

## 2010-11 Program Assessment Update

Department & Program: Mathematics MA K-9 Program

submitted by: Mathematics Education Committee

As one part of ongoing program assessment at Eastern Washington University, each department is asked to report on assessment results for *each* program for *at least one* Student Learning Outcome this year. Use this electronic file to report on your program assessment for AY 2010-11, and please submit it to both your Dean and to Academic Affairs (SHW 220) by Nov. 1, 2011. The following definitions explain the assessment information you'll enter in the table below:

1. **Student Learning Outcome:** The student performance or learning objective as published either in the catalog, the AIEA assessment data portal, or elsewhere in your department literature.
2. **Strategy or method of measurement:** Mode and process through which student performance data was gathered. Examples: embedded test questions in a course or courses, portfolios, in-class activities, standardized test scores, case studies, analysis of written projects, etc. Additional detailed description could describe the use of rubrics, etc. as part of the assessment process.
3. **Observations gathered from data:** The findings and analysis of those findings from the above strategies.
4. **Actions recommended based on observations:** Course (activities or content) or program changes recommended.
5. **Plan and timeline for taking action:** How the recommended actions will be implemented, and in what timeframe.
6. **Overall evaluation of progress on objective:** The extent to which the student learning outcome is still valid and the assessment of it is producing important and meaningful data.

Student Learning Outcome	Strategy or method of measurement	Observations gathered from data	Actions recommended based on observations	Plan and timetable for taking action	Overall evaluation of progress on objective
<p>Develop a deep and connected understanding of mathematics concepts.</p> <p>Specifically: The role of representation in developing ratio and proportion</p>	Final Exam and Final Folders for Math 511: Ratio & Proportion for Teachers	<p>(1.) Data were gathered from six students completing Math 511, a required mathematics course in the program.</p> <p>(2) Findings:</p> <ul style="list-style-type: none"> <li>Final exam – Final exams indicate that all six of the students earned above an 85% on the final exam. All three students had good or excellent explanations of concepts and knew when and how to apply them.</li> <li>Overall Final Folders grades ranged from 3.2 to 4.0 for the three students. The area of most concern was the lack of detail in making explicit underlying assumptions regarding the representation of rational numbers, ratios, and proportional thinking in a problem-solving context.</li> </ul>	<p>(1.) Continue emphasizing that students must provide a thorough explication of the details behind the underlying assumptions, and make clear connections between the concepts, actions, and symbolic representations involved.</p> <p>(2.) It is critical for students to understand that capturing the flexibility and diverse ways of approaching ratios and proportions is dependent on the details of the structural approaches. However, because of the wide range of mathematical understanding initially held by students, much time was spent even processing what I considered to have been prerequisite knowledge. So, having a clear standard of prerequisite ability will enable this class to go deeper into the mathematical ways of teaching and learning.</p>	<p>AY 2011-2012.</p> <p>Discuss changes to the course for the next time it is offered, including:</p> <p>A refocused attention on prerequisites, and how to deal with limitations of both conceptual and procedural knowledge of ratios and proportions.</p>	<p>Students were able to demonstrate their understanding of the role of representation in developing ratio and proportion, via applications to a variety of problem-solving contexts. However, more depth could have been attained had all students been at a higher initial level of mathematical proficiency. I expect that future students will continue to struggle with the need to provide a consistently clear analysis with a focus on making underlying assumptions explicit.</p>

Student Learning Outcome	Strategy or method of measurement	Observations gathered from data	Actions recommended based on observations	Plan and timetable for taking action	Overall evaluation of progress on objective
<p>Develop a deep and connected understanding of mathematics concepts.</p> <p>Specifically: Ability to explain and apply concepts of probability and statistics.</p>	<p>Final Exam and Final Project for Math 513: Data Analysis and Probability for Teachers</p>	<p>(1.) Data were gathered from four students completing Math 513, a required mathematics course in the program.</p> <p>(2) Findings:</p> <ul style="list-style-type: none"> <li>Final exams indicate that all four of the students earned above an 88% on the final exam. All four students had good or excellent explanations of concepts and knew when to apply them.</li> <li>Overall project grades ranged from 3.6 to 4.0 for the four students. The area of most concern was the lack of sophisticated statistical procedures built into their project designs.</li> </ul>	<p>(1.) Continue emphasizing that students must provide complete explanations of concepts and connections between concepts.</p> <p>(2.) The projects were not as valuable to students as they could have been. Since the project was a culminating project, but the course schedule did not include more sophisticated statistical procedures until late in the quarter, and did not address hypothesis testing until the last week, students' projects were limited to those that did not include sophisticated statistical procedures or hypothesis testing. We should consider reorganizing the topics of the course so that students can design projects that use more of the more complex ideas of the course.</p>	<p>AY 2011-2012. Discuss changes to the course for the next time it is offered (Summer 2013).</p>	<p>Students were able to demonstrate their understanding of the concepts and connections on exam questions, by both applying them to textbook type problems, and explaining them. However, being able to apply the same concepts to projects that they design would better indicate their ability to apply the concepts as teachers in the future.</p>

Student Learning Outcome	Strategy or method of measurement	Observations gathered from data	Actions recommended based on observations	Plan and timetable for taking action	Overall evaluation of progress on objective
<p>Develop a deep and connected understanding of mathematics concepts</p> <p>Specifically: Ability to explain and apply the concepts of rate of change and Calculus.</p>	Final Exam and Final Project for Math 516: Calculus for Middle School Teachers	<p>(1.) Data were gathered from one student completing Math 516, a elective mathematics course in the program.</p> <p>(2) Findings:</p> <ul style="list-style-type: none"> <li>Final exam – student earned 84% with above average explanations and application of concepts.</li> </ul> <p>Overall project grade was 70%. The area of most concern was the lack of details and use of research on teaching functions in the lesson plans designed.</p>	<p>(1.) Continue emphasizing that students must provide complete explanations of concepts and connections between concepts.</p> <p>(2.) It is critical for students to understand the level of detail required in planning effective lessons and the criteria of applying knowledge gained via the research readings to the lessons.</p>	AY 2011-2012. Discuss changes to the course for the next time it is offered (Summer 2012) as well as how to deal with limitations of both conceptual and procedural knowledge of precalculus topics	I anticipate that students will continue to struggle with precalculus procedural knowledge as much as calculus topics, despite the emphasis on the underlying concepts of calculus.