Exploring the Exploration Program

Michael Yacci, PhD
Director, Exploration Program
Professor and Associate Dean for Academic Affairs
Golisano College of Computing
mayici@rit.edu

James Foley, MS
Information Sciences and Technology
Rochester Institute of Technology
Computing Exploration Program

• *Computing Exploration* is a one-year program that accommodates entering first-year students who are not yet able (or willing) to make a choice between computing programs at RIT

• But before we go there...
The Computing Landscape

- What do you mean “programs” as a plural?

- To the outside world, everything is often “computer science”

- But, the computing field has various career opportunities, and RIT has many different programs to connect students with other like-minded students, faculty and careers
RIT’s College of Computing

- Golisano College of Computing and Information Sciences (GCCIS)
- 3400 students in computing programs

- 7 Undergraduate (BS) Programs
- 8 Graduate (MS) Programs
- 1 PhD Program

(RIT has over 200 academic programs!)
Computing Exploration Program

- A one-year program
- To help students to make a good choice between computing majors
- And then smoothly transition them into the major with no lost credits
The Computing Exploration Program

The *Computing Exploration* program works with five computing majors:

1. Computer Science
2. Computing Security
3. Information Technology
4. Networking and Systems Administration
5. Software Engineering
How Do Students Choose a Major?

Somewhat haphazardly...

Over two-thirds of entering students change their major during their first year (Kramer, Higley, & Olsen, 1993).

Between 50-75% of all students who enter college with a declared major change their mind at least once before they graduate (Foote, 1980; Gordon, 1984; Noel, 1985).
Lewallen (1995) examined a national sample of over 20,000 decided and undecided students at six different types of postsecondary institutions, and he found that undecided students actually displayed higher levels of academic achievement (average GPA) and were more likely to persist to graduation than decided students.

• From Cuseo, 2003
Bad Selections

- Uninformed
- Unrealistic
- Premature
- Based on extrinsic pressure
Exploration “Program Theory”

- Formal Exposure to Information about each major
- Effective Advising
- Experience Through Coursework
- Delay but don’t impede
The CEP in a Nutshell

- **Fall**: take a course from CS, IT, and Security
- Participate in a CEP seminar in which program directors, students, and industry people talk about careers, programs, skills, etc.

- **Spring**: take a course from CS, Software Engineering or Networking

- Students can select major at end of Fall or end of Spring (working with Exploration advisors)
Evaluation Questions

Is the computing exploration program effective in helping students to select their programs?

1. How confident are students that they have selected the “correct” program?

2. Does the computing exploration program help students to understand the difference between programs?
Some Additional Research Questions

3. What factors contribute most to student selection of majors?

4. Which student characteristics (skills and preferences) are most predictive of selecting each major?
Assessment?

• The Exploration Program’s primary output is a student’s **decision**

• To that end, we provide content about programs, and exposure to actual courses from each major.

• **But we don’t teach the courses.** Course outcomes are (to some extent) irrelevant to the goals of the Exploration Program (more later)
Methods Part 1

• Survey students on first day:
  • characteristics of high school careers (self reporting)
  • program preference

• Survey students after each program presentation (weeks 2-8) regarding how much they learned
  • “fact-based questions”
  • quality of presentation
Methods Part 2

• Survey students at end of Fall
  • Program preference
  • Degree of confidence with selection
  • Influences

• Look at academic record at end of Spring regarding actual choice

• Survey students at end of Spring regarding overall satisfaction with Exploration Program
Is the program effective in helping students to select a major?
1. How confident are you in your choice of major at this time?

- Not at All: 3.45%
- Somewhat Confident: 3.45%
- Moderately Confident: 20.69%
- Confident: 48.28%
- Extremely Confident: 24.14%
Student Preferences

<table>
<thead>
<tr>
<th></th>
<th>CS</th>
<th>SE</th>
<th>NSA</th>
<th>CSEC</th>
<th>IT</th>
<th>Non-Computing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>12</td>
<td>4</td>
<td>2</td>
<td>8</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Week 15</td>
<td>5</td>
<td>6</td>
<td>1</td>
<td>2</td>
<td>10</td>
<td>4</td>
</tr>
</tbody>
</table>

- This change suggests that as students learned more about the programs, many may not have been what they originally anticipated.
2. Does CEP help students to differentiate between the programs?

• Students were asked after each department presentation if it helped them to distinguish that major from the others.

Order of Seminar Presentations
1. Computer Science
2. Software Engineering
3. Information Technology
4. Networking
5. Computing Security
2. Does CEP help students to differentiate between the programs?

• 16% of the students expressed some confusion after the CS presentation

• Some students commented after the CS presentation that:
  
  • “I still have trouble distinguishing it from software engineering”
  • “Sort of, but not really, I need to hear from the SE guy next week to tell the difference more.”
  • “It helped for the most part but CS vs SE is still a little fuzzy.”
  • “Well I am confused with software engener (engineering)”
2. Does CEP help students to differentiate between the programs?

