

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
1.2	Reasoning: Submit a narrative that describes how the requirements of your program provide opportunities for your candidates to make and evaluate mathematical conjectures, arguments, and to validate their own mathematical thinking. What evidence indicates that this is being accomplished?	<p>Major: In MTH 483 (Fundamental Concepts in Geometry), teacher candidates make conjectures about geometric properties, and then verify/refute their conjectures by performing precise constructions.</p> <p>In MTH 477 and 478 (Concepts of Modern Elementary School Math I and II), mathematical problems are posed requiring teacher candidates to solve problems and establish rules, patterns and/or generalizations based on the solutions. Evidence: Oral or written demonstrations and illustrations showing rules, patterns and/or generalizations have been established.</p>	<p>Minor: In MTH 483 (Fundamental Concepts in Geometry), teacher candidates make conjectures about geometric properties, and then verify/refute their conjectures by performing precise constructions.</p> <p>In MTH 477 and 478 (Concepts of Modern Elementary School Math I and II), mathematical problems are posed requiring teacher candidates to solve problems and establish rules, patterns and/or generalizations based on the solutions. Evidence: Oral or written demonstrations and illustrations showing rules, patterns and/or generalizations have been established.</p>
1.3	Communication: Submit a narrative that describes how the requirements of your program provide opportunities for your candidates to use both oral and written discourse between teacher and candidates and among candidates to develop and extend candidates' mathematical understanding. What evidence indicates that this is being accomplished?	<p>Major: MTH 480 (Analysis for Teachers) makes use of the Computer Algebra System (CAS) Maple. Maple assignments allow the students to focus on the set-up and analysis of the problem. These assignments require that students analyze the output given and interpret results. Answers must be explained in complete sentences, giving students practice in communicating mathematically.</p> <p>In MTH 477/478 (Concepts of Modern Elementary School Math I and II), opportunities are provided, both in and outside of class, for students to interact with each other and share ideas in small and large groups. Evidence: Group activities and sharing and participating in individual assessment projects.</p> <p>In MTH 484 (History of Mathematics), teacher candidates give presentations before the class, and respond to questions about their presentations, thus engaging in interactive dialogue regarding the highlights of math history.</p>	<p>Minor: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), opportunities are provided, both in and outside of class, for students to interact with each other and share ideas in small and large groups. Evidence: Group activities and sharing and participating in individual assessment projects.</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
1.4	<p>Connections: Submit a narrative that describes how the requirements of your program provide opportunities for your candidates to demonstrate an understanding of mathematical relationships across disciplines and connections within mathematics. <i>What evidence indicates that this is being accomplished?</i></p>	<p>Major: In MTH 477 and MTH 478 (Concepts of Modern Elementary School Math I and II), the NCTM Principles and Standards are addressed and explored within grade level bands. The mathematical concepts are related to literature, science, social science, art, etc., and to real-life experiences. Evidence: Individual assessment projects. In MTH 483 (Fundamental Concepts of Geometry), many geometry problems lend themselves to applications in architecture, physics, astronomy, surveying, etc. In MTH 484 (History of Mathematics), while teacher candidates discuss the history of mathematics, many related disciplines are discussed as motivating factors in the development of many branches of mathematics.</p>	<p>Minor: In MTH 477 and MTH 478 (Concepts of Modern Elementary School Math I and II), the NCTM Principles and Standards are addressed and explored within grade level bands. The mathematical concepts are related to literature, science, social science, art, etc., and to real-life experiences. Evidence: Individual assessment projects. In MTH 483 (Fundamental Concepts of Geometry), many geometry problems lend themselves to applications in architecture, physics, astronomy, surveying, etc.</p>
1.5	<p>Programs prepare prospective teachers who can:</p>		

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
1.5.1	demonstrate knowledge of the development, use, and multiple representation of numbers and number systems; apply concepts of number, number theory, and number systems;	<p>Major: MTH 477 and 478 (Concepts of Modern Elementary School Math I and II), teaching is modeled that is consistent with the National Council of Teachers of Mathematics (NCTM) <i>Principles and Standards for School Mathematics</i> and is congruent with the Michigan mathematics Benchmarks. These courses offer multiple tools, strategies and ideologies are utilized in the teaching of mathematical concepts. Students explore hands-on materials that assist in the conceptual understanding of mathematics. MTH 481 (Modern Algebra for Teachers) topics include modular arithmetic, as well as groups and fields, using many different number systems to demonstrate properties of number sets and operations. MTH 486 (Higher Arithmetic for Teachers, one of two possible electives) is a thorough course in Number Theory; highlights include modular arithmetic, divisibility, primality, and factor trees.</p>	<p>Minor: MTH 477 and 478 (Concepts of Modern Elementary School Math I and II), teaching is modeled that is consistent with the National Council of Teachers of Mathematics (NCTM) <i>Principles and Standards for School Mathematics</i> and is congruent with the Michigan mathematics Benchmarks. These courses offer multiple tools, strategies and ideologies are utilized in the teaching of mathematical concepts. Students explore hands-on materials that assist in the conceptual understanding of mathematics. MTH 481 (Modern Algebra for Teachers) topics include modular arithmetic, as well as groups and fields, using many different number systems to demonstrate properties of number sets and operations. MTH 486 (Higher Arithmetic for Teachers, one of two possible electives) is a thorough course in Number Theory; highlights include modular arithmetic, divisibility, primality, and factor trees.</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
