STLF Report to CWSEI and Mathematics Department

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Period: 19/01/13 – 18/03/13
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Specific activities performed by STLF

1) Professional development

- Attended the weekly CWSEI Reading group meetings.
- Attended the weekly STLF meetings.
- Met with STLF Brett Gilley for a MetaSTLF meeting (Jan 25).
- Attended the Research in Undergraduate Mathematics Education Conference in Denver, Colorado (Feb 20-23).

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 (Jan 30, Feb 6, Feb 13, Mar 13).
- Met with Sarah Gilbert and the MATH-SEI group (Jan 23) to review the status of our projects.
- Attended our Math Education Reading Group, where Wes Maciejewski presented "Extraneous perceptual information interferes with children's acquisition of mathematical knowledge," Kaminski & Sloutsky, 2012. (Feb 8)

3) Course-specific meetings/activities

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

1. The bi-weekly workshops have continued in Math 220, and the final workshop will take place March 28th. On scoring the workshop quizzes (a single question students do at the end of the workshop), I have noticed some excellent examples of student misconceptions. Therefore, for the final workshop I plan to photocopy the quizzes before marking them to create a pool of authentic examples to critique when I teach the course this summer.

2. Our first draft of the proof concept test has now been reviewed by 5 faculty members, who have provided a substantial amount of feedback. Brian Marcus and I are now in the process of revising the test accordingly. I plan next to pilot the revised test in student think-aloud interviews during the last week of classes.

3. At the Research in Undergraduate Mathematics Education (RUME) conference, I presented the basic proof skills diagnostic test and some results we have found using this test in our courses. I received a lot of useful feedback from my talk, as well as met several individuals who are interested in using the test at their own institutions. Some ideas for future work on this test that came out of this are: (1) to develop a parallel version of the test, so that pre- and post-test need not be identical, and (2) to perform Item Response Theory analysis on the test to further assess its validity.

MATH 103 (Integral Calculus with Applications to Life Sciences)

1. I have continued preparing weekly WeBWorK assignments for MATH 103. Overall, students and instructors are very happy so far with the implementation of WeBWorK in this course.

MATH 105 (Integral Calculus with Applications to Commerce and Social Sciences)

1. Together with instructor David Steinberg and graduate student Steve Bennoun, we are trying out a post-midterm reflection exercise called "exam wrappers." The exercise consists of a series of questions given along with the graded midterm that aim to have students reflect on how their prepared for the midterm, how effective their preparation was, and to make plans for changes in how they study for the next exam. Instructors in 5 sections of the course have agreed to participate and gave their students the wrappers along with their marked midterm 1. Then, a week prior to midterm 2 the wrappers were returned to the students to remind them of what they had planned to change. The exercise will be repeated with midterm 2, and we plan to compare the final exam and overall performance of students who completed the wrappers with those in other sections who did not participate in the exercise. We also plan to ask survey questions to all students at the end of term to probe whether they changed their study habits over the course of the term, as well as to see if this differs between the students who completed the exam wrappers and those who did not.

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

1. We have completed our revisions to the survey based on the student validation interviews. We are now performing the factor analysis to establish the categories we will have for the survey. Once the categories are finalized, we will be soliciting expert responses so that we can further assess the validity of the survey questions as well as to determine the "expert response" for each question.

2. We plan to run MAPS in a range of courses in the last 2 weeks of the term to collect baseline data for the most recent version of the survey.

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.
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.

MATH 105:
Learning Goals: Learning goals have previously been created for this course.
Assessments: None.

New Methods/Materials: An "exam wrapper" has been created as a post-midterm reflection exercise for students.

Plan for immediate future work

MATH 220:

1. Continue working on our paper about the basic proof skills diagnostic. Also, continue discussions with conference contacts about how to improve the test.
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. Collect examples of proofs to critique in the workshops during the summer session of the course.

Higher-Level Proof Courses

1. Finish revising the proof concept test based on feedback received from faculty.
2. Create an outline for student think-alouds on the revised proof concept test and begin student interviews.

MATH 103

1. Continue to make weekly WeBWorK problem sets.
2. Run the WeBWorK survey in Math 103 and analyze the results.

MATH 105

1. Create the end of term survey questions probing how students study strategies changed over the term and run it in all sections (if possible).
2. Run the exam wrapper exercise for midterm 2.

MAPS

1. Finish establishing the categories for the survey and finalize the current version.
2. Post the finalized version of the survey online and solicit responses from experts (aim for 50 expert responses).
3. Run the survey in a range of courses at the end of term.