

STLF Report to CWSEI and Mathematics Department

STLF: Sandra Merchant

Period: 04/12/12 – 18/01/13

Submitted: 18/01/13

Specific activities performed by STLF

1) Professional development

- Attended the weekly CWSEI Reading group meetings.
- Attended the weekly STLF meetings.

2) MATH SEI general meetings/activity

- Met with Director Costanza Piccolo and the MATH-SEI group to review the status of our projects and plan future work (Dec 12, Dec 20, Jan 7, Jan 16).
- Met with Sarah Gilbert and the MATH-SEI group (Dec 5) to review the status of our projects.
- Attended our departmental Lunch Series on Teaching and Learning where visitor Kim Maltman described the remedial calculus workshops he developed at York University (Dec 10).

3) Course-specific meetings/activities

Tracking Proof Skills Project (MATH 220 – Mathematical Proof and subsequent courses)

1. In both sections of Math 220 I administered the basic proof skills diagnostic (short version). The performance of students on the diagnostic test was very similar to previous terms. I wrote a brief summary of the results for the instructors and they are already trying to address some of the noted difficulties in their classes.
2. Along with the diagnostic test, I also administered the proof attitude survey to both sections of the course. The proof attitude survey results are similar to those found at the end of Math 220 last term. It will be interesting to see if these attitudes are indeed stable over the term, and I intend to run the attitude survey at the end of this term as well so as to get matched student data to study this.
3. Both sections of Math 220 this term are running the workshops developed for the course and I am assisting the instructors with planning these (selecting problems, etc.) as well as facilitating during the workshops and scoring the workshop quizzes.
4. I have finalized a first draft of the proof concept test that we are developing to track proof skills to higher-level courses. This draft is now being reviewed by faculty members that teach these higher-level courses to determine which problems they think are most relevant. Following this, I will create a shorter second draft of the test that I plan to use in student think-aloud interviews to collect a body of student misconceptions and difficulties with these concepts.

MATH 102 (Differential Calculus with Applications to Life Sciences)

1. An end-of-term survey was prepared (primarily by Costanza Piccolo) and run as a voluntary online survey after the final exam. The survey was developed to particularly focus on how students use WeBWorK in this course, with questions in common with other course surveys, so that these may be compared across the different differential calculus courses. There were also many open-ended questions for student comments on the various course components. I coded the open-ended responses and summarized the results in a report for the instructor-in-charge. Some of the main results are (from 279 responses):
 - Students found the weekly WeBWorK homework to be the most useful component of the course for learning the material. The other components are written homework, course notes, pre-lecture quizzes and labs and rank in this order for reported usefulness.
 - Students view the lab component of the course as irrelevant, or unrelated to the rest of the course. (17 comments)
 - Webwork problems were seen as “easier” than the exam questions (25 comments)
 - Feedback on hand-in (written) homework was poor or non-existent (17 comments)
 - Although some students commented that they liked how the pre-lecture quizzes helped them stay on track (10 comments), many students disliked the frequency of the quizzes (6 comments) or the general idea of testing “before you’ve covered the material” (4 comments)

Students also suggested a number of possible future improvements to the WeBWorK assignments that should be kept in mind for next year:

- More solutions to problems should be available
- Pre-lecture quizzes should allow them to see which parts of the quiz they have correct (currently only the total score is shown to the student upon completion)
- Many answer blanks need to be longer to allow for easier reading of mathematical expressions

MATH 103 (Integral Calculus with Applications to Life Sciences)

1. This course is the follow-on course for Math 102, and I am assisting with it by preparing WeBWorK assignments. So far, the first 3 homework sets have been prepared. From the end-of-term survey administered in Math 102 last term there was a general sense that the workload was a little too high, so we will attempt to make the homework assignments shorter and more targeted this term.

Math Attitudes and Perceptions Survey (MAPS) – joint work with STLFs Warren Code and Joseph Lo

1. We have completed our student validation interviews and are currently assessing the results for each question to determine whether any additional revision and validation is required before seeking expert responses.
2. MAPS was administered on paper in class in both sections of Math 220 this term, as well as in one section at the end of term. I have recorded the results of the surveys, but as we have not yet established the expert responses and appropriate scoring scheme I cannot tell yet if there has been a statistically significant negative or positive shift in attitudes in this course. From a

purely descriptive view, however, attitudes among the group of students who completed both surveys appear quite stable.

Current Project Status (material was prepared by either STLTF or other members of the MATH SEI group)

MATH 220:

Learning Goals: Learning goals have previously been created for this course.

Assessments: The following assessments are planned to be used this term: basic proof diagnostic (pre and post), Proof attitude survey (pre and post).

New Methods/Materials: A proof concept test is under development to assess higher-level proof skills.

MATH 103:

Learning Goals: I do not know the status of learning goals for this course.

Assessments: None.

New Methods/Materials: A series of weekly WeBWorK assignments (online homework) is being prepared this term.

Plan for immediate future work

MATH 220:

1. Continue working on our paper about the basic proof skills diagnostic.
2. Perform student validation on the portions of the basic proof skills diagnostic that have not been validated.
3. Assist with the bi-weekly workshops and observe student behaviour with a view to improvements to be made in the summer term.
4. Search for student examples of proofs to critique in the workshops during the summer session of the course.

Higher-Level Proof Courses

1. Get feedback from several faculty on the proof concept test and revise (shorten) the test appropriately.
2. Create an outline for student think-alouds on the revised proof concept test.

MATH 103

1. Continue to make weekly WeBWorK problem sets.

MAPS

1. Finish our assessment of the student validation interviews and revise and revalidate the survey if necessary.
2. Post the validated version of the survey online and solicit responses from experts (aim for 50 expert responses).
3. Examine the results of the survey run in Math 220 and compare with other courses.