1.5.2	<p>demonstrate number sense and knowledge of number systems; apply numerical computation and estimation techniques and extend them to algebraic expressions; model the use of the four basic operations (addition, subtraction, multiplication, and division) in multiple contexts; use a variety of mental computation techniques; apply estimation strategies to quantities, measurements, and computation to determine the reasonableness of results; model, explain, and develop a variety of computational algorithms;</p>	<p>Major: In MTH 477 and MTH 478 (Concepts of Modern Elementary School Math I and II) and in MTH 480 (Analysis for Teachers), a variety of concrete and representational models are used to implement conceptual mathematical ideas and promote understanding, including patterns and relationships, in abstract thinking. Grade level band development is incorporated in the course. Teacher candidates investigate various mathematical tools and algorithms. Each topic in these courses is taught numerically, graphically and algebraically. Students see a variety of approaches to solving problems, including numerical approaches. MTH 486 (Higher Arithmetic for Teachers, one of two possible electives) is a thorough course in Number Theory; highlights include modular arithmetic, divisibility, primality, and factor trees.</p>	<p>Minor: In MTH 477 and MTH 478 (Concepts of Modern Elementary School Math I and II) and in MTH 480 (Analysis for Teachers), a variety of concrete and representational models are used to implement conceptual mathematical ideas and promote understanding, including patterns and relationships, in abstract thinking. Grade level band development is incorporated in the course. Teacher candidates investigate various mathematical tools and algorithms. Each topic in these courses is taught numerically, graphically and algebraically. Students see a variety of approaches to solving problems, including numerical approaches. MTH 486 (Higher Arithmetic for Teachers, one of two possible electives) is a thorough course in Number Theory; highlights include modular arithmetic, divisibility, primality, and factor trees.</p>
1.5.3	<p>apply the process of measurement to two- and three-dimensional objects using <i>non-standard</i>, customary and metric units;</p>	<p>Major: In MTH 477 and MTH 478 (Concepts of Modern Elementary School Math I and II), non-standard and standard units of measurement, as well as non-numeric models are utilized. Teacher candidates explore activities making connections between two and three-dimensional objects. Three-dimensional models are constructed, analyzed and decomposed. In MTH 483 (Fundamental Concepts of Geometry), more than a week of this class is spent reviewing tactile experiments teachers can conduct to emphasize measurement and computation of standard geometric figures.</p>	<p>Minor: In MTH 477 and MTH 478 (Concepts of Modern Elementary School Math I and II), non-standard and standard units of measurement, as well as non-numeric models are utilized. Teacher candidates explore activities making connections between two and three-dimensional objects. Three-dimensional models are constructed, analyzed and decomposed. In MTH 483 (Fundamental Concepts of Geometry), more than a week of this class is spent reviewing tactile experiments teachers can conduct to emphasize measurement and computation of standard geometric figures.</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
1.5.4	use geometric concepts and relationships to describe and model mathematical ideas and real-world constructs;	<p>Major: In MTH 477 and MTH 479 (Concepts of Modern Elementary School Math I and II), real-world models are used in hands-on activities. Teacher candidates view videos extending the use of geometric concepts, relationships and constructions in the real-world. Many topics in MTH 477, 478, and 480 require geometric as well as algebraic modeling of problems. MTH 483 (Fundamental Concepts of Geometry) This is a course in the teaching of Euclidean geometry.</p>	<p>Minor: In MTH 477 and MTH 479 (Concepts of Modern Elementary School Math I and II), real-world models are used in hands-on activities. Teacher candidates view videos extending the use of geometric concepts, relationships and constructions in the real-world. Many topics in MTH 477, 478, and 480 require geometric as well as algebraic modeling of problems. MTH 483 (Fundamental Concepts of Geometry) This is a course in the teaching of Euclidean geometry.</p>
1.5.5	understand the major concepts of Euclidean geometry from a variety of perspectives including coordinate and transformational;	<p>Major: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), tangrams, miras, mirrors, geoboards, and grid and dot paper are utilized to explore Euclidean geometry and make connections between coordinates and transformations. In MTH 480 (Analysis for Teachers), algebraic transformations of functions are covered. MTH 483 (Fundamental Concepts of Geometry) is a course in the teaching of Euclidean geometry.</p>	<p>Minor: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), tangrams, miras, mirrors, geoboards, and grid and dot paper are utilized to explore Euclidean geometry and make connections between coordinates and transformations. In MTH 480 (Analysis for Teachers), algebraic transformations of functions are covered. MTH 483 (Fundamental Concepts of Geometry) is a course in the teaching of Euclidean geometry.</p>
1.5.6	use both descriptive and inferential statistics to analyze data, make predictions, and make decisions; collect, organize, represent, analyze, and interpret data;	<p>Major: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), multiple techniques for collecting, organizing and representing data are used. After the data is interpreted and analyzed, the information is used either descriptively and/or inferentially.</p>	<p>Minor: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), multiple techniques for collecting, organizing and representing data are used. After the data is interpreted and analyzed, the information is used either descriptively and/or inferentially.</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
1.5.7	apply concepts and interpret probability in real-world situations, construct sample spaces, model and compare experimental probabilities with mathematical expectations, use probability to make predictions;	<p>Major: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), activities utilizing probability in real-world situations are explored in class. Individual or small group data is compiled to make predictions and to make comparisons to classical probability.</p>	<p>Minor: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), activities utilizing probability in real-world situations are explored in class. Individual or small group data is compiled to make predictions and to make comparisons to classical probability.</p>
1.5.8	use algebra to describe patterns, relations, and functions, and to model and solve problems;	<p>Major: In MTH 480 (Analysis for Teachers), many topics in this course require geometric as well as algebraic modeling of problems. Students determine many of the formulas taught, by looking for patterns in earlier results In MTH 477/478 (Concepts of Modern Elementary School Math I and II), manipulatives are used to build patterns (such as: ABAB, AABAAB), increasing and decreasing patterns. Students interpret relationships and functions and use algebra with various levels of difficulty. In MTH 481 (Modern Algebra for Teachers), homomorphisms are studied to demonstrate similar patterns of interactions of elements in various groups and fields. In MTH 483 (Fundamental Concepts of Geometry), pattern recognition is used as a device for deriving many useful formulas.</p>	<p>Minor: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), manipulatives are used to build patterns (such as: ABAB, AABAAB), increasing and decreasing patterns. Students interpret relationships and functions and use algebra with various levels of difficulty. In MTH 481 (Modern Algebra for Teachers), homomorphisms are studied to demonstrate similar patterns of interactions of elements in various groups and fields. In MTH 483 (Fundamental Concepts of Geometry), pattern recognition is used as a device for deriving many useful formulas.</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
