Influential Interventions: Assessing Supplemental Instruction in Gateway STEM Courses

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Background

In 2011, with support from a two-year Teagle Foundation grant (shared with Davidson College), Agnes Scott College initiated a targeted effort to improve student persistence and success in STEM disciplines, especially among our significant and growing population of first-generation and underrepresented minority students (in 2011-12, first-gen and URMs were the largest demographic within our first-year class, making up nearly 40% of the student body). Adding peer-led supplemental instruction to gateway math and science courses and hiring a Coordinator to enhance support offered through our Math and Science Learning Centers have been high-impact changes, with positive results demonstrated by directed assessment of student performance, focus groups and surveys.

Abstract

In 2011, Agnes Scott College initiated a targeted effort to improve student persistence and success in STEM disciplines, especially among our significant and growing population of first-generation and underrepresented minority students (in 2011-12, first-gen and URMs were the largest demographic within our first-year class, making up nearly 40% of the student body). Adding peer-led supplemental instruction to gateway math and science courses and hiring a Coordinator to enhance support offered through our Math and Science Learning Centers has been high-impact changes, with positive results demonstrated by directed assessment of student performance, focus groups and surveys.

Supplemental Instruction Implementation

<table>
<thead>
<tr>
<th>Course</th>
<th>SI offered</th>
<th>Attendance Incentive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry 101/150 &amp; 102/220</td>
<td>offered FA11, SP12, FA12, SP13</td>
<td>Exam bonus points</td>
</tr>
<tr>
<td>Math 117 Pre-Calculus</td>
<td>offered FA12</td>
<td>Exam bonus points</td>
</tr>
<tr>
<td>Math 118 Calculus I</td>
<td>offered FA13, SP12, FA13, SP13</td>
<td>Exam bonus points</td>
</tr>
<tr>
<td>Math 119 Calculus II</td>
<td>offered SP12, SP13</td>
<td>Exam bonus points</td>
</tr>
<tr>
<td>Physics 110 &amp; 111 Introductory Sequence</td>
<td>offereed FA12, SP13</td>
<td>Attendance Incentive: Encouragement</td>
</tr>
</tbody>
</table>

Faculty had some flexibility in SI implementation

- All students encouraged to attend SI sessions, with incentives in most classes
- Specific impact on URMs and first-generation students (“target” students) determined through assessment

new Academic Support Roles

Coordinate of Resource Center for Math & Science (RCMS)

• Assists in facilitating the implementation and assessment of the SI program
• Coordinates and works with the SI program. Peer helpers and peer tutors (individual peer tutors have been in place for two decades)
• Addition of this new position has provided an opportunity to increase level & variety of academic support available to our students in math and the sciences

Peer Learning Assistants (LAs)

• Sophomores, juniors or seniors selected by faculty/partner with individual faculty and course
• Training: 2-3 day session in August, 1-2 day session in January, and on-going training at regular meetings each semester
• Responsibilities: attending course lectures, leading SI sessions, developing workshop content (to varying extents), holding 1-1 tutoring hours & attending regular staff meetings
• Grant support allowed for hiring students not eligible for traditional work-study

Key Findings

Positive impact of regular SI attendance

- More students who attended 6+ workshops in 2011-13 saw their grades increase, while more students who attended 0 workshops saw their grades worsen (in both the target and non-target populations).
- This trend was more pronounced for target students.

Institutional Changes

These positive impacts have occurred in faculty and administration support for continuing SI and expanded resources for STEM courses in the following ways:

- SI will continue beyond the grant period with the support of college funds
- Faculty are committed to adding SI to more courses
- The Resource Center for Math and Science will have a dedicated space within our newly renovated Academic Resource Center (opening scheduled 2014)
- Coordinating the RCMS now officially falls within the role of our Director of the Science Center for Women

Recommendations

- A robust peer tutoring/mentoring system, coupled with SI, can help an institution shift from a “boot camp” approach to gateway STEM courses to an approach that assumes and supports student success
- SI sessions are more effective when the LAs and the professor establish specific activities and learning goals for each session and put those in writing.
- An excellent template for this can be found in Supplemental Instruction: Improving First-Year Student Success in High-Risk Courses, by Martin C. Oehme and David R. Arendale (University of South Carolina)
- Flexibility in method and approach is important for both professors and LAs
- Including sophomores, juniors and seniors in the LA cohort:
  - Maintains continuity when seniors graduate
  - Makes first-year students feel more comfortable approaching LAs
- Allows rising sophomore and junior LAs who previously attended SI as students to build on and share their own classroom experiences and knowledge
- Regular group meetings of the Resource Center Coordinator with the LAs and faculty are critical
- Discussions at these meetings led to the development of new resources and changes that improved academic support for students
- Incentives or requirements for attendance are essential to the success of SI programs.