

**Assessment Report (2010-2011)**

**Central Connecticut State University  
Department of Mathematical Sciences  
Sixth Year Certificate in Mathematics Education Leadership**

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**Preamble:**

The overall objective of the Sixth Year Certification Degree in Mathematics Education Leadership is to develop highly skilled and knowledgeable educators who can play leadership roles in their schools and districts to improve student learning in mathematics. There are two tracks within this degree to meet the objectives of our graduates. One track leads to the department chair certification (DCC). The other track leads to the intermediate administrator certification (IAC). Students progress through the program in cohorts. Course and classroom work are enlivened by internships in area schools. Students complete course work within three years (two academic years including three summer sessions). Students in the DCC track will perform one semester of internship, while those in the IAC track will perform two semester-long internships.

**Section 1. Learning Outcomes**

When students complete this program they will be effective leaders in mathematics and as such:

1. Will possess deep content knowledge of the mathematics that is taught in the school, with a focus on grades K-12, and are able to analyze any mathematics curriculum in terms of its logical, psychological, and sociological sources.
2. Are knowledgeable about research on the learning and teaching of mathematics and its impact in the classroom.
3. Examine cultural connections with mathematics and mathematics education and are aware of equity issues, such as gender, race, ethnicity, social class, language acquisition, access to technology, and achievement.
4. Is able to use assessment as a tool for continued program improvement.
5. Applies their deep understanding of curriculum, learning, teaching, the social context of education, and assessment issues to the challenges of improving teaching and learning in their school and district.

**Alignment of Learning Outcomes to Required Courses**

<b>Learning Outcome</b>	<b>Addressed in the following Course(s)</b>
LO1, Content Knowledge	Math 611 & Math 612
LO2, Theories of Learning	Math 613
LO3, Cultural Connections	Math 615
LO4, Assessment	Math 614 & Math 616
LO5, Application of Skills and Knowledge	MATH 622 OR EDL 660 OR EDL 691

**Section 2. Findings.**

The Department of Mathematical Sciences performed two evaluations of the program. The first evaluation is from the professors who have completed courses in the program. The second evaluation is from the perspective of the students enrolled in the program made up of three parts. The first part is an

evaluation of the program upon the completion of MATH 611 and MATH 612 in the spring of 2010. The second is an evaluation of the program upon the completion of MATH 615 in the summer of 2010. And, the third evaluation was completed upon the completion of MATH 613 in the fall of 2010. The findings along with an analysis and use of results are provided for each course.

When the mathematics component of the program is complete in Fall 2011, a full analysis of the mathematics component will be conducted. Beginning Fall 2011, all students will be enrolled in the Educational Leadership component of the program. During the Educational Leadership component, students complete two internships (one at the school level and one at the district level) and the courses connected with those internships. Mathematics data will not be collected by the mathematics department during this component; however, we will work with Educational Leadership to acquire the appropriate data to include in next year's report. The results, analysis, and use of results for each course are shown below. These individual course evaluations will later be used to evaluate the entire program.

**FACULTY EVALUATIONS of Course outcomes:**

**MATH 611**

LO1: Students will possess deep content knowledge of mathematics that is taught in the schools, with a focus on grades K-12 and are able to analyze any mathematics curriculum in terms of its logical, psychological and sociological sources.

**Tasks**

1. Students learned how curriculum is developed from the logical, the psychological, and the sociological perspective.
2. Students evaluated current elementary school textbooks from grades 1, 3, 5 and 8 identifying the above three components or lack thereof. Students defended their searches through written reports.
3. Students evaluated elementary school textbooks from the 80s using the above three components for the above grades. Students defended their searches through written reports.
4. Students evaluated elementary textbooks from the 60s using the above three components for the above grades. Students defended their searches through written reports
5. Students extrapolated how curriculum changed in the elementary grades over the past 50 years. Students defended their searches through written reports.
6. Students interviewed teachers from grades 1, 3, 5 and 8 for their impressions of the role of a system.

**Table 1. Faculty Evaluation of Students in Math 611**

Task#	Exceeds Expectations	Meets Expectations	Does Not Meet Expectations
1	3	6	0
2	2	7	0
3	2	7	0
4	2	7	0
5	3	5	0
6	4	5	0

N = 9 students

**Analysis:**

1. The cohort has become a very cohesive group. They support each other in their assignments. They are never critical of each other.
2. It was very difficult to successfully move the students out of their comfort zones. That is, the one elementary teacher felt very uncomfortable considering the idea of extending the elementary curriculum into the middle school. Most notably was the difficulty in getting the class to feel comfortable in discussing the elementary curriculum. In general two students did exceptional work in this area, all other students, however difficult the task, did acceptable work in investigating the evolution of the elementary school mathematics curriculum.