1.5.9	understand the role of axiomatic systems and proofs in different branches of mathematics, such as algebra and geometry;	<p>Major: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), teacher candidates work with informal proofs, develop models for proofs and make connections with the axiomatic systems and proofs. In MTH 481 (Modern Algebra for Teachers), teacher candidates prove many theorems and properties of number systems and permutations. In MTH 483 (Fundamental Concepts of Geometry), Euclidean axiomatic theory is discussed, and the main geometry theorems of Euclid's Elements are explored through construction projects. MTH 486 (Higher Arithmetic for Teachers), one of two possible electives), teacher candidates prove many theorems and properties of the natural numbers.</p>	<p>Minor: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), teacher candidates work with informal proofs, develop models for proofs and make connections with the axiomatic systems and proofs. In MTH 481 (Modern Algebra for Teachers), teacher candidates prove many theorems and properties of number systems and permutations. In MTH 483 (Fundamental Concepts of Geometry), Euclidean axiomatic theory is discussed, and the main geometry theorems of Euclid's Elements are explored through construction projects. MTH 486 (Higher Arithmetic for Teachers), one of two possible electives), teacher candidates prove many theorems and properties of the natural numbers.</p>
1.5.10	understand calculus as modeling dynamic change, including an intuitive understanding of differentiation and integration and apply calculus concepts to real-world settings;	<p>Major: The basics of calculus are covered in MTH 112 (Mathematical Analysis II), the derivative and its applications. The definite integral is investigated in Chapter 5 of Larson and Edwards' textbook, <i>Brief Calculus: An Applied Approach (6th Edition)</i>. The teacher candidates visualize these concepts through application to real-world settings.</p>	<p>Minor: The basics of calculus are covered in MTH 112 (Mathematical Analysis II), the derivative and its applications. The definite integral is investigated in Chapter 5 of Larson and Edwards' textbook, <i>Brief Calculus: An Applied Approach (6th Edition)</i>. The teacher candidates visualize these concepts through application to real-world settings.</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
1.5.11	use counting to enumerate and order; use matrices, finite graphs, and trees to model problem situations; describe basic algorithms for accomplishing tasks;	<p>Major: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), teacher candidates learn to use counting in a variety of ways. Matrices are used when exploring multiplication and division concepts. Tree models are utilized when using prime factorizations in relationship to rational numbers.</p> <p>In MTH 482 (Linear Algebra for Teachers), one of two possible electives), simple problems in linear programming are solved using the Simplex Method and tableaux.</p>	<p>Minor: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), teacher candidates learn to use counting in a variety of ways. Matrices are used when exploring multiplication and division concepts. Tree models are utilized when using prime factorizations in relationship to rational numbers.</p> <p>In MTH 482 (Linear Algebra for Teachers), one of two possible electives), simple problems in linear programming are solved using the Simplex Method and tableaux.</p>
1.5.12	describe and represent mathematical relationships; use mathematical modeling to solve real-world problems;	<p>Major: In MTH 480 (Analysis for Teachers), modeling data through functions and solving applications are covered.</p> <p>In MTH 477/478 (Concepts of Modern Elementary School Math I and II), hands-on materials are consistently used as concrete and representational models to show relationships. Students view and discuss videos illustrating real-world problems solving.</p>	<p>Minor: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), hands-on materials are consistently used as concrete and representational models to show relationships. Students view and discuss videos illustrating real-world problems solving.</p>
1.5.13	understand and apply the concepts of proportional reasoning; and	<p>Major: In MTH 483 (Fundamental Concepts of Geometry), similarity is studied in detail, as an introduction to proportional reasoning and as a prelude to trigonometry.</p>	<p>Minor: In MTH 483 (Fundamental Concepts of Geometry), similarity is studied in detail, as an introduction to proportional reasoning and as a prelude to trigonometry.</p>
1.5.14	understand and apply concepts of variable and function.	<p>Major: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), exposure to open-frames and patterns lay foundations for teacher candidates to understand variables and function.</p> <p>MTH 483 Formulas for area and volume are presented as functions of several variables.</p>	<p>Minor: MTH 477/478 Exposure to open-frames and patterns lays foundations for students to understand variables and function.</p> <p>MTH 483 Formulas for area and volume are presented as functions of several variables.</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
1.6	Programs prepare prospective teachers who have a knowledge of historical development in mathematics that includes the contributions of under-represented groups and diverse cultures.	<p>Major: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), as mathematical ideas are presented, recognition of contributing diverse cultures is noted.</p> <p>In MTH 484 (History of Mathematics), topics in math history are discussed chronologically. Early in the course, the origin of many areas of mathematics, particularly in China, India, and the Middle East, is studied in detail. Papers are assigned on famous female mathematicians and African-American mathematicians.</p>	<p>Minor: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), as mathematical ideas are presented, recognition of contributing diverse cultures is noted.</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
2.0	TEACHING PREPARATION		
2.1	<p><u>Diverse Learners</u> Submit a narrative that describes how the requirements of your program prepare teachers of mathematics to <i>develop and use</i> their knowledge of student diversity to affirm and support full participation and continued study of mathematics by all students. This diversity includes gender, ethnicity, socioeconomic background, language, special needs, and mathematical learning styles.</p> <p><u>Diverse Learners</u></p>	<p>Major: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), class activities are multi-faceted and multi-sensory. Provisions are deliberately made for student to solve problems with diverse solutions, any of which is an equally correct solution. Information about special needs, student difficulties, learning modalities, etc. is shared during class discussions.</p> <p>In MTH 484 (History of Mathematics), topics in math history are discussed chronologically. Early in the course, the origin of many areas of mathematics, particularly in China, India, and the Middle East, is studied in detail. Papers are assigned on famous female mathematicians and African-American mathematicians.