Assessment Techniques for a STEM Peer Tutor Program

NMHEAR, February 28, 2014
The STEM Gateway grant at UNM

- Focuses resources on undergraduate science and math courses that traditionally have low student success rates.

- Aims to increase the number of students attaining degrees in science, technology, engineering and mathematics (STEM).
Mission

Improve STEM instruction and student support at the University of New Mexico; Improve STEM graduation rates among Hispanic and/or low-income students.

Funding

The University of New Mexico STEM Gateway program is funded through a U.S. Department of Education TITLE V grant, 2011–2016 (total anticipated funding $3.82 million).
What does “gateway” mean?

Courses which meet at least one of the following criteria:

- Entry level (100 and 200 level) program–requirement courses that lead to degrees in the approved STEM disciplines

- Companion courses (labs, problem solving courses, etc) that are connected to Core Requirement or Program Requirement courses (as specified above)

- Pre–requisite courses that are required by students to take Core Requirement or Program Requirement courses (as specified above)

- Large–enrollment (>500 students/year) courses required for degrees in the approved STEM disciplines and typically taken within the first two years in the field
How do we do that?

- Gateway Science and Math Course Reform

Faculty-driven projects designed to change instruction and curriculum to better serve low-income and minority students. Each project team includes faculty from UNM and CNM.
How do we do that?

- Workshops and Outreach

Students for STEM Success (S3), a student-centered STEM Gateway initiative, that focuses on helping STEM students network and collaborate with other students, faculty, and staff who have similar academic, professional, and personal interests.
How do we do that?

- Data-driven Prioritization

Data collection and analysis to assist UNM in better understanding the course-taking patterns and success rates of UNM students and CNM transfers in relation to STEM degree attainment.

STEM Gateway Spring Symposium, 2013
How do we do that?

- Peer Learning Facilitators (PLF)

Peer-assisted collaborative learning activities in large gateway sections.

The assistance of facilitators allows instructors to incorporate a wider variety of effective instructional strategies.
# The breakdown by semester

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<tr>
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<th>Spring 2012</th>
<th>Fall 2012</th>
<th>Spring 2013</th>
<th>Fall 2013</th>
<th>Spring 2014</th>
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<tbody>
<tr>
<td>PLFs</td>
<td>27</td>
<td>40</td>
<td>42</td>
<td>45</td>
<td>61*</td>
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<td>Number includes 7 CEP MALL tutors</td>
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<td>Instructors</td>
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<td>15</td>
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<td>Sections</td>
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<td>23</td>
<td>18</td>
<td>26</td>
<td>30</td>
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How are we assessing and evaluating?

- Faculty
  - We attempted formal surveys with limited success.
  - We now do informal inquiries via email and meeting in-person.
  - Because we often work with the same faculty each semester, informal assessment is feasible.
How are we assessing and evaluating?

- PLFs
  - We survey the PLFs at the beginning and end of each semester, as well as once a week after training sessions.
  - PLFs also receive feedback based on class observations.
How are we assessing and evaluating?

- Students enrolled in PLF–supported classes
  - We survey the students once per semester.
Why these types of surveys?

- Dual approach
- Grades/retention take time, need more teasing out
- For our day-to-day work, we need the immediate response that these type of surveys provide
PLF Student Surveys

1. Does working with other students in class help you learn more than you would otherwise?

   A. Yes, I learn much more when I work with other students.
   B. I don’t learn more or less.
   C. No I don’t learn more at all.
2. About how many times have you asked PLFs for help during class?

A. never
B. 1–2 times
C. 3–4 times
D. 5 or more times
3. How many times so far this semester have you met with a PLF outside of class time?

A. Never
B. 1–2 times
C. 3–4 times
D. 5 or more times
4. In this class, how important is it for you to have a PLF available?

A. Very important  
B. Moderately important  
C. Not at all important
5. What would you do to make the PLF program better?

A. Have more PLFs in class
B. Have PLFs hold more/longer office hours
C. Have the PLFs spend more time helping on in–class assignments
D. Have PLFs organize and assist study groups outside of class time
E. Other (suggestions):
6. When do you feel like you get to learn the most about the material?

