

**Degree/Certificate: Bachelor of Arts in Education**

**Major/Option: Mathematics / Secondary**

**Submitted by: Mathematics Education Committee**

**Date: November 1, 2013**

**Part I – Program SLO Assessment Report for 2012-13**

1. **Student Learning Outcome:** The student performance or learning objective as published either in the catalog or elsewhere in your department literature.

Possess a deep understanding of how students learn mathematics and of the pedagogical knowledge specific to mathematics teaching and learning.

2. **Overall evaluation of progress on outcome:** Indicate whether or not the SLO has been met, and if met, to what level.

\_\_\_\_\_ SLO is met after changes resulting from ongoing assessments, referencing assessment results from the previous year to highlight revisions;

\_\_\_\_\_ SLO is met, but with changes forthcoming;

X  SLO met without change required

3. **Strategies and methods:** Description of assessment method and choices, why they were used and how they were implemented.

In MTED 490, the Senior Capstone: Mathematics Practicum, majors submit a Unit Plan. There were four students who took MTED 490 in the Winter of 2013 on which this assessment is based. The description from the syllabus and the rubric follow:

**Unit Plan:**

Rough outlines, which must include a concept map or learning trajectory and questions students should be able to answer after completing the unit, are due January 25th and February 22nd; final document is due March 1<sup>st</sup>. Please number pages and include a table of contents or day-by-day list of topics. The unit plan should be an *ideal* plan that you could use. That is, do not feel constrained by your placement, but incorporate ideas you have learned this quarter, in methods, and in your placement that you believe will support student learning and motivation.

- See *NCTM Teaching Standards* (p. 6) as a resource in your planning.
- Assessed with the Instructional Planning and Teaching Rubric (p. 3).

**Guidelines for Unit Plan**

Part of Unit Plan	Guiding questions
Heading	Include your name, school, and subject. Describe the student characteristics in the class – who is the audience of the lessons. Include a title of the unit and a short description of the topic for each daily lesson.
Unit overview and summary	List the Big Ideas of the unit and then create a concept map or a learning trajectory of the unit that describes how the big ideas relate to each other. As you study your textbook ask yourself why the authors structured the sequence of topics in this particular way. Describe how students’ understanding of both procedures and concepts should develop throughout the unit. What big questions should they be able to answer? List the standards addressed in this unit; include both content and process standards.

Lesson Plans (this will be the bulk of your unit and should be from 7-10 days of plans).	<p>Include detailed lesson plans. Your plans should be detailed enough that a substitute could teach from them. As you plan, use the following questions to guide your thinking:</p> <ul style="list-style-type: none"> <li>• What conceptions or intuitions might students have about this concept? How does each lesson engage students' preconceptions?</li> <li>• What ideas and representations can I connect to that may be helpful to assist students in understanding?</li> <li>• How is this concept connected to the other concepts in the curriculum? How is it related to the Big Ideas?</li> <li>• What concepts and procedures will students encounter in the future that connect to this idea?</li> <li>• Include an opener and closure in each lesson.</li> <li>• Why should students learn this? (How will you motivate the unit?)</li> <li>• How are the concepts and procedures related? What concepts underlie the procedures?</li> <li>• What student activities will help them learn with understanding?</li> </ul>
Formative assessment	<p>This will be integrated into the lesson plans, but be sure to label them as formative assessment. Include at least three discussion questions in each lesson plan aimed at finding out what students think so you can adapt your instruction. How will students know if they understand? (Can you create a rubric or checklist that might aid formative assessment?). Plan at least two journal entries or open-ended questions to ask students and collect so you can assess their understanding of the big ideas before the end of the unit.</p>
Summative assessment	<p>Include homework assignments for each lesson. Write an end-of-unit exam. Will you give any quizzes during the unit? Other summative assessment?</p>
Resources and technology	<p>Briefly describe the resources and technology you will use.</p>
Differentiated instruction	<p>Do you have resource, ESL, or gifted students in your class? What accommodations will you make?</p>
Classroom environment	<p>Vary your instructional strategies and include both individual and group work. For each lesson consider how students' dispositions to do mathematics are affected by classroom environment and the activities you ask them to do. In what ways does your lesson plan reflect the NCTM's vision for teachers' and students' roles in discourse? (See p. 6) How will you set up expectations for the way students implement mathematical processes (communication, problem solving, connections, representation, reasoning)?</p>

### Instructional Planning and Teaching Rubric

Score	Criteria for Overall Assessment
	(Late work will be assigned decreased scores. No work will be accepted after the last day of classes.)
4 – Exemplary	<p>Lesson Plan shows clear evidence of critical thinking about the mathematical content, and the components of the lesson plan clearly support the goals of the standard listed as the focus of the lesson. The performance task and learning plan are well-articulated and clearly aim at conceptual and relational learning. The plan includes ample opportunities for students to engage in the Standards for Mathematical Practices (SMP) as they learn the content. Addresses sequencing of concepts, breadth and depth of coverage, accuracy of mathematics, and homework/independent practice in an exemplary manner. The plan includes considerations of how students learn, and a classroom management and environment plan that maximize student engagement with the mathematics. All criteria of the assignment are met at an exemplary level.</p>