</p> <p>Through inclusion of diversity issues in Education courses, students are provided many opportunities to learn about gender, ethnicity, socioeconomic background, language, special needs, and mathematical learning styles and to learn and practice inclusive teaching strategies to ensure that all students will learn mathematical content and skills. These examples are illustrative of such opportunities. EDU 400 (Introduction to Education) engages the students in activities based upon Lisa Delpit's book <i>Other People's Children</i>. Their action research and case study require observation, participation, and reflections in diverse K-12 school settings. Mathematic majors and minors concentrate their efforts on how children respond to mathematical instruction. EDU 420 (Philosophy of Education) and EDU 525</p>	<p>Minor: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), class activities are multi-faceted and multi-sensory. Provisions are deliberately made for student to solve problems with diverse solutions, any of which is an equally correct solution. Information about special needs, student difficulties, learning modalities, etc. is shared during class discussions.</p> <p>Through inclusion of diversity issues in Education courses, students are provided many opportunities to learn about gender, ethnicity, socioeconomic background, language, special needs, and mathematical learning styles and to learn and practice inclusive teaching strategies to ensure that all students will learn mathematical content and skills. These examples are illustrative of such opportunities. EDU 400 (Introduction to Education) engages the students in activities based upon Lisa Delpit's book <i>Other People's Children</i>. Their action research and case study require observation, participation, and reflections in diverse K-12 school settings. Mathematic majors and minors concentrate their efforts on how children respond to mathematical instruction. EDU 420 (Philosophy of Education) and EDU 525 (Educational Policy Studies) celebrate diversity through small group discussions of class handouts that focus on issues of race, culture, gender, and socio-economic diversity. In EDU 440 (School and Society) and EDU 514 (Society and Education), gender role stereotypes are studied, discussed, and used in projects and other assignments. In the reading methods course, EDU 443, readings, videos/movies/DVD's are used to</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
2.1 (cont.)	<p>Submit a narrative that describes how the requirements of your program prepare teachers of mathematics to <i>develop and use</i> their knowledge of student diversity to affirm and support full participation and continued study of mathematics by all students. This diversity includes gender, ethnicity, socioeconomic background, language, special needs, and mathematical learning styles.</p>	<p>(Educational Policy Studies) celebrate diversity through small group discussions of class handouts that focus on issues of race, culture, gender, and socio-economic diversity. In EDU 440 (School and Society) and EDU 514 (Society and Education), gender role stereotypes are studied, discussed, and used in projects and other assignments. In the reading methods course, EDU 443, readings, videos/movies/DVD's are used to understand cultural differences in children and to show K-12 classroom teachers modeling strategies that are successful with students from different cultural backgrounds. Attention to special needs students is particularly addressed in SED 460 (Education and Mainstreaming of Exceptional Persons) and in SED 560 (Exceptional Persons) where students learn and practice how to adapt lessons to the special needs of children, both in the general classroom and a tutorial classroom. In EDU 449 (Methods and Materials of Instruction for Mathematics in Elementary and Middle Schools), students must address issues of differences in the assignments, projects, lesson/unit plans, and in their reflective writing journals. In their Student Teaching experiences (EDU 489, 474, and/or 484), candidates are placed in settings with diversity and work with students of various mathematical abilities.</p>	<p>understand cultural differences in children and to show K-12 classroom teachers modeling strategies that are successful with students from different cultural backgrounds. Attention to special needs students is particularly addressed in SED 460 (Education and Mainstreaming of Exceptional Persons) and in SED 560 (Exceptional Persons) where students learn and practice how to adapt lessons to the special needs of children, both in the general classroom and a tutorial classroom. In EDU 449 (Methods and Materials of Instruction for Mathematics in Elementary and Middle Schools), students must address issues of differences in the assignments, projects, lesson/unit plans, and in their reflective writing journals. In their Student Teaching experiences (EDU 489, 474, and/or 484), candidates are placed in settings with diversity and work with students of various mathematical abilities.</p>
2.2	<p><u>Technology</u> Submit a narrative that describes how the requirements of your program prepare teachers of mathematics to use appropriate technology to support the learning of mathematics. This technology</p>		

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
	includes, but is not limited to,		
2.2.1	computers and computer software, calculators, interactive television, distance learning, electronic information resources, and a variety of relevant multimedia.	<p>In MTH 477/478 (Concepts of Modern Elementary School Math I and II), calculator use in the classroom is modeled and investigated.</p> <p>In MTH 480 (Analysis for Teachers) and MTH 111 (Mathematical Analysis I), teacher candidates use graphing calculators and the CAS Maple software program to examine solutions of linear systems and properties of matrices and linear transformations. Students are taught when it is appropriate to use these tools as well as how to use them effectively. Such knowledge is adaptable to use for helping elementary students learn the use of technology in mathematics and to learn mathematics concepts.</p> <p>While all Education courses require use of appropriate technology to facilitate learning and professors model and use a variety of technology in their teaching, two courses focus on helping candidates learn and demonstrate their ability to apply electronic tools and software for teaching K-12 students subject matter: EDU 449 (Methods and Materials of Instruction for Mathematics in Elementary and Middle Schools) and the education technology courses, EDU 459 and 600 (Instructional Technology).</p> <p>Education professors rely on their colleagues in the Mathematics courses to provide the foundation for use of calculators, graphing calculators, and mathematical software</p>	<p>In MTH 477/478 (Concepts of Modern Elementary School Math I and II), calculator use in the classroom is modeled and investigated.</p> <p>In MTH 111 (Mathematical Analysis I), teacher candidates use graphing calculators and the CAS Maple software program to examine solutions of linear systems and properties of matrices and linear transformations. Students are taught when it is appropriate to use these tools as well as how to use them effectively. Such knowledge is adaptable to use for helping elementary students learn the use of technology in mathematics and to learn mathematics concepts.</p> <p>While all Education courses require use of appropriate technology to facilitate learning and professors model and use a variety of technology in their teaching, two courses focus on helping candidates learn and demonstrate their ability to apply electronic tools and software for teaching K-12 students subject matter: EDU 449 (Methods and Materials of Instruction for Mathematics in Elementary and Middle Schools) and the education technology courses, EDU 459 and 600 (Instructional Technology). Education professors rely on their colleagues in the Mathematics courses to provide the foundation for use of calculators, graphing calculators, and mathematical software programs. In EDU 449 students explore how technology can support math skill development beyond simple drill and practice.</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
