The Emerging Scholars Program (ESP)

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Goals

- Increase the enrollment of female students in Computer Science courses beyond CS1.
- Ultimately, increase the number of female CS majors.
- Demonstrate that Computer Science is more than just programming, and that it is intrinsically collaborative.
- Build a network of undergraduate women interested in computers and technology

ESP Topics

- ESP is meant to be complementary to CS1, "Introduction to programming."
- The problems expose students to a variety of fields within CS.
- Focus is on higher-level problem solving, rather than technical details or coding problems.

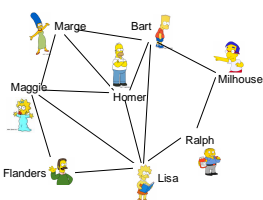|	Problems	CS Topics
Week 1	Ice breakers; sudoku	Representing problems abstractly
Week 2	NIM; balancing coins	Designing algorithms for problems
Week 3	Cryptograms; compression	Encoding; encryption
Week 4	Problems in machine translation	Computational Linguistics
Week 5	Usability	Human-Computer Interaction; UI Design
Week 6	Face Recognition; Handwriting Recognition; Speech Recognition	Biometrics; Spoken Language Processing
Week 7	Facebook	Graph Algorithms and Social Network Analysis
Week 8	TSP, cliques, vertex cover	NP Completeness
Week 9	Digital Dilemmas	Ethics of technology; policy-making decisions
Week 10	ESP Reunion with Pinkberry	

Computational Linguistics

- Match the Luvian language names with their English translations.
- What language clues can we use to guide the matching algorithm?
- Use your knowledge of Luvian to translate words from English into Luvian.

Regions: Khamatu, Palaa.
Cities: Kurkuma, Tuvarnava.
Kings: Varpalava, Tarkumuva.

Social Network Analysis

- How would you implement Facebook's "people you might know" feature?
- If Bart is a zombie and we want to prevent the zombie disease from spreading to anyone else, how many people do we need to inoculate?

PLTL Paradigm

- Peer-Led Team Learning (PLTL) involves students working cooperatively in small groups, led by trained undergraduate peer leaders. PLTL is an Academic Alliance Best Practice.
- Special emphasis is placed on solving problems as a team, and making the activities fun.
- Group problem solving helps develop algorithmic thinking, and demonstrates that Computer Science is a collaborative activity.
- ESP is organized as follows:
  - *Project leaders* develop materials for the workshop, with assistance from the *faculty advisor*.
  - Each section is led by a *peer leader*, a junior or senior female CS major, who presents the problems and directs the discussion.
  - Each section also has a *workshop assistant*, a sophomore or junior CS major, who assists the leader and provides feedback about the materials.
  - ESP sections have 6-9 students, who have to apply. Applicants must be female freshman or sophomore students currently enrolled in CS1.
- At the end of each semester, all ESP alumnae are invited to an ESP reunion, which provides a chance for networking, Q&A with a professor, and connecting with other resources within the CS department.

Lessons Learned

- Topic Diversity: Initially, we had many AI topics, but the students wanted more breadth.
- Challenging Problems: Students rarely complain that things are too hard, but they are quick to notice when problems are too easy. Don't underestimate the students!
- Growing Pains: Expanding from one section to two sections required more logistics than we imagined.
- Recruiting is Key: Since classroom participation is essential, having one or two unmotivated students in a room of six can bring down the group morale. Next semester, we plan to have an info session to help increase our applicant pool, and allow for more targeted selection.

Through the varied workshops, I was exposed to interesting people and ideas, realizing the breadth of an entirely **fascinating subject** in which I had no previous experience.

I love being part of ESP because it challenges me to **think with a different perspective** and then apply it to computer science. What I've learned in the workshops has helped me grasp and understand many topics in my classes.

I loved being in a **small group** because it forced us all to participate and I also loved having a workshop leader that was close in age and **encouraged creative thinking**.

Results

- Over the past three semesters, **30 students** have completed ESP in five different sections; at the last reunion, 15 students attended, showing that ESP remains a good networking opportunity for many students.
- From the first two semesters, of the students who have declared majors, 42% of them have declared CS. (5/12; 4 more have not declared)
- ESP also helps develop leadership: two of the ESP assistants have gone on to receive CRA-W summer research positions, and one of the ESP leaders now works full time at Microsoft.
- The majority of students would "**definitely**" recommend ESP to other students.

Would you recommend ESP to other students?

Do you plan to major in CS?

Do you plan to take another CS course?