A. When my instructor lectures and goes over examples
B. When I answer iClicker questions
C. When I work with a PLF on in-class assignments
D. When I work with other students on in-class assignments
E. When I visit a PLF outside of class
PLF Student Surveys

7. How were PLFs used in your class this semester?

A. Grading Assignments
B. Proctoring exams
C. Taking attendance
D. Helping with in-class assignments
E. Holding office hours or individual tutoring sessions
F. Holding exam review questions
G. Other (please write in):
8. What do you expect your final grade to be in this class?

A   B   C   D   F

9. What is your major?
Step One: Take and Tally

- Surveys are printed in hard copy.

- STEM Gateway staff schedule days to visit class based on instructor requests.

- We are in and out in 5–10 minutes.

- Student assistants then tally results.

- Instructors are given the rough numbers before the end of the semester.
Does working with other students in class help you learn more than you would otherwise?

No, I don't learn more at all. (N=61) 6.1%

I don't learn more or less. (N=222) 22.0%

Yes, I learn much more when I work with other students. (N=724) 71.9%
Does working with other students in class help you learn more than you would otherwise?

- **No, I don't learn more at all**
  - Chemistry: 6.9%
  - Earth & Planetary Sciences: 2.4%
  - Math: 6.0%

- **I don't learn more or less**
  - Chemistry: 19.1%
  - Earth & Planetary Sciences: 23.6%
  - Math: 25.9%

- **Yes, I learn much more when I work with other students**
  - Chemistry: 73.9%
  - Earth & Planetary Sciences: 74.0%
  - Math: 68.1%
About how many times have you asked your PLFs for help during class?

- Never (N=76): 7.5%
- 1-2 times (N=312): 30.9%
- 3-4 times (N=272): 27.0%
- 5 or more times (N=349): 34.6%
About how many times have you asked your PLFs for help during class?

- 5 or more times:
  - Chemistry: 26.1%
  - Earth & Planetary Sciences: 46.8%
  - Math: 43.2%

- 3-4 times:
  - Chemistry: 27.2%
  - Earth & Planetary Sciences: 28.2%
  - Math: 26.1%

- 1-2 times:
  - Chemistry: 35.5%
  - Earth & Planetary Sciences: 22.6%
  - Math: 27.0%

- Never:
  - Chemistry: 11.3%
  - Earth & Planetary Sciences: 2.4%
  - Math: 3.7%
How many times so far this semester have you met with a PLF outside of class time?

- Never (N=637): 63.1%
- 1-2 times (N=209): 20.7%
- 3-4 times (N=82): 8.1%
- 5 or more times (N=81): 8.0%
How many times so far this semester have you met with a PLF outside of class time?

- **Never**
  - Chemistry: 65.1%
  - Earth & Planetary Sciences: 54.3%
  - Math: 79.8%
- **1-2 times**
  - Chemistry: 21.2%
  - Earth & Planetary Sciences: 12.1%
  - Math: 23.0%
- **3-4 times**
  - Chemistry: 6.6%
  - Earth & Planetary Sciences: 5.6%
  - Math: 11.4%
- **5 or more times**
  - Chemistry: 7.1%
  - Earth & Planetary Sciences: 2.4%
  - Math: 11.4%
In this class, how important is it for you to have a PLF available?

- Not at all important (N=101): 10.0%
- Moderately important (N=461): 45.7%
- Very important (N=447): 44.3%
In this class, how important is it for you to have a PLF available?

- **Chemistry**
  - Not at all important: 12.2%
  - Moderately important: 37.5%
  - Very important: 50.3%

- **Earth & Planetary Sciences**
  - Not at all important: 5.6%
  - Moderately important: 39.5%
  - Very important: 54.8%

- **Math**
  - Not at all important: 8.2%
  - Moderately important: 40.9%
  - Very important: 50.9%
What would you do to make the PLF program better?

- Have PLFs organize and assist study groups outside of class time (N=419): 43.6%
- Have the PLFs spend more time helping on in-class assignments (N=307): 32.0%
- Have more PLFs in class (N=250): 26.0%
- Have the PLFs hold more / longer office hours (N=202): 21.0%
- Other (N=134): 14.0%
What would you do to make the PLF program better?