2.2.1 (cont.)	computers and computer software, calculators, interactive television, distance learning, electronic information resources, and a variety of relevant multimedia.	<p>programs. In EDU 449 students explore how technology can support math skill development beyond simple drill and practice. Projects and lesson/unit plans must incorporate technology appropriately. In EDU 459 and 600 candidates are taught how to integrate technology into instruction, which is modeled by the professor. Mathematics majors and minors concentrate on preparing to use a variety of technology tools in the math K-12 classrooms. Integration of technology is accomplished mainly through interdisciplinary collaborative projects and curriculum building activities. During their student teaching experience, candidates are expected to infuse technology and demonstrate that their students did learn mathematical content and skills from their lessons. The candidates' formal assessments by their Co-operating Teacher and UDM Supervisors include assessment of their technology expertise.</p>	<p>Projects and lesson/unit plans must incorporate technology appropriately. In EDU 459 and 600 candidates are taught how to integrate technology into instruction, which is modeled by the professor. Mathematics majors and minors concentrate on preparing to use a variety of technology tools in the math K-12 classrooms. Integration of technology is accomplished mainly through interdisciplinary collaborative projects and curriculum building activities. During their student teaching experience, candidates are expected to infuse technology and demonstrate that their students did learn mathematical content and skills from their lessons. The candidates' formal assessments by their Co-operating Teacher and UDM Supervisors include assessment of their technology expertise.</p>
2.3	<u>Assessment</u> : Submit a narrative that describes how the requirements of your program prepare teachers of mathematics to use:		
2.3.1	Formative and summative methods to determine students' understanding of mathematics and to monitor their own teaching effectiveness. How do you ensure that teacher candidates can carefully align their instructional and assessment practices?	<p>Major: The concept of aligning instructional and assessment practices is at the center of the EDU 449 (Methods and Materials of Instruction for Math in Elementary and Middle Schools). Not only does the instructor for the course model both formative and summative assessment (as he indicates on Page 3 of his syllabus), he also clearly expects it of the students, as demonstrated by his explicit reference to the continual use of Chapter 5 of the text ("Building Assessment into Instruction") in all teacher candidate work. Additionally, teacher candidates are required to keep a portfolio of their work and this can be used to monitor the teacher candidate's strengths and area for improvement related to aligning curriculum and assessment,</p>	<p>Minor: The concept of aligning instructional and assessment practices is at the center of the EDU 449 (Methods and Materials of Instruction for Math in Elementary and Middle Schools). Not only does the instructor for the course model both formative and summative assessment (as he indicates on Page 3 of his syllabus), he also clearly expects it of the students, as demonstrated by his explicit reference to the continual use of Chapter 5 of the text ("Building Assessment into Instruction") in all teacher candidate work. Additionally, teacher candidates are required to keep a portfolio of their work and this can be used to monitor the teacher candidate's strengths and area for improvement related to aligning curriculum and assessment, among other things.</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
		<p>among other things.</p> <p>Teacher candidates understanding of mathematical concepts is, in part, checked during MTH 477 (Concepts of Modern Elementary School Math I). This course includes a gateway written examination, and problems set forth in this exam model the more difficult problems found on the MTTC mathematics subject test. Students must receive a score of 80% or better to pass and to continue with courses for the Math major, minor, or endorsement.</p>	<p>Teacher candidates understanding of mathematical concepts is, in part, checked during MTH 477 (Concepts of Modern Elementary School Math I). This course includes a gateway written examination, and problems set forth in this exam model the more difficult problems found on the MTTC mathematics subject test. Students must receive a score of 80% or better to pass and to continue with courses for the Math major, minor, or endorsement.</p>
2.3.2	<p>Formative assessment to monitor student learning and to adjust instructional strategies and activities. Formative assessment includes, but is not limited to, questioning strategies, student writing, student products, and student performance.</p>	<p>Major: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), informal formative assessment is made during the first class session. The method used is: individual and small group reaction to specific questions regarding content and expectations. Total group debriefing follows. Subsequent formative assessment is made by instructor observation and student input.</p> <p>In EDU 449 (Methods and Materials of Instruction for Mathematics in the Elementary and Middle Schools), teacher candidates receive formal instruction and complete assignments that demonstrate their mastery of a variety of assessment strategies that will help their students understand what they know as well as inform their instructional practice. Chapter 5, "Building Assessment into Instruction," in Van de Walle's text provides explanation and examples of a variety of appropriate assessments: rubrics and performance indicators, observation, writing and journals, high-stakes testing and traditional quizzes and examinations, portfolios, diagnostic interviews, grading. The education and technology courses (EDU 459 and EDU 600) include projects that help candidates learn to use</p>	<p>Minor: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), informal formative assessment is made during the first class session. The method used is: individual and small group reaction to specific questions regarding content and expectations. Total group debriefing follows. Subsequent formative assessment is made by instructor observation and student input.</p> <p>In EDU 449 (Methods and Materials of Instruction for Mathematics in the Elementary and Middle Schools), teacher candidates receive formal instruction and complete assignments that demonstrate their mastery of a variety of assessment strategies that will help their students understand what they know as well as inform their instructional practice. Chapter 5, "Building Assessment into Instruction," in Van de Walle's text provides explanation and examples of a variety of appropriate assessments: rubrics and performance indicators, observation, writing and journals, high-stakes testing and traditional quizzes and examinations, portfolios, diagnostic interviews, grading. The education and technology courses (EDU 459 and EDU 600) include projects that help candidates learn to use technology as a formative assessment tool for their students and themselves</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
