STLF Report to CWSEI and Mathematics Department

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Specific activities performed by STLF

1) Professional development
   • Attended weekly STLF meetings (Nov 17, Nov 24, Dec 1).
   • Attended weekly Reading Group meetings (Nov 16, Nov 23, Nov 30).
   • Attended NOJO meetings (Nov 15, Dec 5, Dec 19)
   • Attended ISW - Instructional Skills Workshop, designed specifically for mathematics instructors. Obtained an ISW certificate. (Dec 3, 4, 6, 7)
   • Attended Course Design Intensive, given by CTLT (Dec 12, 14, 16)

2) Department meetings/activity
   • Participated in a meeting with departmental Review Committee. Meeting was dedicated to discussion of departmental efforts to improve undergraduate education and to corresponding role of CWSEI. (Dec 2)
   • Gave a talk for the departmental Lunch Series on Teaching and Learning on the topic of building and using diagnostic tests at the start of course. Subsequent discussion followed.

3) MATH SEI general meetings/activity
   • Meeting with other Math STLFS (Nov 21, Dec 19)
   • Attended Math STLF reading group (Nov 28)
   • Put together a 5-page Math 220 summary report of work and findings by Sandi Merchant - amounting to 9 major directions. Made summary of useful findings - for example on correlations between calculus background and failures in Math 220, on differences in student population between sections. Based on findings, added new questions to diagnostic and to surveys, to confirm the trends in the present semester, and potentially make recommendations to the department. Also, put together a list of follow-up activities to each direction, as well as additional thoughts how structure set up by Sandi can be re-used in Math220 work and adjusted to Math230/335.

4) Course-specific meetings/activities
   **Math 230 – Finite mathematics course (Math for future elementary school teachers)**
   • Met with Steph van Willigenburg (Nov 25, Dec 2). During the two meetings we finalized learning goals up to Midterm 2, and then up to final exam - so now the set of learning goals is complete. The list of pedagogical remarks and teaching recommendations from Steph has been put together alongside learning goals - as aid for future instructors.
   • Last two weeks of class (four lecture periods) were dedicated to a science fair activity - as suggested originally by Mark MacLean. Students selected a mathematical topic and created a poster, which they later had to present to instructor and their peers. I have attended two such lecture periods to observe. The science fair in its present format is really a find for this
class: it pushes students out of their mathematical ‘comfort zone’ and prompts active engagement at the time when they have gained sufficient confidence in their mathematical ability. It demonstrates to students the difficulty to present mathematical material and the challenges of selecting and structuring the relevant pieces of information. Part of students’ grade came from peer evaluation - thus students had to listen carefully and evaluate others’ mathematical arguments.

- During last meeting with Steph we have assembled existing learning goals for science fair, along with Steph’s pedagogical and practical recommendations to instructor, as well as evaluation sheets for students. Science fair ‘package’ can now conveniently be part of Math335 class and be passed on to next instructor.

- Students took diagnostic post-test, right before the science fair. Results have been analysed. One of the most significant accomplishments of the the instructor: not one student has listed mathematical anxiety as one of the negatives - in fact, all students show marked increase in confidence and their own ability to do and learn mathematics, as well as present it to students. In retrospect, it would have been interesting to see confidence level of students after they completed the science fair and gained experience of presenting mathematics. Other results of the test are available in a separate report.

- On my request, several students gave their email address and expressed willingness to participate in a discussion panel/interview to gather their opinions on their experience. Now that the semester has started, I will contact the students and run the discussion panel to make results available to the present instructor as soon as possible.

- I contacted Cynthia Nicol of UBC Education Department to discuss results of diagnostic test and gather information on relevant mathematics needed for her course on Math Pedagogy. During last meeting we talked about old materials assembled by Dr Klaus Hoechsmann - it would be very helpful to add these to mathematical archive for the course. We did not manage to meet in December due to both sides being busy - so I shall make another contact with Cynthia in about two weeks, once the term is in a less busy stage.

- Met with John MacDonald, who is teaching Math 335 this semester. Math335 is the same course as Math230 - with an addition of 1hr20min weekly lab. I gave John all the materials assembled for Math230 in the fall semester 2011.

- Math 335 students took the diagnostic pretest . Results will be ready by Monday Jan 9th and John and I will meet to discuss them so that teaching and course structure can be adjusted accordingly.

Math 220 – Introduction to proof

- 12 workshop problem sheets and solutions have now been put together, by Katya Yurasovskaya and Athena Nguyen. They are now ready to use in any subsequent Math220 course. Athena’s excellent, careful and reliable work has been greatly appreciated.

