments were valuable
- Learning was enhanced by instructor presentations and assignments requiring them to search, read and analyze research papers.
- Did not enjoy guest lecturers, not specific enough to their major.
- Students wanted more help in writing the literature review, liked the step by step approach, but wanted even more steps and feedback at each step.
- Students wanted more career information, help in picking a research topic, more team-based activities in class, and visits to a laboratory.
- Would have met multiple times per week to get more out of the class.



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

Focus Group

UCF: 15 participants

- High levels of satisfaction
- Six pursuing undergraduate research already or soon, one determined not for them
- Useful course
- Assignments and experiences most valuable: guest speakers, how research is funded, how to contact a professor, resume writing, and graduate school applications and funding.
- Weaknesses: Some of the library work



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

Focus Group

WSU: 10 participants

- Motivation similar to other programs (want to see what it's like)
- Saw a disconnect between lecture/activities and assignments.
- Positive: how to interact with faculty
- Negative: lab notebooks
- Wanted lab tours, job shadowing
- Mixed results on workload (too much and too little)
- 5 going to labs, 2 internships, other looking for openings



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY
UNIVERSITY COLLEGE

Recommendations

- Consider breaking the literature review assignment into smaller tasks to provide more guidance and feedback as students are completing each step.
- Clarify the course's purpose and student learning outcomes - what the course will focus on and what it will not focus on. Possibly by providing the syllabus for prospective students so that their expectations are in line with content.
- Provide lab tours or shadowing experiences.



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

Boot Camp Assessment

- WSU has run this since 2007
- UCF running first time 2012
- Alabama will run it 2013
- So reporting so far will be only WSU participants



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY

UNIVERSITY COLLEGE

Boot camp participants

- 94 students 2007-2012
- 44% women, 56% men
 - WSU Engineering 13-18% F , 14% URM
- Starting majors: all engineering majors (90%), plus neuroscience, math, zoology, a few ag-related, psychology.
- Starting GPA: 3.32
 - Note, we do not filter on GPA for admission, this also is very close to our freshmen engineering 2nd semester GPA.



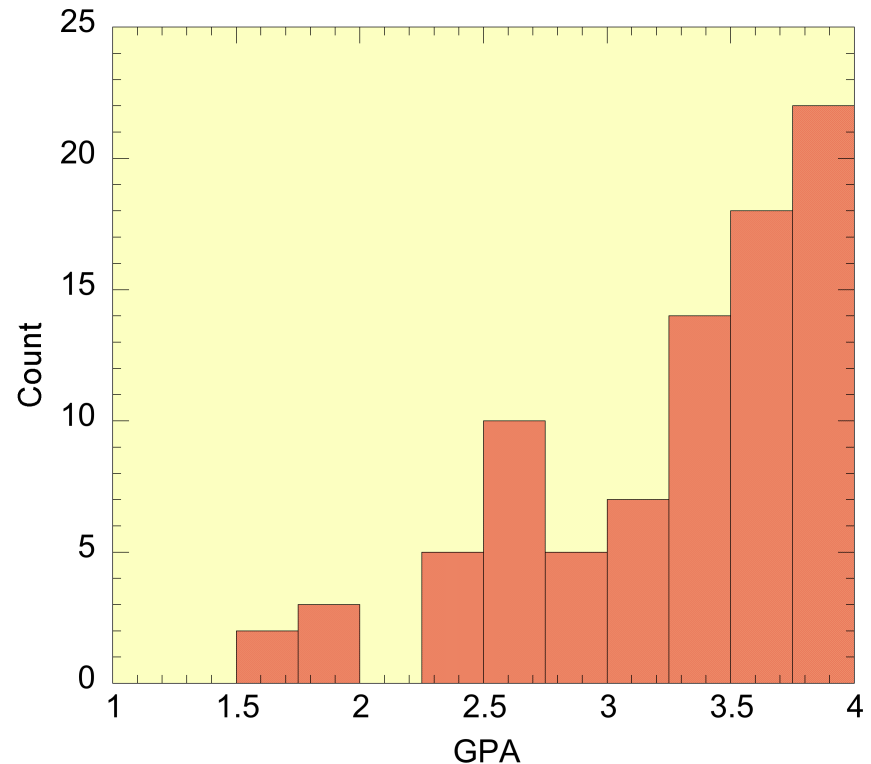
UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY

UNIVERSITY COLLEGE

GPA for CURE program 2007-2012

- Starting GPA reflects WSU engineering population after first year



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

Does it work?

- 61% of CURE participants found an advisor after 1 year.
- Reasons for not finding an advisor ...
- *“Can’t spend the time” and “Haven’t found a match”*
 - *Seems to build maturity, realizing “can’t do everything”*
 - About 15% are still looking (in 2010 and 11), this is increased from the beginning.
- Non-uniform start dates, from 1 week after the program to 1 year later
- Since 2010 more are reporting “found an industrial internship instead”



UNIVERSITY OF CENTRAL FLORIDA

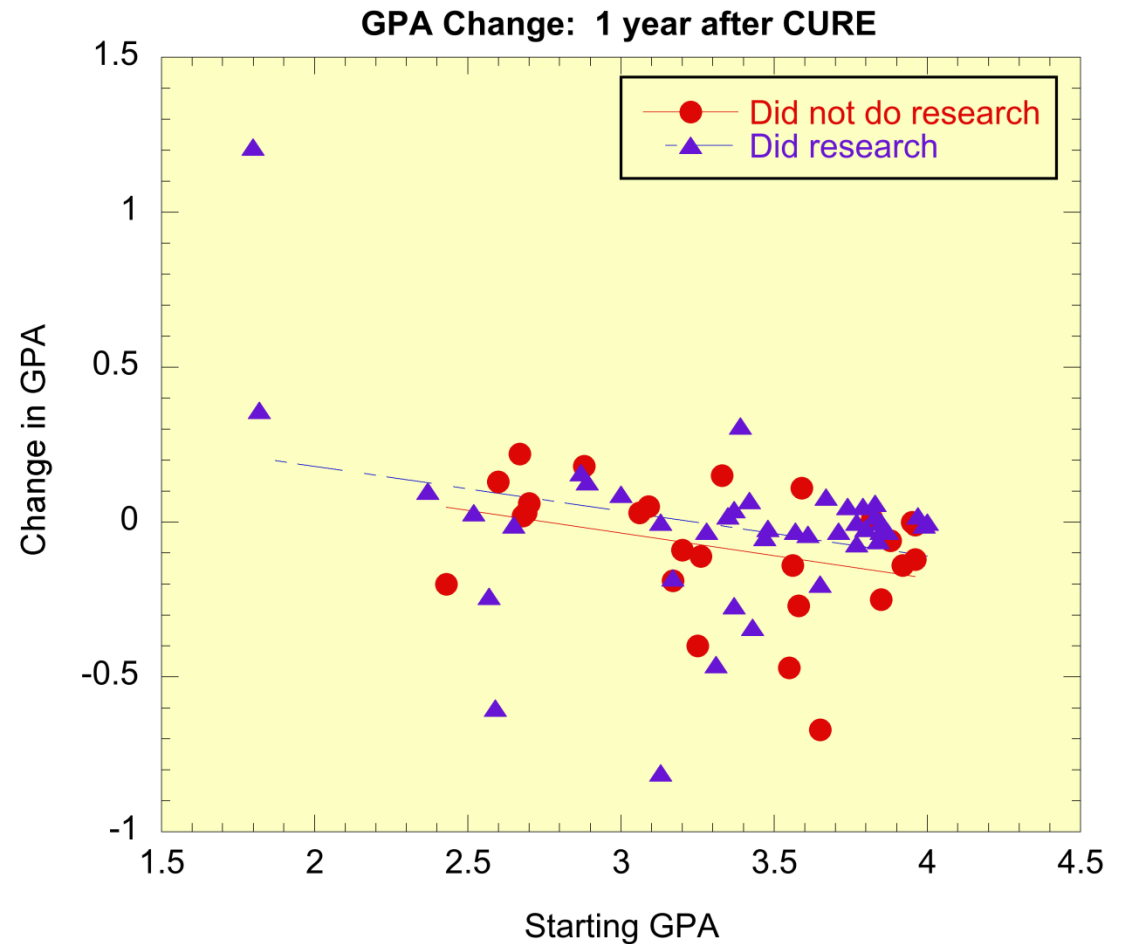
WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