- After the SE presentation, it dropped to 0%, indicating that distinguishing between these two was the challenge

- Then after SE they commented:
  - “Yes. It helped set apart SE from CS”
  - “Yes. It helped a lot from CS.”
  - “yes, the difference between SE and CS are notable”
  - “Yes it showed the difference between CSCI (CS) and SE”
  - “yes, especially between CS and SE”
2. Does CEP help students to differentiate between the programs?

- A similar pattern emerged for Security and Networking.
- Student comments during the Networking session:
  - “Yes, but I would want a better comparison of this and Comp. Sec."
  - “It helped split from it, but need to speak security to help.”
  - “Yes, there are still overlaps in other degrees like computer security and web though"

- After the Security presentation, the results changed to 0%
2. A “Natural” Clustering Effect

Order of Seminar Presentations

1. Computer Science
2. Software Engineering
3. Information Technology
4. Networking
5. Computing Security
“What programs do you still have uncertainty about (week 15)?”
Does not align with the weekly surveys

- Certainty may have diminished with the passage of time ("you don’t know what you don’t know")
- Students may have misunderstood what was being asked by “uncertainty”
- Student comments were indicative of a clustering trend
  - Students who chose CS or SE programs, showed little uncertainty about the CS or SE majors
  - Students seemed focused on distinguishing within the clusters:
    - between SE and CS,
    - NSA and CSEC,
    - to a lesser extent IT and NSA/CSEC
3. What factors contribute to selecting a major?

- In-Class Presentations: 79.31%
- Friends or Classmates: 72.41%
- Advisors: 58.62%
- Courses taken at RIT: 89.66%
- Instructors: 48.28%
- Student Q&A: 75.86%
- Professional Panel: 20.69%
3. What factors contribute to confidence in selection?

- Instructors
- Student Q & A
- $r^2 = 18.1$
- Faculty interaction follows closely to Tinto’s theories of college attrition
Course Influence: Comments

• Class Assignment: “what program most interests you, and what has influenced you in that direction?”

• Many students positively mentioned an Information Technology course and a particular instructor

• Several students mentioned a poor instructor in a Computer Science course

• Several students negatively mentioned the Security course
4. What characteristics predict choice of major?

We asked students (in Week 1)

- “How much did you enjoy each of the following High School subjects?“

- “What classes did you perform well in? (check as many as applicable)”
Preference variables in order of strength:

- Technology ($r = 0.214$)
- Music ($r = 0.184$)
- Art ($r = -0.131$)
- Science ($r = 0.106$)

[Dislike of Art and Science]

$r^2 = 19.2$
Self-assessed skill variables in order of strength:

- Foreign Language $r = -0.328$
- Writing $r = 0.311$
- Technology $r = 0.284$
- Music $r = 0.258$
- Social Studies $r = -0.182$

- Negative impact of Social Studies!

$r^2 = 30.4$
Preference Variables in order of strength:

• Computer Networking \((r = 0.355)\)
• Computer Programming \((r = 0.336)\)
• Math \((r = -0.188)\)
• (Students self-identified didn’t like math)

• \(r^2 = 28.3\)
Computer Science Major: Performance

Performance variables in order of strength:

- Computer Programming \((r = 0.380)\)
- Computer Networking \((r = 0.296)\)
- Math \((r = -0.243)\)

- Really consistent: but odd – Computer Science is considered our most “rigorous” math program

- \(r^2 = 28.5\)
Preference variables in order of strength:

- Programming (r = 0.450)
- Technology (r = 0.374)
- Networking (r = 0.223)

- All positive relationships

\[ r^2 = 35.2 \]
Performance variables in order of strength:

- Social Studies ($r = -0.411$)
- Math ($r = -0.244$)
- Networking ($r = 0.128$)

- The really don’t think they perform well in social studies

$r^2 = 26.8$
Recommendations 1

• Based on the idea that students want to differentiate within a “cluster” of majors:

  • Be more aggressive in the presentations addressing those specific majors within the cluster (CS and SE; Networking and Security)

  • Bring in students from the different programs simultaneously, so they may offer insight into how they see the programs and why they made their choices
Recommendations 2

• Create a “cheat sheet” or matrix of the features and elements of each program
  
  • Can underscore the more subtle differences between programs
  
  • Students could fill it out as the Seminar course progresses, prompting questions when an area is not populated
Recommendations 3

• Gather the student’s High School performance data and create a set of “heads-up” recommendations

• The results from the surveys show that performance in different subjects are good indicator of what program might interest students

• Track progress as they continue through their chosen major
The End

Questions?