- **Have PLFs organize and assist study groups outside of class time**
  - Chemistry: 43.2%
  - Earth & Planetary Sciences: 42.8%
  - Math: 45.2%

- **Have the PLFs spend more time helping on in-class assignments**
  - Chemistry: 31.8%
  - Earth & Planetary Sciences: 28.0%
  - Math: 33.0%

- **Have the PLFs hold more / longer office hours**
  - Chemistry: 22.1%
  - Earth & Planetary Sciences: 23.7%
  - Math: 19.7%

- **Have more PLFs in class**
  - Chemistry: 29.7%
  - Earth & Planetary Sciences: 30.3%
  - Math: 18.2%

- **Other**
  - Chemistry: 17.0%
  - Earth & Planetary Sciences: 12.7%
  - Math: 12.3%
When do you feel like you get to learn the most about the material?

- When my instructor lectures and goes over examples (N=706): 70.9%
- When I work with other students on in-class assignments (N=473): 47.5%
- When I work with a PLF on in-class assignments (N=405): 40.7%
- When I answer iClicker questions (N=292): 29.3%
- When I visit a PLF outside of class (N=191): 19.2%
When do you feel like you get to learn the most about the material?

When I visit a PLF outside of class
- Chemistry: 15.9%
- Earth & Planetary Sciences: 11.2%
- Math: 27.0%

When I work with other students on in-class assignments
- Chemistry: 49.7%
- Earth & Planetary Sciences: 51.2%
- Math: 42.7%

When I work with a PLF on in-class assignments
- Chemistry: 30.0%
- Earth & Planetary Sciences: 65.6%
- Math: 48.0%

When I answer iClicker questions
- Chemistry: 40.8%
- Earth & Planetary Sciences: 36.0%
- Math: 9.3%

When my instructor lectures and goes over examples
- Chemistry: 67.0%
- Earth & Planetary Sciences: 76.8%
- Math: 74.7%
How were PLFs used in your class this semester?

- Helping with in-class assignments (N=951) - 95.1%
- Holding office hours or individual tutoring sessions (N=848) - 84.8%
- Holding exam review sessions (N=717) - 71.7%
- Grading assignments (N=426) - 42.6%
- Proctoring exams (N=372) - 37.2%
- Taking attendance (N=55) - 5.5%
- Other (N=27) - 2.7%
How were PLFs used in your class this semester?

- Holding exam review sessions: 72.7% (Chemistry), 72.0% (Earth & Planetary Sciences), 70.1% (Math)
- Holding office hours or individual tutoring sessions: 80.0% (Chemistry), 86.4% (Earth & Planetary Sciences), 91.6% (Math)
- Helping with in-class assignments: 94.4% (Chemistry), 99.2% (Earth & Planetary Sciences), 94.8% (Math)
- Taking attendance: 1.1% (Chemistry), 2.4% (Earth & Planetary Sciences), 13.4% (Math)
- Proctoring exams: 17.2% (Chemistry), 40.8% (Earth & Planetary Sciences), 49.3% (Math)
- Grading assignments: 27.5% (Chemistry), 55.2% (Earth & Planetary Sciences), 72.0% (Math)
- Other: 2.3% (Chemistry), 2.4% (Earth & Planetary Sciences), 3.5% (Math)
Step Two: Compare and Contrast

1. Does working with other students in class help you learn more than you would otherwise?
   Yes, I learn much more when I work with other students

   71.9%

6. When do you feel that you learn the most about the material?
   When my instructor lectures and goes over examples

   70.9%

(only 42.48% said working with other students and/or PLFs)
Step Two: Compare and Contrast

3. How many times so far this semester have you met with a PLF outside of class time?

Never

63.1%

5. What would you do to make the PLF program better?

Have PLFs organize and assist study groups outside of class time

43.6%
Step Two: Compare and Contrast

4. In this class, how important is it for you to have a PLF available?  

Very or Moderately Important  

89.9%

7. How were PLFs used in your class this semester?  

Helping with in-class assignments  

95.1%
What’s working for us?

- Doing it “old school” provides huge response with many comments
- Consistent results
Problems we’ve faced

- Faculty participation
- Paper surveys are time-consuming to conduct and enter.
- Online survey response is much easier and faster, but can have lackluster response rates and often without comments.
Future work

- Further analyzing the data
  - How do grades factor in? Majors?
  - And what about breakdowns within each discipline?
- Implementation of a PLF Advisory Council
- STEM Gateway Symposium in April 2014