MERIT PROGRAM
Merit Immersion for Students and Teachers
University of Illinois at Urbana-Champaign
An Overview of the Merit Program and the MIST Project at the University of Illinois

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History of the Program

- Dr. Uri Treisman’s collaborative learning model
- Math Merit, 1989
- Chemistry Merit, 1993
- IB Merit, 2004
- MIST Expansion, 2007
# What is the Merit Program?

<table>
<thead>
<tr>
<th>Typical Recitation Section</th>
<th>Merit Workshop Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students sitting in rows</td>
<td>Students sitting in groups at round tables</td>
</tr>
<tr>
<td>Individual learning</td>
<td>Collaborative learning</td>
</tr>
<tr>
<td>TA presents concepts, principles, and solutions to problems; students can be passive</td>
<td>Students are challenged to use the concepts and principles to solve and understand the problems</td>
</tr>
<tr>
<td>TA explains how to solve problems and information</td>
<td>Students thinking out loud and explaining to each other; TA provides guiding questions</td>
</tr>
<tr>
<td>More lecture-based</td>
<td>Stimulating worksheet or activity</td>
</tr>
<tr>
<td>Some TA training</td>
<td>Intensive TA training and ongoing mentoring</td>
</tr>
</tbody>
</table>
Benefits of the Merit Model

• Students model how to think about problems
• Students are required to be active participants in their own education
• TA can interact with the students and question them further
• Students become more confident around TA (and many times the professor for course)
• TA gets to know students more quickly
How is Merit Structured?

- Merit students attend same labs and lectures and take the same exams
- Merit workshops replace regular recitation sections
- Extra 2-4 hours per week of class
- 199 credit
- Additional advising from Merit Director and Merit TAs
Recruiting Students

• Any major that requires at least one year of general chemistry, calculus, or biology.

• Target underrepresented groups
  – Minorities
  – Students from Small High Schools

• MIST Group: Any undecided major
Recruiting Students

• Initial selection based on:
  – High school class ranking
  – Competitive ACT/SAT scores
    • 24 Math ACT (1060 SAT)
    • Avg. STEM major = 30 ACT (1310 SAT)
  – Meet during summer registration

• Also:
  – Advisor referrals
  – Word of mouth
Indicators of Success

• Increased Retention
• Increased Recruitment
• Increased Level of Interest in STEM Fields
MIST Project

• New target group in 2007 – undeclared majors
  – Early enrollment in STEM courses
• Summer workshops for community college and high school teachers
• Merit TA Mentoring Program
• New Website: www.merit.illinois.edu
Enrollment

• Fall 1990: 57 students
  3 sections

• Fall 2009: ~700 students
  47 sections
  ~300 on waiting list
The evaluation employed a quasi-experimental, non-equivalent comparison group design to document the impact of the MIST Program on those freshman who qualify for MIST when they entered Illinois in Fall 2007 and who were undeclared.
MIST students accrued significantly (p < .01) more credit hours in STEM courses than those students who were not in MIST.

Mean Number of Credit Hours Earned by Students With Undeclared Majors: MIST* vs. Non-MIST†, Fall 07-Spring 08

<table>
<thead>
<tr>
<th></th>
<th>MIST</th>
<th>Non-MIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MIST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-MIST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MIST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-MIST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MIST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-MIST</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean Number of Credit Hours

* N = 232; † N = 1260
Regardless of their ethnicity, MIST students accrued significantly ($p < .01$) more credit hours in STEM courses than those students who were not in MIST.

![Bar chart showing mean number of STEM credit hours earned by MIST and non-MIST students, disaggregated by ethnicity.](image_url)

**Mean Number of STEM Credit Hours Earned Disaggregated by Ethnic Group for Students With Undeclared Majors: MIST vs. Non-MIST, Fall 07-Spring 08**

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>MIST (N = 140)</th>
<th>Non-MIST (N = 727)</th>
<th>MIST (N = 31)</th>
<th>Non-MIST (N = 166)</th>
<th>MIST (N = 22)</th>
<th>Non-MIST (N = 132)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caucasian</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean Number of Credit Hours

0 5 10 15 20

14
Both female and male MIST students accrued significantly (p < .01) more credit hours in STEM courses than those students who were not in MIST.

