Learning Skills Accommodations and Math Course Success

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Introduction

In the spring of 2010 PRO staff met with Learning Skills staff to design a study that would evaluate the effectiveness of tutorials and other learning skills accommodations for students who had been referred to the Learning Skills Program. Anecdote and common sense would have us believe that such interventions are effective. But what is the evidence of their effectiveness? What kind of impact do these types of interventions have on student success?

Students experiencing difficulty in their academic work may be referred to the Learning Skills Program, or they may discover it on their own. Prior to receiving an accommodation, a student’s learning disability is verified. A student may present documentation of the disability (from an evaluation that occurred elsewhere), or the Learning Skills staff perform the evaluation in-house.

Once students are certified as Learning Disabled (LD), they will typically meet once or twice with an LD counselor, after which time an accommodation is usually provided. Accommodations are designed for specific courses where students are experiencing difficulty. The specific accommodation and the course for which it applies are recorded in the student’s paper file in the Learning Skills program offices. Accommodations must be ‘renewed’, each semester, as necessary; many students return in subsequent semesters and receive additional accommodations.

The Learning Skills Program staff expressed the belief that approximately 70% of their requests for services were in regard to difficulties experienced by a student in a math course. After accommodations for these students were in place, students typically reported improved math course success. Following two meetings between the Learning Skills staff and PRO (the Planning and Research Office staff), it was agreed that a student’s first learning skills accommodation could be regarded an intervention that ought to result in discernable improvement in subsequent math course outcomes.

Detailed data on students’ specific accommodation are not available in the main campus database (they are only available in paper-based files), therefore the evaluation focused on who received accommodations and when they were received as this information can be extracted from the Student Appointment and Reporting System (SARS). SARS is used by the Learning Skills center for scheduling and tracking student appointments. With SARS data, which include the
date, time, location, name of counselor, the purpose of the appointment, and whether or not the student attended, it becomes possible to identify ‘accommodation events’.

This study focuses on the first accommodation event. Student performance in math courses before and after the event will be examined in an attempt to determine if the accommodation has an effect on students’ math performance. The assumption is that if the accommodation has positive effect, students will demonstrate higher average levels of success in the relevant courses that occur after the accommodation than in those that came before the accommodation.

**Methodology**

The date of the first accommodation is used to place that event into a particular fall or spring semester, such that enrollment records can be categorized as occurring before or concurrent with the accommodation. Accommodations that occurred toward the end of a semester (in October, November or December for a fall semester, or in April, May or June for a spring semester) are ‘placed’ into the subsequent semester.

In order to observe performance in a math class both before and after the first accommodation (i.e., a within-subject or dependent design), the student must have relevant enrollment records both before and after. There were a number of students with math enrollments before their first accommodation event but none following it, and there were others with no record of any math enrollments at all. These students were removed from the study.
Figure 1 shows the number of students receiving a first time accommodation, by term. Over the period of the study, 187 students had both a before and an after math enrollment record.

Figure 1. Students with both pre-accommodation and post-accommodation math course enrollments by semester of first accommodation event

**Improvement after the first-time accommodation event**

The math enrollment from before the accommodation and the math enrollment from after the accommodation were evaluated for success. Success was defined as receiving a grade of A, B, C, or P or CR in the course.

Overall, students showed a statistically significant (p=0.037) improvement in math course success following their first Learning Skills accommodation. This means that it is highly unlikely that the observed improvements are due to chance. Average success rates for the math enrollments before the accommodation was 53%. The success rate for the math enrollment which comes after the accommodation is 61%. The trend is fairly robust, with only one term (fall 2008) not showing this pattern. The before after and after data for each term is shown in Figure 2 and Table 1.
Figure 2. Success of LD students in math before and after accommodation

![Math Success Before/After the Accommodation](image)

Table 1. Success of LD students in math before and after accommodation

<table>
<thead>
<tr>
<th>Term</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006FA</td>
<td>33%</td>
<td>56%</td>
</tr>
<tr>
<td>2007SP</td>
<td>49%</td>
<td>65%</td>
</tr>
<tr>
<td>2007FA</td>
<td>53%</td>
<td>60%</td>
</tr>
<tr>
<td>2008SP</td>
<td>48%</td>
<td>67%</td>
</tr>
<tr>
<td>2008FA</td>
<td>60%</td>
<td>53%</td>
</tr>
<tr>
<td>2009SP</td>
<td>65%</td>
<td>70%</td>
</tr>
<tr>
<td>2009FA</td>
<td>60%</td>
<td>60%</td>
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</tbody>
</table>
Improvement by level of the math course

Going one level deeper into the available data, the analysis was repeated by breaking the cohort into three groups, taking into account the difficulty of the post-accommodation math course. When math courses are organized by level, there are three levels of remedial (below transfer-level) math, followed by a sequence of college level (transfer level) math courses. For the purposes of this study, math courses are placed into one of the following four categories:

- Three levels below transfer-level (Math-254)
- Two levels below transfer-level (Math-154)
- One level below transfer-level (Math-152)
- Transfer-level

The charts below show the before/after success rates for accommodated students, grouped by the level of the student’s post-accommodation math course.

Figure 3. Success of LD students by difficulty of math course before and after accommodation
Figure 3 shows an intriguing pattern in which small (but statistically not significant) gains are shown for students who attempt a transfer level math course or a course one level below transfer subsequent to the accommodation. For the forty students two levels below there is a small, non-significant difference in the opposite direction. Among students who are taking courses three levels below there is a large and statistically significant difference, suggesting that the LD accommodations are particularly effective with the lowest level of the math sequence.

The challenge going forward may be for the Learning Skills Program to examine its accommodations and attempt to find ways to enhance the learning of the more advanced LD math students as much as they apparently have for those at the lowest level of the math curriculum.

**Conclusion**

For the population of students who remain in the cohort, there is a significant improvement in math success following the students’ first-ever learning skills accommodation. Closer examination of the data shows that there was additional variation depending on the level of the post-accommodation math course. At this more detailed level of analysis, the association between the learning skills accommodation and the math course success is very strong for students working at the lowest level of remedial math. Reliability of the results for students working at higher levels of math course work cannot be established without further research.

**Future Research**

The sample sizes for this study were quite small, mostly due to the requirement that students have a math enrollment both pre and post accommodation. This resulted in excluding a large number of students who received a learning skills accommodation, and therefore, this study fails to address questions regarding success of students who, after receiving an accommodation, subsequently have not enrolled in a math course. A closer look at these individuals is recommended. A future study would benefit from harvesting the data available in the students’ paper files kept in the Learning Skills offices. For example, a future study could include data regarding the specific types of accommodations. This would entail data entry of paper documents to create a database containing the details of each accommodation record.