Research doesn't alter your GPA

- No statistical difference in GPA if you do research or not:
- Doing research doesn't hurt or help your GPA



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY
UNIVERSITY COLLEGE

Retention has been excellent

- Standard WSU Engineering retention: 48% to graduation.
- 42 CURE students “should have” graduated
 - Of those, 34 graduated in STEM, 1 in psych, 2 in business, 2 still enrolled in STEM, and 3 dropped out.
 - **81%+ retention in STEM to graduation!**
- Total retention: of 78 students (2011 and earlier), 3 are non STEM, 2 are on academic probation, 3 dropped out, and 70 are still STEM or graduated: **90% retention**



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

Boot camp costs

- Up front, need money for faculty to buy in for development.
- Once the leaders have done their segments, operating costs have been \$100 per student. Faculty report no need for salary (1/2 day is fine, access is +)
- 2007-2011 we provided a \$500 stipend to the students. We surveyed students and asked how much would be a minimum stipend, \$238.
- 2012: We used a \$275 stipend. Still had full enrollment.
- So good estimate of steady state costs: \$375 per student



UNIVERSITY OF CENTRAL FLORIDA



Student views: Boot Camp vs. SLS

- We asked students in CURE if they liked the 1 week format.
 - Overwhelming yes (80%). Those that didn't thought they needed more time for topics to sink in
 - SLS students had strong reporting in surveys that it was too much work for a 1 credit class, and there were comments that they were "too busy" with other classes to get the work done
- This suggests that expectations for workload need to be VERY clear, freshmen often didn't expect to work that hard



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY

UNIVERSITY COLLEGE

Open ended feedback from all students

- CURE students often didn't realize you had to approach professors.
- Many SLS students thought the “how to email a professor” was the best thing we did
- They were generally surprised how much research occurs on campus in all programs



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

Conclusions 1

- Yield to research appears similar between boot camp and peer mentored programs
- Semester long seminar probably easiest if you don't have an UGR office
- Intensive courses do not appear to have the issue of mixed expectations in content and workload
- SLS probably will max at 30 for one instructor
- The activities for the week long course do not always translate well into take-home assignments, some things need that block of time with faculty



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY



UNIVERSITY COLLEGE

Conclusions 2

- Costs are probably very similar (if you work out faculty time, UGR director time, etc.). Between \$200 - \$500 per student to get these running.
- So far we have not been bold enough to try a pay for access model
- Clearly there is student interest in all three models.
- Continued tracking on effectiveness



UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE
UNIVERSITY

UNIVERSITY COLLEGE

For more information about the EURO programs

Washington State University	University of Alabama	University of Central Florida
Shelley Pressley spressley@wsu.edu	Susan Burkett sburkett@eng.ua.edu	Kimberly Schneider KRS@ucf.edu
David Bahr dbahr@wsu.edu	John Lusth lusth@cs.ua.edu	Amy Bickel amy.bickel@ucf.edu
http:// undergraduateresearch .wsu.edu		http://www.SRA.ucf.edu

We'll be looking for partners for national expansion in the next few years



UNIVERSITY OF CENTRAL FLORIDA