		<p>technology as a formative assessment tool for their students and themselves as teachers. EDU 432 (Psychology of Education) and EDU 513 (Principles of Learning, Development, and Adjustment) develop knowledge and understanding of measurement and evaluation in the teaching/learning process. As their Mathematics colleagues practice sound formative assessment practices in their courses, so do the Education instructors. Reflective journal writing, interviews, review of draft copies of assignments, rubrics, peer review, discussion and traditional quizzes and examinations are assessment staples in Education courses.</p>	<p>as teachers. EDU 432 (Psychology of Education) and EDU 513 (Principles of Learning, Development, and Adjustment) develop knowledge and understanding of measurement and evaluation in the teaching/learning process. As their Mathematics colleagues practice sound formative assessment practices in their courses, so do the Education instructors. Reflective journal writing, interviews, review of draft copies of assignments, rubrics, peer review, discussion and traditional quizzes and examinations are assessment staples in Education courses.</p>
2.3.3	<p>Summative assessment to determine student achievement and to evaluate the mathematics program. Summative assessment includes, but is not limited to, teacher-designed tests, criterion-referenced tests, norm-referenced tests, portfolios, projects, and other open-ended student products.</p>	<p>Major: MTH 47/478 (Concepts of Modern Elementary School Math I and II) To determining student achievement, teacher observation, evaluation of mathematical concepts used in product assessments and evaluation of test grades are used. Teacher candidates also revisit their perception about the class, as viewed the first day of class (see 2.32) and compare their thinking at the end of the year. Teacher candidate comments are considered by the instructor, when planning for future courses. Summative assessment practices are presented and modeled in the Education courses in ways similar to those explained in the previous two standards. In EDU 449 (Methods and Materials of Instruction for Mathematics in the Elementary and Middle Schools), teacher candidates present a test designed by them for teaching a specific mathematics concept, which is reviewed by their peers. They also maintain a collection of assessment strategies designed by their classmates. Working with MEAP results and other criterion and norm referenced tests is</p>	<p>Minor: MTH 47/478 (Concepts of Modern Elementary School Math I and II) To determining student achievement, teacher observation, evaluation of mathematical concepts used in product assessments and evaluation of test grades are used. Teacher candidates also revisit their perception about the class, as viewed the first day of class (see 2.32) and compare their thinking at the end of the year. Teacher candidate comments are considered by the instructor, when planning for future courses. Summative assessment practices are presented and modeled in the Education courses in ways similar to those explained in the previous two standards. In EDU 449 (Methods and Materials of Instruction for Mathematics in the Elementary and Middle Schools), teacher candidates present a test designed by them for teaching a specific mathematics concept, which is reviewed by their peers. They also maintain a collection of assessment strategies designed by their classmates. Working with MEAP results and other criterion and norm referenced tests is also</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
2.4	Programs prepare prospective teachers who can identify, teach, and model problem solving in grades K-8. How do you ensure that teacher candidates can do this effectively?	<p>also part of EDU 449.</p> <p>Major: In MTH 477/478 (concepts of Modern Elementary School Math I and II), the class learning experience requires teacher candidates to identify and model problem solving. An expected outcome is: future teachers will teach as teaching was modeled at the university. Teaching problem-solving is the basis of all assignments and products in EDU 449 (Methods and Materials of Instruction for Mathematics in the Elementary and Middle Schools). We ensure that our teacher candidates can teach mathematics this way through continuous evaluation of their work in the course. Our final proof is demonstrated through the informal and formal assessments by the Cooperating Teacher in the assigned K-8 classroom and the UDM Student Teacher Supervisors as well as through the teacher candidate's self reflection practices. As soon as a student teacher appears to be lacking in her/his ability to teach and model problem solving by the Cooperating teacher or University Supervisor, the teacher candidate is provided additional assistance to improve her/his performance. If at the end of the Student Teaching experience, the teacher candidate does not meet UDM standards, he/she receives an Incomplete for the course and a plan for remediation is designed and implemented. The teacher candidate then is assigned to another student teaching experience. If the student fails to meet the standard, he/she is counseled out of the teaching program.</p>	<p>part of EDU 449.</p> <p>Minor: In MTH 477/478 (concepts of Modern Elementary School Math I and II), the class learning experience requires teacher candidates to identify and model problem solving. An expected outcome is: future teachers will teach as teaching was modeled at the university. Teaching problem-solving is the basis of all assignments and products in EDU 449 (Methods and Materials of Instruction for Mathematics in the Elementary and Middle Schools). We ensure that our teacher candidates can teach mathematics this way through continuous evaluation of their work in the course. Our final proof is demonstrated through the informal and formal assessments by the Cooperating Teacher in the assigned K-8 classroom and the UDM Student Teacher Supervisors as well as through the teacher candidate's self reflection practices. As soon as a student teacher appears to be lacking in her/his ability to teach and model problem solving by the Cooperating teacher or University Supervisor, the teacher candidate is provided additional assistance to improve her/his performance. If at the end of the Student Teaching experience, the teacher candidate does not meet UDM standards, he/she receives an Incomplete for the course and a plan for remediation is designed and implemented. The teacher candidate then is assigned to another student teaching experience. If the student fails to meet the standard, he/she is counseled out of the teaching program.</p>
2.5	Programs prepare prospective teachers who use a variety of physical and visual materials for exploration and development of mathematical	<p>Major: Math 111 (Mathematical Analysis I) covers fractions, decimals, algebraic concepts, all of which are evaluated by homework and test results.</p>	<p>Minor: Math 111 (Mathematical Analysis I) covers fractions, decimals, algebraic concepts, all of which are evaluated by homework and test results. In MTH 477/478 (Concepts of Modern</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
