Piloting Next Generation Learning Strategies To Increase Inclusive Excellence and Persistence In Math And Science
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INTRODUCTION

“For we know that the nation that out-educates us today will out-compete us tomorrow.”

Based on a recent survey by the National Assessment of Educational Progress, minority students have a performance gap in math and sciences as early as elementary school, with more students struggling to complete a high school degree and enroll in college as they progress. Additionally, a growing body of evidence indicates that these students are even less likely to major in STEM fields. According to the US Department of Education, only 35.1% of students who enrolled in STEM fields graduated with a STEM degree. Our nation’s demographics are changing, California’s in particular. We are becoming more and more a diverse nation and a diverse state. Given the academic achievement lag in minority, low-income and first-generation students, a true crisis may be developing. With a vision to close this gap, tremendous effort is required to shepherd these students from the start line to the finish line. Given NU’s large presence in CA, we see this as a call and an opportunity to positively impact people’s lives, improving the communities we live in, the economy, and our nation’s global competitiveness at large.

METHODOLOGY

We designed an experimental group and a control group to monitor and track the learning success of all students. Assessments of the pilots included the following measurements:

1) The impact on student learning,
2) Student perceptions of science, prepost CURE surveys,
3) Persistence data and student pass rates.

RESULTS

Biobeyond demands rigor and has been perceived as hard and difficult by our students (productive struggle). It presents them with game-like challenges, interactive exercises, and simulations and requires them to think critically and engage “earnestly” with the material.

Grades by gender by treatment indicated that female students showed grade improvements in Biobeyond. A mean grade increase from 2.77 to 3.07 was observed.

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<thead>
<tr>
<th>Gender</th>
<th>Control</th>
<th>Experimental</th>
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<tbody>
<tr>
<td>Male</td>
<td>2.83</td>
<td>3.57</td>
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<tr>
<td>Female</td>
<td>2.77</td>
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Grades by age quartile by treatment indicated that students who were 26 years and younger benefited the most from this innovative platform. The mean grade increase for this group jumped from 2.83 to 3.57. This finding was not surprising given tech savviness in this age group as well as digital expectations.

Grades by Age Quartile by Treatment

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<tr>
<th>Quartile</th>
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<tr>
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<tr>
<td>Q2</td>
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<td>Q4</td>
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DISCUSSION and CONCLUSION

Personalized and adaptive learning strategies and technologies can increase student motivations and learner engagement.

We have identified the following powerful practices and takeaway messages:

1. Students own their learning, study at their own pace
2. Students chart their success and are engaged
3. Students embrace difficult tasks as an opportunity for deeper learning rather than an obstacle!
4. Students experience great learning opportunities with formative and summative assessments
5. Faculty and students feel empowered by tracking and monitoring their progress in real time through powerful analytics,
6. The impact on student success is high and represents a forward thinking view on ROI.
7. 3D Printing: “You had quality professionals that knew the background in the field of study and were able to support the material they presented.”

FUTURE DIRECTIONS

1. Make the majority of courses active and adaptive in order to educate every student in a unique way, and teach him/her effective “habits of the mind.”
2. Implement teaching as research in every course.
3. Promote student metacognition.

BIBLIOGRAPHY

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