**Use of Results:**

1. In the next cohort we will require each student to get out of his or her comfort zone in order to become more fluent in understanding and vocalizing the evolution of the elementary teachers evaluating the curricula used by various schools.
2. Each student will take one stand of an elementary program and develop it utilizing each of the three components of curriculum development with the goal of balancing the strand.

**MATH 612**

LO1: Students will possess deep content knowledge of the mathematics that is taught in schools, with a focus on grades 7-12, and are able to analyze any mathematics curriculum in terms of its logical, psychological, and sociological sources.

**Tasks**

1. Reaction papers to assigned readings.
2. Curriculum Topic Study based on the work of Keely and Rose (Mathematics Curriculum Topic Study, Thousand Oaks, CA: Corwin Press, 2006). Students worked in teams of three or four with each member responsible for part of the presentation. Each team was assigned to select a topic from one curriculum area: Algebra, Geometry, or Statistics.
3. Curriculum Project Evaluation. This assignment was based on one of the “exemplary curricula,” e.g. Core Plus, IMP, Math Connections, UCSMP, or Connected Math. Students work in pairs.
4. Analysis of the 7-12 curriculum in a specific school district and recommendations for improvement. This was an individual assignment.

**Table 2. Faculty Evaluation of Students in Math 612**

Task#	Exceeds Expectations	Meets Expectations	Does Not Meet Expectations
1	2	7	0
2	0	9	0
3	0	9	0
4	2	6	1

N=9 students

**Analysis:**

1. Writing skills are weaker than expected. Some students had difficulty summarizing and analyzing an article.
2. Students felt uncomfortable working on more than one assignment at a time (e.g. a weekly reaction paper and a longer term project.)
3. Some students would have preferred that all assignments be given individually (rather than two major tasks requiring collaboration). Students had logistical problems meeting between class sessions.

4. Students felt the Curriculum Topic Study was too open ended.

**Use of Results:**

1. Give more explicit instructions with writing prompts including exemplars of outstanding work.
2. Reduce the number collaborative tasks from two to one.
3. Modify the Curriculum Topic Study Task to be more focused, therefore producing less anxiety.

**MATH 613**

LO2: Mathematics education leaders are knowledgeable about different theories of learning. They are knowledgeable about current research in learning mathematics and the impact it has had on students in the classroom. They understand how the conceptual understanding of mathematics is constructed by students and how it is connected to students’ prior knowledge. They conceptualize how the results of current research in learning mathematics might be implemented in schools

**Tasks**

1. Students interviewed K-12 students to discover what the K-12 students’ understanding of various mathematics concepts really is.
2. The students were exposed to learning mathematics in a second language, including sign language. They were also exposed to how a variety of mathematical operations are carried out in different cultures.
3. Students examined how the human brain learns mathematics and the differences in learning mathematics by gender.
4. How learning mathematics is impacted by a variety of disabilities was investigated.

**Table 3. Faculty Evaluation of Students in Math 613**

Task#	Exceeds Expectations	Meets Expectations	Does Not Meet Expectations
1	3	5	0
2	4	3	0
3	3	4	0
4	2	5	0

N=9 students

**Analysis:**

1. Students have begun to move out of their comfort zones. In particular, when they were assigned to learn something that they had avoided in the past because of their discomfort with the topic, they met the challenge enthusiastically and successfully.
2. The two youngest students pondered leaving the program. Their issues were not with the program itself, but a combination of personal issues, and having been students for their entire lives since kindergarten with no breaks.
3. All the students feel much stress from the academic work load of taking two graduate courses (Ed. Lead., courses along with math courses) at once, along with their own teaching, and family responsibilities.

**Use of Results:**

1. Have students fulfill all pre-reqs prior to starting program.
2. Spell out program’s work load at time of interviews or have an orientation prior to the first course so that students will be able to understand the scope of the program.

3. Get students to review each other's writing or have students find editors to evaluate their writing before submitting product to professor.
4. Offer some courses or some parts of courses on-line.

**MATH 615**

LO3: Students will be able to examine cultural connections with mathematics and mathematics education. They are aware of equity issues, such as gender, race, ethnicity, social class, language acquisition, access to technology, and achievement.