2.5 (cont.)	<p>concepts in grades K-8, including prenumeration concepts; numbers (whole numbers, fractions, decimals, percents) and their relationships; four basic operations with positive and negative rational numbers; geometric concepts and spatial visualization; measurement concepts and procedures; algebraic concepts; logical conjectures and conclusions using words such as all, some, and none; and concepts of probability and elementary data analysis. See <i>Michigan Curriculum Framework, 1996</i> and its successor documents). How is this evaluated?</p>	<p>In MTH 477/478 (Concepts of Modern Elementary School Math I and II), students are expected to work in cooperative groups. During class, one person from each group is chosen to work a random problem at board and the whole group is given a grade based on the one person's result. The expectation is that this invites students to work together and teach material to one another so that everyone is well-prepared to answer the given problem presented to them. Homework in these courses also involve the use of manipulatives</p> <p>MTH 481 (Modern Algebra of Teachers) includes proof writing and basic set theory homework and proof writing tests and quizzes.</p> <p>MTH 485 (Statistics for Teachers) includes data analysis test and homework and, in this course, homework carries more weight than test. Projects involve data collection from survey/repeated measurements and require categorization of data in terms of common distributions (See project assignments 3& 4 in syllabus)</p> <p>Education courses and professors assume that teacher candidates have experienced a variety of physical and visual materials for learning these mathematics concepts in their Mathematics courses; reinforce the methods; and teach the candidates how to design, adapt, and implement such strategies in their K-8 classrooms. The syllabus and textbook used in EDU 449 (Methods and Materials of Instruction for Mathematics in the Elementary and Middle Schools) demonstrate that all of the mathematical terms listed are covered through reading, lecture, student and professor presentations, discussions, and personal exploration and reflective thinking—orally and in writing. Candidates are introduced to the</p>	<p>Elementary School Math I and II), students are expected to work in cooperative groups. During class, one person from each group is chosen to work a random problem at board and the whole group is given a grade based on the one person's result. The expectation is that this invites students to work together and teach material to one another so that everyone is well-prepared to answer the given problem presented to them. Homework in these courses also involve the use of manipulatives</p> <p>MTH 481 (Modern Algebra of Teachers) includes proof writing and basic set theory homework and proof writing tests and quizzes.</p> <p>The syllabus and textbook used in EDU 449 (Methods and Materials of Instruction for Mathematics in the Elementary and Middle Schools) demonstrate that all of the mathematical terms listed are covered through reading, lecture, student and professor presentations, discussions, and personal exploration and reflective thinking— orally and in writing. Candidates are introduced to the <i>Michigan Curriculum Framework</i> in EDU 400 (Introduction to Education) as they explore pursuing education as a career and while they conduct their field study in the subject areas they believe they may wish to teach. Students become familiar with the <i>MCF</i> through web based and text based activities in their elementary methods courses (EDU 441-Sciences, EDU 442-Social Science, EDU 443-Reading, EDU 448-Reading and Language Arts).</p> <p>Finally, they are assigned to K-8 schools that have aligned their mathematics and other curricula to the State standards, materials, and tests. The use of the <i>MCF</i> and other state materials is evaluated through the use of rubrics and other evaluation formats that require that the student site such sources and demonstrate their use of them in</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
		<p><i>Michigan Curriculum Framework</i> in EDU 400 (Introduction to Education) as they explore pursuing education as a career and while they conduct their field study in the subject areas they believe they may wish to teach. Students become familiar with the <i>MCF</i> through web based and text based activities in their elementary methods courses (EDU 441-Sciences, EDU 442-Social Science, EDU 443-Reading, EDU 448-Reading and Language Arts).</p> <p>Finally, they are assigned to K-8 schools that have aligned their mathematics and other curricula to the State standards, materials, and tests. The use of the <i>MCF</i> and other state materials is evaluated through the use of rubrics and other evaluation formats that require that the student site such sources and demonstrate their use of them in discussions; preparation of and presentation of projects, lesson and unit plans; and in their teaching.</p>	<p>discussions; preparation of and presentation of projects, lesson and unit plans; and in their teaching.</p>
2.6	<p>Programs prepare prospective teachers who use a variety of print and electronic resources (e.g. calculators and computers).</p>	<p>Major: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), teacher candidates use computers and calculators in computations and problem solving situations as well as in their preparatory work for presentations, class discussions, and their written work. In MTH 484 (History of Mathematics), teacher candidates conduct research on the internet in preparing their in-class presentations. Mathematics and Education professors use a variety of electronic resources in their own teaching and require their students to demonstrate their ability to use appropriate electronic resources in their oral presentations and written documents. Candidates learn the benefits of technology to maximize student</p>	<p>Minor: In MTH 477/478 (Concepts of Modern Elementary School Math I and II), teacher candidates use computers and calculators in computations and problem solving situations as well as in their preparatory work for presentations, class discussions, and their written work. Mathematics and Education professors use a variety of electronic resources in their own teaching and require their students to demonstrate their ability to use appropriate electronic resources in their oral presentations and written documents. Candidates learn the benefits of technology to maximize student learning and facilitate higher order thinking skills and how to enrich their teaching and their students' learning in EDU 459 (Instructional Technology) or EDU 600 (Computer Use in Education). In EDU 449</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
		<p>learning and facilitate higher order thinking skills and how to enrich their teaching and their students' learning in EDU 459 (Instructional Technology) or EDU 600 (Computer Use in Education). In EDU 449 (Methods and Materials of Instruction for Mathematics in the Elementary and Middle Schools), candidates learn and practice the appropriate use of calculators, computers, and other electronic tools in mathematics teaching. Chapter 8 in Van de Walle's textbook, "Technology and School Mathematics," provides a foundation that is enhanced through professor and student demonstrations, observation in K-8 classrooms—including the instructor's classroom, other readings, and student designed documents. During the teacher candidates' Student Teaching experience, they are expected to use the electronic tools of the assigned school and to enhance, as appropriate and possible, the resources provided with their own electronic tools and/or University equipment and software. An Education computer laboratory is available in the UDM library for independent use by candidates and for professors to use with their courses and students. The UDM Library Liaison to Education is available to make presentations in the library computer labs as well as in the regular classrooms.