Prairie State College  
Course/Program Assessment Report  
Spring 2015

<table>
<thead>
<tr>
<th>Course title/number</th>
<th>College Algebra (Math 151), Calculus I (Math 171)</th>
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<tbody>
<tr>
<td>Faculty members participating</td>
<td>All full-time Math faculty, Wyatt Rush, Jen Berezewski, Sam Perry, Ju’Ton Hemphill</td>
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<tr>
<td>Faculty member submitting this report</td>
<td>Kate Sims-Drew</td>
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<tr>
<td>Date submitted</td>
<td>June 16, 2015</td>
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**Part A: Project Overview**

1. **Course student learning outcome(s) assessed:**  
   
   Based on your Student Learning Outcome on the official course outline.

   - Demonstrate a greater awareness of the use of mathematics and how one translates questions into the language of mathematics. (MATH 171)
   - Solve application problems by using functions to model problem situations. (MATH 151)
   - Gen Ed Outcome: Problem Solving: Students will locate and identify information, determine what problem exists, develop solutions, evaluate results, and extend results to new situations.

2. **Is this a follow-up to a previous assessment and related to the findings?**
   
   __X__ No  ____ Yes

3. **Sections and students assessed:**

<table>
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<tr>
<th>Term</th>
<th>Section Numbers</th>
<th># of Students Assessed</th>
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<tbody>
<tr>
<td>Fall 2014</td>
<td>MATH 171: 1, 2, 3, 4</td>
<td>75 (sampled 12)</td>
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<tr>
<td>Fall 2014</td>
<td>MATH 151: 1-6, IN</td>
<td>49 (sampled 12)</td>
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   (use a separate line for each section)

**Part B: Results and Analysis**

4. **Assessment method: How would you evaluate the assessment method and instrument you used? Was it appropriate and did it provide the desired data? Please explain.**

   Our assessment method was not perfect, but it was a good first effort. We put quite a bit of time into developing the problem (see appendix 1) we gave to students, as well as a rubric (see appendix 2). However, due to limited time we decided to only score a sample of the assessments we received, and this resulted in a fairly small sample for the PLTL group (2 of 12 papers for Math 151, 3 of 12 papers for Math 171). Also, the majority of students in the PLTL groups had attended a bare minimum of PLTL sessions (3 of 5 attended only two or three sessions). With such a small sample we can expect to have more noise in the data than if we had been able to score all 124 papers.

5. **What data was collected? How was the data analyzed? (ie, rubric, etc.) Please attach the rubric, etc., if applicable.**

   All instructors of Math 151 and 171 were given a 15 minute optimization problem that their students were to work on individually during class time sometime during the last 2 weeks of class. Using the first 3 steps of Polya’s 4 step problem solving process (the final step of “Look Back” was not relevant since students were simply setting up the problem, not solving for a numerical answer), we developed a rubric...
that assessed whether the students had: 1. understood the problem, 2. devised a plan, and 3. carried out their plan. In each category the student received a score from 0 to 3. From 49 Math 151 students and 75 Math 171 students we randomly chose 12 students from each class to assess. Each of those 24 students were scored by 7 different full-time faculty members in each of the 3 categories, and then the 7 scores were averaged.

6. Did you meet your desired goal? Include your measurable target. (Example: Only 50 percent of students scored a 3 or better on a five-point evaluation rubric, falling short of the targeted goal of 70 percent.)

Our goal was to determine if students who attended PLTL would achieve statistically significantly better results on the quiz than those who did not attend PLTL. Additionally we wanted to verify that students in Math 171 would score statistically significantly better than students in MATH 151. The PLTL students only outscored the non-PLTL students in the “Understand the Problem” score; all other scores were either similar or lower for the PLTL students. However, the Math 171 students did outscore the Math 151 students in every category by a fairly large margin. The scores can be found in appendix 3.

7. How do the results compare to the previous year’s results (if applicable)?

N/A

8. Was this assessment useful? What strengths and/or areas for improvement were identified?

This assessment had inherent bias in that students were not randomly assigned to participate in PLTL—it is quite possible that students who self-selected to participate in PLTL tended to be either stronger or weaker than the typical student. Also, we classified a student as PLTL if they attended at least 2 weeks, and of the 5 in our sample 3 attended only 2 – 3 times in a 16 week semester; we would expect those students to have gained only limited benefit from PLTL. Finally, we realized once the assessment was complete that grading a much larger sample size would have yielded better results.

We did, however, spend a large amount of time creating a good problem solving rubric that worked well, so we will definitely hold onto that rubric to be re-used in the future.

