

STLF Report to CWSEI and Mathematics Department

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Period: 27/07/12 – 07/09/12

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Specific activities performed by STLF

1) Professional development

- Attended the weekly CWSEI Reading group meetings.
- Attended the weekly STLF meetings.
- Participated in the Statistics workshops offered to STLFs by Dr. Catherine Rawn (Aug 8, Aug 15)

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 for work in the coming year (Aug 9, Aug 23, Aug 30).
- Met with Sarah Gilbert and the MATH-SEI group (Jul 31) to review the status of our projects.

3) Course-specific meetings/activities

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

1. The basic proof skills diagnostic test for MATH 220 was administered in both sections of the course on Sept. 5. This term we chose to use the shorter version of the test (that excludes the algebra and graphing questions) to allow for some time for students to complete the Math Attitudes and Perceptions Survey (MAPS). The tests have not yet been scored, but will be compared with previous term results once this is done.
2. As one component of establishing validity for the MATH 220 basic proof skills diagnostic we want to verify that more expert students perform better on the test. David Brydges has agreed to run the test in his MATH 320 class on Sept. 12th. This class is a proof-intensive real analysis course, and only majors students with a score of 80% or greater in MATH 220 can take it, so this population of students should perform better on the test. In addition, there may be a few students who have taken the diagnostic in MATH 220, and it will be interesting to compare their performance longitudinally (for retention). Unfortunately, the numbers of students are likely to be too small to say anything statistically significant in this case. Another possible interesting analysis that could be done on the data is a comparison of the honours students and the majors students in the course, as they take different 100-level and 200-level courses.
3. Work on the higher-level “proof concept test” has continued, together with faculty member Brian Marcus. At this stage we have a draft of the first (open-ended) version of the test. My intention is to further refine the questions this term using data from student think-alouds on the test questions. However, first I plan to collect feedback on the test from faculty members who teach proof-intensive courses, to ensure the overall content of the test is appropriately targeted.

MATH 102 (Differential Calculus with Applications to Life Sciences)

The plans for this course have changed substantially from my last report. The several exciting course improvements we are making are described below:

1. The course is much more heavily coordinated than in past terms. Essentially all homework, quizzes and labs are in common for all 6 sections, in addition to exams. There is also a private course wiki for instructors and myself to post and review course materials, agendas for the weekly meetings, and discuss other course issues.
2. Pre-lecture quizzes have been implemented and are being created by myself. There will be approx. 36 online pre-lecture quizzes, usually with 2 or 3 problems each, due one hour before class. The extra hour is intended so that instructors have the ability to access the quiz results and review them before class. Indeed, some instructors are already doing this and there is a private instructor “forum” on the course wiki where instructors have discussed trends they have seen in student scores and responses.
3. I am developing weekly online homework sets in WeBWorK. This homework system allows for immediate feedback to students, and multiple attempts at problems. Students will in addition have a few long answer handwritten problems due with the labs, to allow practice at more “exam-style” problems.
4. The course labs are being changed to use a more generic spreadsheet program (ex. Excel), rather than the MathSheet software. My role in this is integrating these labs into WeBWorK so that students need only access one application to see all of their assignments.
5. There is a forum for the course (in Piazza). Here students post questions about the course and students and instructors can answer. There has already been a large amount of activity on the forum given that only 2 lectures have taken place. At present I am helping to monitor the forum and answering student questions about WeBWorK. However, this work is intended to be taken over by TAs for the course, and then I will simply monitor the forum to gain insight into common student difficulties and student thinking.

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

1. We have now begun student validation interviews on the most recent version of the survey. So far only 3 validation interviews have been conducted, but more are planned for the next week or two.
2. The survey was administered in class in MATH 220 this term. In past terms, the survey was optional and online, and had very low response rates, so we decided it was important to get a good sample from this core course this term. The answers have not yet been tabulated or analyzed.

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

MATH 220:

Learning Goals: Learning goals have previously been created for this course and are in use.

Assessments: The basic proof skills diagnostic pre-test was given at the start of term. The results still need to be compiled and analyzed. A proof concept test is in development to assess higher-level proof skills.

New Methods/Materials: We now have a draft of the first (open-ended) version of the proof concept test.

MATH 102:

Learning Goals: Learning goals for this course exist, but are in need of substantial revision.

Assessments: None yet.

New Methods/Materials: A series of online pre-lecture quizzes is being created. Weekly online homework sets are being created. Labs for the course are being substantially modified.

Plan for immediate future work

MATH 220:

1. Continue working on our paper about the basic proof skills diagnostic.
2. Analyze the basic proof skills diagnostic and compare with previous terms.
3. Perform student validation on the portions of the basic proof skills diagnostic that have not been validated.
4. Meet with instructor David Steinberg to discuss his plans for the course (he was only recently assigned to this course).

Higher-Level Proof Courses (MATH 320, and MATH 312)

1. Administer the basic proof skills diagnostic in MATH 320 and analyze the results. Compare the performance with MATH 220 students, as well as compare the honours and majors student groups.
2. Get feedback from several faculty members on the proof concept test.
3. Pilot the draft test in think-aloud interviews with students from MATH 312 and revise the test as needed.

MATH 102

1. Create pre-lecture quizzes and weekly problem sets in WeBWorK.
2. Continue to assist with the revisions of the course labs.
3. Continue to monitor the student forum, and keep track of difficulties and misconceptions that are discussed there.
4. Review the learning goals for the course and make a plan for revising them.

MAPS

1. Examine the responses from MATH 220 students, and compare these with responses we have from first-year calculus courses.
2. Continue student validation interviews.
3. Publish the validated version of the survey online and solicit responses from experts (goal of 50 expert responses).