<table>
<thead>
<tr>
<th>Gender</th>
<th>MIST (N = 104)</th>
<th>Non-MIST (N = 584)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean Number of STEM Credit Hours Earned Disaggregated by Gender for Undeclared Majors: MIST vs. Non-MIST, Fall 07-Spring 08
MIST students earned significantly higher (p < .01) GPAs in STEM and other courses than those students who were not in MIST.

Table 1. GPA in Courses for MIST/Non-MIST Undeclared Majors, Fall 2007–Spring 2008

<table>
<thead>
<tr>
<th>GPA</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA in All Courses</td>
<td>MIST</td>
<td>232</td>
<td>3.14</td>
<td>0.60</td>
<td>3.24</td>
</tr>
<tr>
<td></td>
<td>Non-MIST</td>
<td>1262</td>
<td>3.05</td>
<td>0.72</td>
<td>3.20</td>
</tr>
<tr>
<td>GPA in STEM Courses</td>
<td>MIST</td>
<td>229</td>
<td>2.99</td>
<td>0.71</td>
<td>3.08</td>
</tr>
<tr>
<td></td>
<td>Non-MIST</td>
<td>1158</td>
<td>2.76</td>
<td>0.93</td>
<td>2.96</td>
</tr>
<tr>
<td>GPA in Other Courses</td>
<td>MIST</td>
<td>231</td>
<td>3.32</td>
<td>0.59</td>
<td>3.42</td>
</tr>
<tr>
<td></td>
<td>Non-MIST</td>
<td>1260</td>
<td>3.17</td>
<td>0.68</td>
<td>3.32</td>
</tr>
</tbody>
</table>
Student Personal Learning Ratings were significantly higher for the “Class with the Merit program” versus the “Class Only” in Fall 2008 and Spring 2009.
Preliminary STEM Major Status

• 234 undeclared freshmen started Merit in FA07
  – 195 have declared a major
    • 95 of those are STEM majors – 48.7%
    • 100 are non-STEM majors
• 239 undeclared freshmen started Merit in FA08
  – 85 have declared a major
    • 41 of those are STEM majors – 48.2%
    • 44 are non-STEM majors
Acknowledgements

• National Science Foundation, Award #: 0622573
• University of Illinois at Urbana-Champaign
  – College of Liberal Arts and Sciences
  – Department of Chemistry
  – Department of Mathematics
  – School of Integrative Biology
  – I-STEM
• All Merit students and TAs!
Questions?
Summer Teacher Workshop Participants. During the on-campus training for the last two years, three surveys were administered each time. In addition, a follow-up survey is administered approximately 5 months after participation. Of the 64 original participants (21 from 2008 and 43 from 2009), all completed the three on-campus surveys (100% response rate), while 18 completed the 2008 follow-up survey (85.7% response rate) and 2009 will be administered Jan. 27, 2010.

MIST Teaching Assistants. Teaching Assistant surveys and interviews were completed in Fall 2008, Spring 2009, and Fall 2009.
Summer Teacher Workshop
Participants reported improved instruction.

- A majority (88.9%) of the 2008 teachers reported in the follow-up survey that they had changed the instructional strategies that they use in class, with 13 attributing this directly to the workshop. Teachers reported increases in their confidence and comfort levels in fostering active student participation in their classes from the pre- to post-participation surveys for both 2008 and 2009.
Teaching Assistants reported positive impacts associated with the mentoring program.

- All teaching assistants interviewed (n = 15 Fall 2008, n = 12 Spring 2009, and n = 15 Fall 2009) reported positive impacts associated with the mentoring program, and many planned to continue their studies or pursue positions in education.

- Over 82% of the TAs reported on the surveys (n = 35 Fall 2008, n = 28 Spring 2009, and n = 35 Fall 2009) positive opinions toward the overall MIST program and the mentoring program.