Math-Related Predictors of Academic Success for Future Educators

Dr. Lisa McCully, Director, Office of Student Services
Michelle Xiong, Undergraduate Advisor

BACKGROUND

California has a predicted deficit of 2 million degrees by 2025. In California, there is a predicted deficit by 2021 of more than 2 million workers with degrees or credentials. Millions of California lack the required credential or degree to benefit from California’s predicted economic growth (California Competes, 2011).

CSU prioritizes student success with Graduation Initiative 2025. The California State University (CSU) publically committed to improved graduation rates and zero achievement gaps by 2025 for its underrepresented student populations. CSU Graduation Initiative 2025 calls for 40% of first-time students to graduate within 4-years, 70% within 6-years. Likewise, 45% of transfer students are to graduate in 2-years, 85% within 4-years.

Low grades impedes progress, damage confidence and add to student debt. Low grades are known to negatively impact student retention and graduation rates by impeding student progression (Babey, 2009; Vak & Feu, 2017). They have also been shown to damage academic confidence (Lotkowski, Robins & Noeth, 2004; Fowler & Boylan, 2010); increase the cost of college, and add to student debt (Britt, Armstern, Barnett & Jones, 2017).

Currently, graduation rates for College of Education liberal studies students are strong; approaching or exceeding 60% for graduation. In 2015, CSU College of Education leadership and staff along with college and program leadership are committed to identifying and taking action on opportunities for improvement. We especially want to be attentive to opportunities to close completion gaps that may exist for traditionally underrepresented student populations.

Liberal studies advisors were especially interested in exploring the relationship between low course grades and student progress through the major. This is an issue of equity. We want to encourage students to see themselves as confident problem solvers who can make valuable mathematical contributions, and to be confident and enthusiastic when teaching math to young minds (Aguirre, Mayfield Ingram, & Martin, 2013).

METHODS

Using Tableau Software, interactive summary charts were prepared for low grades earned by major cohorts. Factors included grades, race, time to degree, transfer institution and demographics.

The Data Champions team reviewed and discussed these charts, and selected two Liberal Studies course for transcript analysis: MATH 210 and MATH 211.

Data Exploration

• What factors relate to low grades?
• Are there differences in graduation rates, time to degree, major changes for liberal studies students with low grades versus those without low grades?

TRANSCRIPT ANALYSIS

• What factors related to math success are statistically significant predictors of on-time graduation?

Regression Analysis

Logistic Regression Analysis

What factors related to math success are statistically significant predictors of on-time graduation?

<table>
<thead>
<tr>
<th>Course</th>
<th>First Time Students</th>
<th>Transfer Students</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2011</td>
<td>68</td>
<td>55</td>
<td>123</td>
</tr>
<tr>
<td>Fall 2012</td>
<td>66</td>
<td>105</td>
<td>171</td>
</tr>
<tr>
<td>Fall 2013</td>
<td>62</td>
<td>87</td>
<td>150</td>
</tr>
<tr>
<td>Fall 2014</td>
<td>66</td>
<td>99</td>
<td>166</td>
</tr>
</tbody>
</table>

Total: 309 | 362 | 671 |

Variables Listed

Group:
- Liberal Studies
- Transfer Status
- Distance Learning

Student Background:
- Age
- Gender
- Hispanic
- Pell
- AYP
- Eligibility
- Service Area
- Academic Performance:
- GPA
- Math Proficiency
- Eligibility
-转学
- SAT

Factors included graduation rates, time to degree, transferring institution and student demographics. The Data Champions team, along with college and program leadership, met twice for a total of 5 hours to discuss the purpose of this program. CSU will allow us to pass individual sections of the exam, instead of requiring all sections be passed in one sitting.

CONCLUSIONS & FUTURE DIRECTIONS

We conclude that our advisors’ interest in liberal studies students’ experiences with math – preparation, assessment, and coursework – was well-founded. And, there is evidence of a disproportionate impact for underrepresented students. Thus, we propose to take the following actions:

• Request funding for a Liberal Studies Math Bridge Program to be incorporated into orientation, or available during summer. Academic will refresh their math skills and take the Liberal Studies Math Placement Assessment. Math Education faculty will be consulted in the design of this program.

• Advocate for procedural changes to the Liberal Studies Math Placement Assessment. We will work with curriculum for Math 210 and/or Math 211 to ensure that the Math Placement Assessment is fair and equitable to students. We will allow students to pass individual sections of the exam, instead of requiring all sections be passed in one sitting.

• Incorporate math preparation and student background data into advising. This study identified new data elements that can support predictive supportive and ‘intuitive’ advising. Liberal studies advisors make frequent use of data, and collaborate often with the college data administrator.

• Seek Student Input. Results of this study may inform questions that will be asked on student surveys. The College of Education is in the process of reviewing and revising exit and follow-up surveys.

• Conduct Follow Up Studies

Pre-major Status. Once again, pre-major status was shown to be related to on-time graduation for liberal studies transfer students. We will further study results annually, and prioritize supporting smooth transitions into the major.

Transfer Students. Our team is enthusiastic about the transcript review method used in this study, and intends to continue to employ in existing student success questions. We will list on the next ‘employing math related factors for students transfer.

ACKNOWLEDGEMENTS

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REFERENCES

Aguirre, J., Mayfield-Ingram, K., & Martin, D. B. (2013). The impact of identity in K-8 mathematics: How can we make valuable mathematical contributions, and to be confident and enthusiastic when teaching math to young minds?


