California State University, Long Beach
Department of Mathematics

Math 113 Precalculus Algebra Spring 2014

Initiative for Increased Faculty-Student and Student-Student Feedback and Interaction in a Large Lecture College Algebra Course using Technology

Motivation
1. Without breakout sessions, no time for supervised time on task

2. If the best way to learn math is to teach it, let’s have our students teach

Students creating videos of themselves explaining math will allow professors to observe them completing tasks deemed critical to their success in the course. It will also provide a resource students cannot create without prior understanding of the material, and will be motivated to revisit.

Instruments
I. Pre-, Mid-, and Post- Surveys of student attitudes and perceptions of large lecture mathematics class environment, and uses of technology therein. Students will also be asked (maybe?) whether they choose to “Opt-In” to the study for homework credit or extra credit

II. Student-Faculty/SI Leader interaction via Panopto
   a. Students receive 20 min training on how to create instructional videos using Panopto during class

   b. Faculty will provide a worksheet for students to complete as part of offline homework (or extra credit)

   c. Students meet with faculty, GA, or SI leader to verify accuracy of worksheet, get checked off

   d. Students upload, and “teach” from worksheet using Panopto’s ability to display documents and video on the same screen

   e. Students upload multimedia video into Blackboard via digital dropbox.

   f. Faculty/GA gives student credit or no credit for the video, depending on its ability to function as a viable teaching tool for other students

III. Student-student peer instruction via Panopto
   g. Students post videos on class Facebook, Piazza or YouTube page for other students to learn from.

   h. Students have an engaging resource to reference throughout the semester, and beyond

Methodology
We will consider improving student performance in the learning outcomes studied in Spring 2013. Data at that time (which we will consider baseline) indicated above average (76.8%-86.8%) performance in each of SLO1, SLO3, and SLO4 on Exam 1. These SLO’s are:

A. **SLO 1: Students Relate Representations of Mathematics (Graphing only)**

B. **SLO3: Students use the Language and Notation of Functions.**

C. **SLO4: Students Manipulate Algebraic Expressions and Equations into Equivalent Convenient Forms; Students Identify Which Forms of Algebraic Expressions and Equations are Convenient**

Looking at longitudinal SLO performance on tests from Exam 1 to the Final exhibited a downward trend for all three, SLO1 and SLO4 having statistically significant exam-to-exam decrease of an average of 6.2% and 4.9% respectively. It is expected that targeted interventions in which students are expected to create study guides that cause them to
1) give verbal (audio), hand written (visual) explanations using digital media (kinesthetic); and
2) interact with faculty/SI leaders
will yield persistence of high levels of competence in SLOs from exam to exam.

For Spring 2014, a pilot study will be conducted using one section (preferably Newberger’s or Bishop’s) of Math 113, and Math department resources. Videos are to be submitted one week before each exam, covering core tasks required for success in each exam, and chosen from SLO1,3 or 4. Each video will be made by a random sample (possibly stratified by ALEKS initial assessment) of students. The following is one example of such a scheme:

<table>
<thead>
<tr>
<th>Sample</th>
<th>Exam 1</th>
<th>Exam 2</th>
<th>Exam 3</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample 1 (n=35)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sample 2 (n=35)</td>
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<td>X</td>
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<tr>
<td>Sample 3 (n=35)</td>
<td></td>
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<td>X</td>
<td></td>
</tr>
<tr>
<td>Sample 4 (n=35)</td>
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<td></td>
<td>X</td>
</tr>
</tbody>
</table>

For each sample we will be interested in testing the following hypotheses:

A: Students that created videos will perform significantly better than the remainder of the class on exam content related to the video

B: Students that created videos will perform significantly better than baseline on exam content related to the video

C: Students that created videos will show a non-decreasing trend in (video related content) SLO competence over the course of the semester

This implementation will allow for statistically reliable results. Also, working on this scale will allow it to be done completely in house for this first pass. If it works well on a small scale, it can be tried on a larger scale, at which point incorporation of the Learning Assistance Center can be considered.