1. ALEKS

Background

For the CEAS-STEP program, the Mathematics Department has been a valuable partner since 2005 by saving seats for the cohorts. When the Calculus Task Force was convened by the Chair of Mathematics, CEAS-STEP was represented. Among the topics discussed by the Calculus Task Force was ALEKS. Through the efforts of the Mathematics faculty, a process was established to allow CEAS to offer to students in CEAS Exploratory (EXEP) a pathway to Pre-Engineering, Pre-Engineering Technology, or Computer Science. That is, in addition to recommending these students take Algebra II at a community college during the summer, CEAS-STEP can now provide ALEKS placement to these students so they can advance to Precalculus or further.

In May 2016, CEAS-STEP sent letters to the Algebra II students and their parents/guardians about the opportunity to “bump-up” to Precalculus through ALEKS. The letter of invitation was shared with advisors from Exploratory Advising, who extended the ALEKS opportunity to students placed by ACT/SAT-Math sub-scores into Algebra I. A total of 68 students created ALEKS accounts; of these, 26 students took the proctored test. The results are summarized in table below:

<table>
<thead>
<tr>
<th>Placed by ACT/SAT</th>
<th># of Students</th>
<th>Placed by ALEKS</th>
<th># of Students</th>
<th>Grade in ALEKS Placed Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1090</td>
<td>2</td>
<td>Algebra I</td>
<td>1</td>
<td>0 ≥ B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Precalculus</td>
<td>1</td>
<td>0 ≥ C</td>
</tr>
<tr>
<td>Algebra I</td>
<td>7</td>
<td>Algebra I</td>
<td>2</td>
<td>2 ≥ B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Algebra II</td>
<td>3</td>
<td>1 ≥ B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Precalculus</td>
<td>2</td>
<td>2 ≥ C</td>
</tr>
<tr>
<td>Algebra II</td>
<td>13</td>
<td>Algebra II</td>
<td>3</td>
<td>0 ≥ B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Precalculus</td>
<td>9</td>
<td>8 ≥ C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Calculus I</td>
<td>1</td>
<td>0 ≥ C</td>
</tr>
<tr>
<td>Precalculus</td>
<td>4</td>
<td>Precalculus</td>
<td>4</td>
<td>3 ≥ C</td>
</tr>
</tbody>
</table>

For Summer Orientation 2017, ALEKS letters were sent in March to Algebra II students and their parents/guardians, and to Precalculus students. The recruitment letter was also shared with Exploratory Advising so they can market ALEKS to the Algebra I students. One hundred and twelve students created ALEKS accounts, and 68 took the proctored test (with one student being a graduate student). The results are summarized in a table on the next page:
In fall 2017, the Mathematics Department made the request to CEAS that it implements the ALEKS test for all incoming new beginners. A goal of the ALEKS requirement is to generate sufficient data points about the usefulness of ALEKS in correctly placing the incoming students into the proper math course at WMU.

**Planning Questions**

a) What can we learn from the use of ALEKS at other universities and engineering programs?
   The STEP Advisory Board members from Michigan State University and Wright State University will report on their respective campus experience with ALEKS.

b) What can we learn from literature on use of ALEKS for math placement?
   - An ANALYSIS OF ALEKS MATHEMATICS PLACEMENT TEST DATA: A Report Submitted in partial fulfillment of the requirement for the degree of Master of Science in mathematical Science, Teresa Woods, Michigan Technological University, tmthomps@mtu.edu (2017)
     Abstract: In Fall 2014, Michigan Technological University (MTU) began using an online mathematics placement test provided by ALEKS Corporation. This study answers three questions that accompanied this implementation: (1) Do the cut scores being used for Precalculus and Calculus I result in the expected pass rates for those courses?, (2) Does the path by which a student becomes eligible for Calculus I – via a single placement test attempt, via multiple placement test attempts, or by beginning in Precalculus at MTU – influence their likelihood of success in Calculus I?, and (3) Does a mathematical background weak in any particular curriculum area correlate with a lower chance of success in Calculus I? ALEKS placement test scores, Calculus I exam scores, and Precalculus and Calculus I final grade data from students who took the ALEKS placement test during the 2015 testing cycle were examined. A conditional probability analysis indicated that the current cut scores result in a probability of a C grade or better of at least 0.64 in each course examined. Tabulation of DFW rates showed that students right at the cut score threshold have higher DFW rates than the overall rate for the course. Odds ratios revealed that students who placed into Calculus I on their first testing attempt were the most likely to receive a final grade of C or better. ALEKS sub-score data
indicated that most incoming students exhibited knowledge gaps in trigonometry. Logistic regression showed that a 1% increase in trigonometry sub-score increased the odds of earning a C or better in Calculus I by 3%.


**Abstract:** In the fall of 2008 Boise State University began using an online assessment tool, ALEKS, as an initial assignment in Precalculus and Calculus courses. This paper reports on the effectiveness of the ALEKS assessment as a self-placement tool, used in conjunction with standard placement tests and prerequisite courses. The benchmark levels of 40% and 70% of knowledge space in the ALEKS course: Preparation for Calculus for Precalculus and Calculus courses were used. The paper looks at the effectiveness of the assessment with these benchmark levels as a first student assignment, both as a tool for student success, and as an instrument for making efficient use of the university's resources. Although there are no hard answers, and although much information is anecdotal, we introduce a statistic that is pertinent to these questions and show that it indicates partial effectiveness of the ALEKS assessment.

- Analysis on Results in using ALEKS at Washington State University (2011-12) 

c) What change(s) to the CEAS Orientation process need to be made so that the ALEKS implementation would not be a disincentive to new beginning students or hamper the orientation activities?

d) Others….
2. Disseminate and/or Replicate CEAS-STEP Best Practices

**Background**

Most of the STEP projects funded by NSF that use a learning community or cohort strategy usually involve no more than 100 students. Our CEAS-STEP project now places 90% of summer orientation participants into cohorts and the number of students impacted has averaged 343 students annually over the past five years. CEAS-STEP has considerable experience in building and scaling up the cohort strategy. There are two opportunities for CEAS-STEP to share its expertise and to contribute:

- In January 2018, WMU President Dr. Edward Montgomery announced two initiatives on institutional transformation that impact undergraduate student success. One of the initiative is Success @ WMU, which is a campus-wide effort of placing all incoming undergraduate students into a learning community that will be led by a faculty or staff, and a peer student mentor. The goal is to increase the number of undergraduate students currently enrolled in learning communities from 1650 to 5,500 in fall 2018.
- A recent RFP by the NSF “Improving Undergraduate STEM Education: Education and Human Resources (IUSE: EHR)” program states, “In addition to innovative work at the frontier of STEM education, this program also encourages replications of research studies at different types of institutions and with different student bodies to produce deeper knowledge about the effectiveness and transferability of findings.” The deadline for a full proposal for either “Exploration and Design” or “Development and Implementation” for the purpose of “Institutional and Community Transformation” is October 1, 2018 or December 11, 2018, respectively.

**Planning Question**

1. How can CEAS-STEP best support Success @ WMU?

2. In previous board meetings, there was interest expressed in replicating the CEAS-STEP cohort program in the College of Arts and Sciences, Western Michigan University, and the Department of Mechanical Engineering, Wright State University. The STEP Principal Investigator is interested in collaborating and preparing a proposal on “replications of research studies at different types of institutions and with different student bodies to produce deeper knowledge about the effectiveness and transferability of findings” of CEAS-STEP for the NSF ISUE-HER program.

   Is there interest and how to proceed?