STLF Report to CWSEI and Mathematics Department

STLF: Sandra Merchant  
Period: 02/06/10 – 30/06/10  
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Specific activities performed by STLF

1) Professional development
   • Attended the weekly Reading Group discussions (Jun 2, Jun 9, Jun 23 & Jun 30)
   • Attended the weekly STLF meetings (Jun 6 & Jun 28)
   • Attended NOJO meetings #2-4 (Jun 3, Jun 10 & Jun 24)
   • Attended the ACPEEP/SEI meeting in Boulder, CO. (Jun 15 – Jun 18)
   • Met with Ashley Welsh to get advice on conducting student interviews (Jun 7)

2) MATH SEI general meetings/activity
   • Met with incoming MATH SEI director Costanza Piccolo to discuss plans and timelines for the summer (Jun 14)
   • Met with department head Rachel Kuske and Michael Doebeli to discuss development of the new 300-level mathematical models course and the timeline for course development (Jun 4) Subsequently met with Wayne Nagata to establish curriculum documents requirements and deadlines (Jun 11)
   • Met with Carl, Sarah and the Math STLFs to discuss plans and review our projects. I obtained advice on developing learning goals and the proof skills diagnostic exam (Jun 28)

3) Course-specific meetings/activities

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

   1. Finished compiling the student survey results and wrote a report summarizing these (available on the MATH-SEI website). Some interesting and useful results include:

      • Overall, students felt least able to prove convergence or divergence of sequences and series. This is not surprising, but student comments about these being “hard to visualize” may indicate a useful area on which to focus course improvements

      • Students also frequently mentioned that they found the “functions” part of the course very challenging, most simply saying that this is because it was “hard to understand” or they “didn't get it.” This is surprising to me because it is the topic to which they have had the most prior exposure. However, here functions are presented abstractly, and students are required to prove things about general classes of functions, rather than specific instantiations. It is unclear to me why there is such difficulty abstracting in this case (not enough different contexts? misconceptions from their previous experience with functions?). I will attempt to clarify this in future student interviews.

      • In the open ended questions, students from terms using the “proof-focused” textbook made more comments about proof and were much more specific in their comments (ex. referencing particular methods of proof) than those using the “analysis-focused” text. I find it interesting that the general method of presentation for the course comes through in voluntary open-ended questions, and I think this suggests it affects the students'
schema/organization of their knowledge for this course, but I think it may also affect their perceptions of mathematics and doing math. For this reason, I think it would be useful to develop some attitude assessment questions (similar to CLASS) about proof and the role of proof in mathematics. This will also require some discussion with faculty about what the “expert” view is.

2. Constructed a poster for the ACPEEP/SEI meeting in Boulder, CO, summarizing the future plans for this project and entitled “Learning, retention and transfer of mathematical proof skills.”

3. Together with Andrew Rechnitzer, extracted learning goals from the April 2008 final exam and compiled a first draft of these. Since most of the questions are lengthy open-ended problems, we have found that they generally led to several learning goals, some of which are easy to identify and clearly topic-level. Some of the extracted goals, however, I am finding more difficult to categorize (and may not in fact belong in this course). I am hoping that continuing with the midterms and homework will clarify some of these, but also think that discussion with other instructors can be helpful for this.

Development of Mathematical Models Course for General Science (MATH 3??)

1. In discussion with Michael Doebele and Wayne Nagata, determined the primary activities to occur before the start of the fall term. These are: 1) Develop course-level learning goals, 2) Examine and assess suitable textbooks, 3) Develop a list of possible topics, 4) Determine the method of assessment and primary course activities and outline how they relate to the desired learning goals, 5) Prepare the necessary curriculum documents (proposal, course outline and consultation form, if needed).

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

MATH 220:
Learning Goals: Faculty interviews are still in progress to compile suggestions for learning goals. Topic-level learning goals have now been started.
Assessments: A pre/post diagnostic test for proof skills is being constructed.
New Methods/Materials: None

MATH 3??: General Sciences Mathematical Models Course
Learning Goals: Course-level learning goals have been started.
Assessments: None
New Methods/Materials: None

Plan for immediate future work

MATH 220:

1. Continue interviewing instructors of related 300-level Math courses for input into learning goals and to summarize observed student difficulties.
2. Extract learning goals from midterm exams and homework problems.
3. Continue student interviews to validate the end-of-term survey and determine study habits and course expectations and beliefs.
4. Code student responses on past MATH 220 final exams to identify common difficulties and errors on exams.
5. Examine past final exams for all subsequent 300-level courses to determine the quantity and level of proof skills required in these assessments. Also, possibly code these problems for the specific proof skills required in them.
6. For at least one of the subsequent 300-level courses, examine student difficulties on the final exam using the coding scheme developed for MATH 220 exams.

MATH 3??:

1. Draft course-level learning goals.
2. Review possible mathematical modelling textbooks for the course and determine if and how they address the course-level learning goals.