3 – Fluent	Lesson Plan shows clear evidence of critical thinking about the mathematical content, and there is evidence that the components of the lesson support the goals of the standard listed as the focus of the lesson. The performance task and learning plan clearly aim at conceptual and relational learning. The plan includes ample opportunities for students to engage in the Standards for Mathematical Practices (SMP) as they learn the content. Addresses sequencing of concepts, breadth and depth of coverage, accuracy of mathematics, and homework/independent practice in a fluent manner. The plan includes considerations of how students learn, and a classroom management and environment plan that maximize student engagement with the mathematics. All criteria of the assignment are met at a fluent level.
2 – Adequate	Lesson Plan attempts to provide learning activities that support a mathematical goal, but the plan and performance task lack enough information for a reader to determine the mathematical content, or lack a clear emphasis on conceptual or relational learning. The plan includes very few opportunities for students to engage in the Standards for Mathematical Practices (SMP) as they learn the content. Addresses sequencing of concepts, breadth and depth of coverage, accuracy of mathematics, and homework/independent practice in an adequate manner. The plan includes considerations of how students learn, and a classroom management and environment plan that include student engagement with the mathematics. Most of the criteria of the assignment are met.
1 – Poor	Work shows little evidence of critical thinking about the mathematics content, and the plan focuses on instrumental learning. Addresses sequencing of concepts, breadth and depth of coverage, accuracy of mathematics, and homework/independent practice in an inadequate manner. Classroom management and environment are not considered. Some of the criteria of the assignment are met.
0 – Unacceptable	No meaningful work submitted.

4. **Observations gathered from data:** Include findings and analyses based on the strategies and methods identified in item #3.

a. Findings:

Of the four students, two received 3+, one received 3-, and one student received a 2+.

b. Analysis of findings:

The scores were all at least adequate, demonstrating that students were able to apply an acceptable understanding of how students learn mathematics and the pedagogical knowledge specific to mathematics teaching and learning. However, the scores (and thus, the learning) could have been better and are a little lower than previous quarters. The biggest difficulty was that none of the students turned in drafts as required. Many students are very busy during the quarter they take MTED 490, spending quite a bit of time in classrooms teaching, in addition to other coursework. Unfortunately, creating Unit Plans is something they feel they can put off. However, it is essential that future teachers learn to manage their time and come to value the time and effort invested in planning. It is also essential to their learning that they are able to respond to feedback on their unit plans and improve them, then receive feedback on their improvements. By not turning in drafts, they eliminated that possibility.

5. **What program changes will be made based on the assessment results?**

- a) Describe plans to improve student learning based on assessment findings (e.g., course content, course sequencing, curriculum revision, learning environment or student advising).

The assignment and rubric are sufficient as they are currently written since they were developed and revised over time in response to evidence from student work and current requirements of teachers. However, in order for this assignment to be a powerful learning experience, students must create early drafts, receive feedback and resubmit the plans with improvements. Thus, we will need to take steps to ensure that students are submitting early drafts. One step could be to assign weekly grades based on how well they are keeping up with the assignments (such as turning in early drafts).

- b) Provide a broad timeline of how and when identified changes will be addressed in the upcoming year.

The changes will be made in the fall of 2013 and data will be collected to see how well the changes worked.

6. Description of revisions to the assessment process the results suggest are needed and an evaluation of the assessment plan/process itself (e.g., what changed, what worked, what did not work, and why?).

The evaluation process was effective; no revisions are necessary.

## PART II – CLOSING THE LOOP

### FOLLOW-UP FROM THE 2011-12 PROGRAM ASSESSMENT REPORT

**Working definition for closing the loop:** *Using assessment results to improve student learning as well as pedagogical practices. This is an essential step in the continuous cycle of assessing student learning. It is the collaborative process through which programs use evidence of student learning to gauge the efficacy of collective educational practices, and to identify and implement strategies for improving student learning.”* Adapted 8.21.13 from <http://www.hamline.edu/learning-outcomes/closing-loop.html>.

1. **Student Learning Outcome(s)** assessed for 2011-12

Use spatial visualization and geometric modeling to explore and analyze geometric figures and apply and use measurement concepts and tools.

2. **Strategies implemented** during 2012-13 to improve student learning, based on findings of the 2011-12 assessment activities.

We included 10 days of problem solving and use of Geometer’s Sketchpad in Math 370: Survey of Geometries in the Winter 2013 that was not included before. While this is different from what we proposed in the 2011-13 Program Assessment Report, it made most sense to improve this SLO in the Geometry class. However, by including these ten days of problem solving and visualization, we had to eliminate other content, deemed less important, but still somewhat important to future teachers.

3. **Summary of results** (may include comparative data or narrative; description of changes made to curriculum, pedagogy, mode of delivery, etc.): Describe the effect of the changes towards improving student learning and/or the learning environment.

Students were not asked to do the same problems as students in the previous year were, since Washington has adopted the Common Core State Standards, which emphasizes geometric transformations. Thus, the new problems involved geometric transformations of translations, rotations, reflections, and shears. Students worked in groups to solve problems and use dynamic geometry software to visualize figures and make conjectures, then prove or disprove their conjectures. These experiences were new to these students since this approach is different from the way they experienced geometry in high school or earlier in the program. Thus, the experiences of the course provided a foundation they could build on when they are teaching.

4. What **further changes to curriculum, pedagogy, mode of delivery**, etc. are projected based on closing-the-loop data, findings and analysis?

We will continue to discuss what parts of this SLO should be addressed in each of the courses: Math 370, Math 492, and MTED 493, and ensure that students are provided experiences that support their growth.