Part C: Strategies for Improvement

9. What strategies will be implemented to improve the outcome and student learning (if needed)?

Because the STEM grant is ending, we will no longer be able to fund PLTL next year. However, our results show that developing problem solving skills is an ongoing issue with our students and something we should continue to address. We would like to look at more peer-based support for our students such as increased peer tutoring and study skills workshops run by students.

10. How will the results impact your assessment plan for next year?

Our department spent a great deal of time developing and improving the rubric used for this assessment plan. This rubric will be a valuable asset for us in future assessments of problem solving strategies.
**Part D: Closing the Feedback Loop:**

11. If adjunct faculty were involved in the assessment, was there any distinction in the results from those sections compared to full-time faculty sections? Please explain.

| There were no adjunct faculty involved in the assessment of Math 171 (only 1 night section of Math 171 was taught by an adjunct, and enrollment was too low to be included in the sample.). However, of the seven sections of Math 151, four of these sections were taught by adjuncts. Our assessment plan focused entirely on students' ability to problem solve. The sample that was selected to be graded was randomly chosen from all sections with no concern given to whether the student was enrolled in a section taught by a full time faculty or adjunct faculty. Therefore our results are completely independent of the status of the student's instructor. |

12. Did you include any online sections of the assessment (if online sections are offered for this course). If not, how will those sections be implemented for next year?

| Math 171 is not taught online, but we did include the online section of Math 151. The sample of 12 that was chosen to be graded contained one paper from the online section. |

13. How will you share the results with the faculty in your department/division?

| We discussed it at a June meeting and I will also email the results out to all Math faculty. |

*Revised 2/15*
Appendix 1

General Education Problem Solving Assessment
Math Department, FALL 2014

Prairie State College has articulated the following General Education Learning Outcomes, which are general skills expected to be developed by all PSC students across all courses. These learning outcomes are:
- Discipline-Specific Knowing
- Problem Solving
- Communication
- Social and Cultural Awareness
- Professionalism
- Information Literacy

The Problem Solving Learning Outcome specifically states:

"Students will locate and identify information, determine what problem exists, develop solutions, evaluate results, and extend results to new situations."

This assessment, which may be a portion of your course grade, as determined by your instructor, will be used to assess the level of student skill in problem solving, and will be used to inform future curriculum development to help all students in math courses to become better problem solvers. Your honest effort in solving the following problem is very important to continuous quality improvement in curriculum and instruction at PSC.

Your instructor will give you 15 minutes to work on solving the problem on the backside of this sheet.
Problem Exercise: A roll of 1100 feet of chain link fencing was donated to a pet rescue center. The center plans to use the fence to construct a rectangular pen for the animals, using the backside of their building as one wall, and using the roll of fence for the three other walls. In addition the fencing material will be used for two inside dividers in order to have three separate pens for dogs, cats, and smaller animals.

Your goal in this problem solving activity is to write an algebraic equation, using a single variable, for the area of the pen, and simplify it as much as possible, given all of the above design constraints.

A. Understand the Problem (rectangle, # of divisions, 2 quantities)
   0  No understanding
   1  Little understanding (any one)
   2  Moderate understanding (any two)
   3  Complete correct understanding

B. Devise a Plan (all relative to understanding in part A)
   0  No evidence of plan
   1  Weak or completely incorrect plan
   2  Moderate plan (not necessarily complete or correct)
   3  Complete correct plan (equation for perimeter, equation for area: length times width)

C. Carry Out a Plan
   0  No evidence of carrying out a plan
   1  Weak job of carrying out plan or good job of carrying out trivial plan
   2  Substantial correct algebraic work based on plan
   3  Complete carrying out of problem based on correct plan
Appendix 3

Average scores (sample size of 12 students per course; each student was graded in each category 0 – 3)

<table>
<thead>
<tr>
<th></th>
<th>Understand</th>
<th>Devise</th>
<th>Carry Out</th>
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<tbody>
<tr>
<td>Math 151</td>
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<tr>
<td>Non-PLTL</td>
<td>1.63</td>
<td>1.5</td>
<td>1.29</td>
</tr>
<tr>
<td>PLTL</td>
<td>1.86</td>
<td>1.08</td>
<td>0.5</td>
</tr>
<tr>
<td>Overall</td>
<td>1.67</td>
<td>1.43</td>
<td>1.16</td>
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| Math 171   |            |        |           |
| Non-PLTL   | 2.08       | 1.79   | 1.64      |
| PLTL       | 2.34       | 1.76   | 1.14      |
| Overall    | 2.14       | 1.79   | 1.51      |