**Tasks**

1. Read assigned sections of texts: a. Greer, *Culturally Responsive Mathematics Education*. b. Stanic, *A History of School Mathematics*. c. Suzuki, *Mathematics in Historical Context*.
2. Students were asked to move outside of their comfort zone by visiting a location from a different culture – another language group, another socioeconomic or ethnic group.
3. Students were asked to prepare four brief papers on topics in each of the study areas. They were to read and critique two papers from their classmates on each of the topics. Ultimately they were to present their papers at a mini-conference at the end of the summer.

**Table 4. Faculty Evaluation of Students in Math 615**

Task#	Exceeds Expectations	Meets Expectations	Does Not Meet Expectations
1	2	5	0
2	5	2	0
3	2	4	1

N=9 students

**Analysis:**

1. When faced with reading significant passages from a scholarly text most of these students have difficulty reading for a big picture. They resisted the reading, but eventually each of them found parts of each of the required texts to be interesting and useful for application in their own classes or as material that suggested areas for their own papers.
2. Students are uncomfortable on more than one paper at a time, yet, for leaders the ability to be able to work on more than one major project at a time is a crucial skill. They resisted having to write the four brief papers, but in the end expressed a sense that the papers had turned out well. The writing of papers seems to be a challenge for all but three of them.
3. Most of the students would have liked more specific guidance at every open-ended task. I believe that as future leaders it will be essential for them to respond to open-ended tasks with little guidance or direction. With the exception of two outstanding students in the class, they do not seem to be able to manage time and responsibilities with flexibility.

**Use of Results:**

1. Give more explicit instructions with writing prompts including exemplars of outstanding work.
2. Reduce the number collaborative tasks from two to one.
3. Modify the Curriculum Topic Study Task to be more focused, therefore producing less anxiety.

**MATH 614 AND 616**

LO4: Students will understand how to use assessment as a tool for continual program improvement

**Tasks**

Not yet taught

**MATH 622 OR EDL 660 OR EDL 691**

LO5: Students will be able to apply their deep understanding of curriculum, learning, teaching, the social context of education, and assessment issues to the challenges of improving teaching and learning in their school and district

**Tasks**

Math 622 was designed for the Department Chair strand. No student has selected that strand. EDL 690 and 691.

**APPENDIX**  
**Course and Capstone Requirements**

**Department Chair Certification (DCC) Track (33 credits)**

- EDL 655 Leadership and Supervision, August of first year (three credits)
- MATH 611 Mathematics Curriculum K-8 Theory and Implementation, Fall of first year (three credits)
- MATH 612 Mathematics Curriculum 7-14 Theory and Implementation, and MATH elective, Spring of first year (three credits each)
  
- MATH 615 The Cultural Context of Mathematics Education, Summer of second year (three credits)
- STAT 453 (if needed) Summer of second year (three credits)
- MATH 613 Research on the Learning of Mathematics, Fall of second year (three credits)
- MATH elective, Fall of second year (three credits)
- MATH 614 Research on the Teaching of Mathematics, Spring of second year (three credits)
- EDL 514 Administration, Spring second year (three credits)
- MATH 616 Assessment in Mathematics Education, Summer of third year (three credits)
- MATH 622 Internship in Mathematics Education Leadership, Fall of third year (two credits)

**Intermediate Administrator Certification (IAC) Track (37 credits)**

- EDL 655 Leadership and Supervision, August of first year (three credits)
- MATH 611 Mathematics Curriculum K-8 Theory and Implementation, Fall of first year (three credits). Students notified of acceptance to IAC track
- MATH 612 Mathematics Curriculum 7-14 Theory and Implementation, Spring of first year (three credits)
- MATH 615 The Cultural Context of Mathematics Education, Summer of second year (three credits)
- STAT 453 (if needed) Summer of second year (three credits)
- MATH 613 Research on the Learning of Mathematics, Fall of second year (three credits)
- EDL 610 School Leadership I, Fall of second year (three credits)
- MATH 614 Research on the Teaching of Mathematics, Spring of second year (three credits)
- EDL 611 School Leadership II, Spring of second year (three credits)
- MATH616 Assessment in Mathematics Education, Summer of third year (three credits)
- EDL 615 Understanding External Environments of School Leadership I, Fall of third year (three credits)
- EDL 690 Internship in Educational Leadership I: Theory and Practice, Fall of third year (two credits)
- EDL 616 Understanding External Environments of School Leadership II, Spring of third year (three credits)
- EDL 691 Internship in Educational Leadership II: Research and Practice, Spring of third year (two credits)
- Prepare for Connecticut Administrators Test, Summer of third year