Student Engagement, Science, Society, and Community at IMSA

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The Smallest School
Inquiry and Mentorship

Inquiry
• In-depth and actively pursued study of topics reflecting student interests.
  – Planning
  – Investigation
  – Analysis
  – Communication

Mentorship
• Actively pursued research under the direction of mentor working in industry or academic laboratory.
### Mentorship and Inquiry

<table>
<thead>
<tr>
<th>Year</th>
<th>% Males</th>
<th>% Females</th>
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<tbody>
<tr>
<td>99-00</td>
<td>238</td>
<td>302</td>
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<tr>
<td>00-01</td>
<td>251</td>
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<tr>
<td>01-02</td>
<td>276</td>
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<tr>
<td>02-03</td>
<td>304</td>
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<tr>
<td>03-04</td>
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</tbody>
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*Graph showing Mentorship, Inquiry, and KI Participation, by Gender.*
Core Competency

- Competency-Driven
- Inquiry-Based
- Problem-Centered
- Integrative
The Class of 2006

- 210 students active in spring of 2005
- 5.7% African-American, 5.7% Latino, 35.7% Asian, 52.9% White/Mixed
- 51% Female, 49% Male
- 17.6% 8th graders, 82.4% 9th graders
- 22.4% admitted through EXCEL for academic reasons
Problem

• Needed to look for way of evaluating EXCEL program for students admitted with academic or transitional needs.
• Indicators included:
  – Academic performance
  – Social networking and engagement
  – Enrollment in upper-level elective courses
Measuring Engagement

- We adopted the Motivated Strategies for Learning Questionnaire (Pintrich 1991) and modified it to reflect student engagement in mathematics.
- The MSLQ is a self-administered instrument of 88 questions that measures 15 subscales related to student motivation and learning strategies.
MSLQ Subscales

• Motivation Subscales
  – Intrinsic goal orientation
  – Extrinsic goal orientation
  – Task value
  – Control beliefs
  – Self-efficacy for learning and performance
  – Test anxiety

• Strategy Subscales
  – Rehearsal
  – Elaboration
  – Organization
  – Critical thinking
  – Metacognitive self-regulation
  – Time and study environment
  – Effort regulation
  – Peer learning
  – Help seeking
Data collection and subjects

• Data Collection
  – MSLQ administered 5 times
  – Current data range covers first 14 months at the academy and a summer administration before they arrived on campus
Method: HLM

• Hierarchical linear modeling is a form of multiple regression that decomposes variance and allows for complex, nested models. (multiple measurements nested within students)

• Directly estimates individual “growth curves”
Cubic growth model investigating student-level variables (EXCEL status, racioethnicity, gender, and age) and their potential effects on intercept, slope, and acceleration of help seeking behavior.
Intrinsic Goal Orientation

![Graph showing the relationship between MVIGO and TIME. The graph shows a decrease in MVIGO over time, with specific values for each time point.]
Intrinsic Goal Orientation: African-American Students

TIME

MV/GO

BLACK = 0
BLACK = 1
Test Anxiety: African-American Students

![Graph showing MATA vs TIME for different groups](image)

- BLACK = 0
- BLACK = 1

**MATA**

**TIME**

-1.15 to 13.75
Control Beliefs: Asian Students
Extrinsic Goal Orientation: Asian Students

![Graph showing changes in time with MVEGO against TIME. The graph has two lines, one for ASIAN = 0 and another for ASIAN = 1. The X-axis represents TIME, ranging from -1.15 to 13.75, and the Y-axis represents MVEGO, ranging from 4.68 to 5.59. The lines indicate a decrease in MVEGO over time for both categories.]
Help Seeking Behavior: Unconditional
Help Seeking: Male/Female Differences

![Graph showing differences in Help Seeking between males and females over time. The graph compares two lines, one for males (FEMALE = 0) and one for females (FEMALE = 1).]
Help Seeking: EXCEL Students

![Graph showing MRHSEEK over time with two lines representing EXACAD = 0 and EXACAD = 1.]
Help Seeking: EXCEL/Female Interaction

Female, non-E  
Female EXCEL  
Male, non-E  
Male, EXCEL
Peer Learning: African-American and Gender Interaction
Peer Learning: EXCEL
Other Models: School Background Data

- Large classes, low writing
- Small classes, low writing
- Large classes, high writing
- Small classes, high writing
Conclusions

• Highly talented students at IMSA develop behaviors relating to the community that assist in their performance.

• Even in an optimized environment, group differences express themselves and have policy implications.

• Minds create and are created by their environment. Even an environment designed to be friendly to tSM needs be adaptive while being adapted to.
Conclusions

• Motivation and learning strategies can be collected and modeled over time

• Modeling can yield information that helps us better understand the student experience at IMSA and can inform programming

• To Do: Collect sixth round of student responses, introduce student performance data (course information, grades), validation with second wave