Why Do Some Engineering Students Study Alone?

Elizabeth Burpee, Cheryl Allendoerfer, Denise Wilson, & Mee Joo Kim
University of Washington
Background (K-12 & Industry)

“Working in groups is important!”
Background (Higher Education)

“Working in groups is a mixed bag ... sometimes good, sometimes detrimental”
So What?

1. Studying alone in STEM
2. Lack of community connection
3. Lack of belonging
4. Eventual or immediate DROP OUT of STEM

Previous studies looking at DROP OUT use academic indicators; few studies look at how these other factors (above) relate to performance & retention.
**GOAL:** Find a way to easily identify students that study alone who are also at risk of STEM dropout.

**RESEARCH QUESTION #1**
What are the primary differences between engineering students who study alone by choice and those who do not study alone by choice?

**RESEARCH QUESTION #2**
How can engineering students who study alone not by choice be easily identified?
Data Collection & Initial Analysis

1. Cross-sectional surveys
   - 435 sophomore, junior & seniors in undergraduate engineering majors

2. Individual interviews
   - 38 sophomore, junior & seniors students
   - Interview transcripts coded & analyzed using constant comparison method
Findings

Academic Solitaries

18.4% of 38 students interviewed reported studying alone.
Academic Solitaries
N = 7

Preferred Solitaries
N = 4

Outsider Solitaries
N = 3
Mean Survey Scores

Mean score on a 5-point Likert scale

Construct

All Surveyed Participants  Preferred Solitaries  Outsider Solitaries

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<th>Belonging Class</th>
<th>Emotional Engagement +</th>
<th>Emotional Engagement + Class</th>
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Research Question #1

What are the primary differences between engineering students who study alone by choice and those who do not study alone by choice?

Preferred Solitary
- Chooses to study alone
- Often sees working with others as a hindrance

Outsider Solitary
- Prefers to study with others
- Perceives barriers to studying in groups
Research Questions #2

How can engineering students who study alone not by choice be easily identified?

Find students who score ≥ 2 Standard Deviations below the Mean in the following survey constructs:

- Belonging to Class
- Positive Emotional Engagement
- Positive Emotional Engagement in Class

And ≥ 2 Standard Deviations above the Mean in:

- Negative Emotional Engagement in Class
In Other Words…

If we identify students who feel

**LESS**
- Support
- Acceptance
- Comfort
- Membership
- Enjoyment
- Good
- Interested

**MORE**
- Worried
- Discouraged

we are more likely to narrow the pool of students at risk of drop out and channel resources to this smaller group for more effective outcomes
### Implications

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<th>Whether or not a student studies in a group is not the important factor.</th>
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<td>A student’s sense of <strong>BELONGING</strong> is the important factor.</td>
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<td>When planning interventions, we must remember that there is no “one size fits all” for belonging.</td>
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Contact information: eburpee@uw.edu