- Diagnostic post-test has been given in both sections of Math220 at the end of term 2011; the results have not yet been recorded and analyzed.

- End-of-term workshop/course survey has been given to students in both sections of Math220 in December 2011. Results of survey have been assembled into a report with a summary and will be provided to present-term instructors Andrew Rechnitzer and Rajiv Gupta. The summary of useful findings is as follows:
1. A great part of students does not realize that the course is difficult - until late in the course: after Midterm 2. By then it is too late to start studying seriously. Thus, 15 out of 31 students in section 101 and 17 out of 33 students in section 102 arrived at the conclusion that the course was challenging only before or after Midterm 2, Nov 14, with course ending on December 2nd. Note: this observation was originally made by Sandi Merchant, and confirmed again by the present survey.

2. A part of students stopped coming to workshops because they felt that workshops were not helping them. There may be a number of reasons for that. First, a perceived disconnect between what instructor assigns as homework and what is being covered in the workshop. While the same concept is being illustrated, students may not see the connection because problems appear different from the ones in the homework. Also, problems like “fake proofs” do not appear in lectures/homework - however they are important for students’ development of logic. They may not appear so to the student. Third: workshop format. There needs to be more intensity in solving problems - quiz at the end is a good incentive. Also, having at least some homework finished before workshop makes students prepared to work on problems seriously rather than review during the session.

• Four new questions have been added to diagnostic test. Questions gather data on student population, such as major, year, past experience with Math220, and “mathematical maturity” - what mathematical courses has the student seen prior to taking Math220. The motivation for adding these questions have been past observations made by Sandi Merchant, regarding performance of repeating students in Math220, as well as likelihood of failure based on the calculus course taken by students in the past. Sandi also observed differences in student populations between the two sections: one section has a larger proportion of math majors, while the other section has a bigger variety of students of different majors. Differences in population may affect students’ beliefs, attitudes, and performance. We shall have this data for the present term processed by the 3rd week of this term.

• Met with Andrew Rechnitzer (instructor in charge), Rajiv Gupta and Costanza Piccolo (Nov 25). Structure for this term’s workshops has been decided on by instructors. It is as follows: “The workshops would be on every second Thursday, and that there would be a quiz at the end. Instructors will collect homework at the start of Thursday classes, to force the students to be prepared for the workshops. The workshops will start on Thursday January 12th.” Note: recommendation to make homework due before workshops was made by Costanza and Katya, based on their experience working with mathematics workshops. The effectiveness of workshop increases greatly when students are prepared.

• Gave diagnostic pretests in both sections of Math 220, winter term 2012. Results will be analyzed by week 3 of this term and given to instructors.

Current Project Status (material prepared STLF and/or other members of MATH SEI group)

Math 220 – Introduction to proof

Learning Goals: No changes to the existing document have been made.

Assessments:

• Four questions on student population have been added to the existing diagnostic test.
• Combined workshop/ course end-of-term survey was created
New Methods/Materials:

- Workshop sets 1 through 12 and their corresponding solutions are finished.

Math 230 – Finite Mathematics

Learning Goals: Learning goals for the entire course have been assembled, along with pedagogical comments by instructor - for the benefit of future instructors who teach the course. Learning goals and practical recommendations for the science fair component of the course have also been recorded and put together in a package.

Assessments:

- Diagnostic test has been modified slightly. Changes have appeared in sections concerning student data and beliefs/attitudes towards the subject. Mathematical component of the test remained unchanged.

New Methods/Materials:

- No new materials were tried.

Plan for immediate future work

Math 220 – Introduction to Proof

1. Provide results and analysis of Dec 2011 survey to present-term instructors.
2. Next week (of Jan 9th) will be the first meeting of Math220 instructors during the term, and we will select problems for the first workshop of the term. I need to pick appropriate problems, since not much course material has been covered yet - however, the workshop can focus on general logic applications and fake proofs, to start students thinking on mathematically and logically valid statements. Instructors will then pick problems they think most appropriate to the learning goals of the course and the material.
3. Discuss with instructors possibility and need to conduct student interviews after in-class workshops. If agreed, set up interview template, based on previous work by Sandi.

Math 230 / Math 335 – Finite Mathematics

1. Write a set of learning goals for Math 335 course as taught by John MacDonald. The course will most probably be different from Steph’s course in selection of material, reflecting instructor’s preferences.
2. Contact students who expressed willingness to participate in a discussion panel. Write interview questions; run the panel.
3. Math 335 course involves labs. As one of the goals for this term’s work I want to write a set of learning goals for labs, as well as assemble a selection of problems and activities for these labs - for future use.
4. Contact Cynthia Nicol of UBC Education Department again and set up a meeting.