</p>	<p>(Methods and Materials of Instruction for Mathematics in the Elementary and Middle Schools), candidates learn and practice the appropriate use of calculators, computers, and other electronic tools in mathematics teaching. Chapter 8 in Van de Walle's textbook, "Technology and School Mathematics," provides a foundation that is enhanced through professor and student demonstrations, observation in K-8 classrooms—including the instructor's classroom, other readings, and student designed documents. During the teacher candidates' Student Teaching experience, they are expected to use the electronic tools of the assigned school and to enhance, as appropriate and possible, the resources provided with their own electronic tools and/or University equipment and software. An Education computer laboratory is available in the UDM library for independent use by candidates and for professors to use with their courses and students. The UDM Library Liaison to Education is available to make presentations in the library computer labs as well as in the regular classrooms.</p>
2.7	<p>Programs prepare prospective teachers who know when and how to use student groupings such as collaborative groups, cooperative learning, and peer teaching.</p>	<p>Major: Mathematics professors regularly engage their students in collaborative groups with individual responsibilities for submitting their own work for evaluation. The following mathematics classes are especially effective about instructors requiring collaboration: MTH 112, MTH 477, MTH 478 (how to use student groupings in the elementary class room is also included in these two courses), MTH 481, MTH 483, and MTH 485.</p>	<p>Minor: Mathematics professors regularly engage their students in collaborative groups with individual responsibilities for submitting their own work for evaluation. The following mathematics classes are especially effective about instructors requiring collaboration: MTH 112, MTH 477, MTH 478 (how to use student groupings in the elementary class room is also included in these two courses), MTH 481, and MTH 483. Students review and give oral</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
		<p>Students review and give oral and written reflections about classmates' work. In the Education Department, collaborative groups are an integral part of the instructional methods used by the professors. In addition, candidates are taught and demonstrate through class discussions, presentations, and their documents how to use student groupings, cooperative learning, and peer teaching. In EDU 400 (Introduction to Education) students are engaged in such in-class activities as they create a community of learners to explore the possibility of Education as a career for themselves. Their Case study must include an explanation and discussion of the criteria used within the observed classes to form groups and how they form naturally. Lectures and activities provide students with the necessary foundation to identify the qualities of effective cooperative work.</p> <p>EDU 449 (Methods and Materials of instruction for Mathematics in Elementary and Middle Schools), provides students with repeated opportunities to work in groups and to learn the most effective ways of grouping K-8 students in a classroom designed around problem-based teaching.</p> <p>The Elementary Methods classes (EDU 441, 442, 443, and 448) enhance the candidates' understanding and ability to use collaboration and peer review in their design of lesson and unit plans for K-8 classrooms. The Assessment forms used by the K-12 Collaborating Teachers and the UDM Supervisors during their Student Teaching experience (EDU 489, EDU 474, and/or EDU 484) calls for assessment of a variety of instructional practices and class room management strategies which include appropriate and effective use of collaborative practices to facilitate children's mathematical</p>	<p>and written reflections about classmates' work. In the Education Department, collaborative groups are an integral part of the instructional methods used by the professors. In addition, candidates are taught and demonstrate through class discussions, presentations, and their documents how to use student groupings, cooperative learning, and peer teaching. In EDU 400 (Introduction to Education) students are engaged in such in-class activities as they create a community of learners to explore the possibility of Education as a career for themselves. Their Case study must include an explanation and discussion of the criteria used within the observed classes to form groups and how they form naturally. Lectures and activities provide students with the necessary foundation to identify the qualities of effective cooperative work.</p> <p>EDU 449 (Methods and Materials of instruction for Mathematics in Elementary and Middle Schools), provides students with repeated opportunities to work in groups and to learn the most effective ways of grouping K-8 students in a classroom designed around problem-based teaching.</p> <p>The Elementary Methods classes (EDU 441, 442, 443, and 448) enhance the candidates' understanding and ability to use collaboration and peer review in their design of lesson and unit plans for K-8 classrooms. The Assessment forms used by the K-12 Collaborating Teachers and the UDM Supervisors during their Student Teaching experience (EDU 489, EDU 474, and/or EDU 484) calls for assessment of a variety of instructional practices and class room management strategies which include appropriate and effective use of collaborative practices to facilitate children's mathematical learning.</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
2.8	<p>Programs prepare prospective teachers who use instructional strategies based on current research as well as national, state (i.e. Teaching and Learning Standards from Chapter 4 of Michigan Curriculum Framework, pages 46-62, 1996, and its successor documents), and local standards relating to mathematics instruction.</p>	<p>learning.</p> <p>Major: The courses in the Education Elementary Education program must adhere to the Department's <i>Conceptual Framework</i>, which is grounded in the wisdom of past and contemporary educators, practitioners, and theoreticians. The Michigan documents were among the resources for the development of the Education Department's statement. While all the Education courses involve the students in using the <i>MCF</i> and other documents from the state as well as national and professional organizations in the candidates' classroom activities, presentations, and documents; the following courses concentrate on teaching the candidates how to use such resources in their preparation and instruction in the K-8 classroom: EDU 441 (Elementary Science Methods), EDU 442 (Social Science methods), EDU 443 (Reading Methods), and EDU 448 (Language Arts and Reading Methods). Most relevant, the Van de Walle textbook used in EDUC 449 (Methods and Materials of Instruction of Mathematics in the Elementary and Middle Schools), is correlated with NCTM's <i>Principles and Standards for School Mathematics</i> and notes about them accompany the topics presented. Candidates are expected to use these documents in their design of and presentation of practice lessons, orally and in writing. During their Student Teaching experience, candidates use the objectives and resources of the school district to which they are assigned. They are placed in districts that have aligned their curriculum to state standards.</p>	<p>Minor: The courses in the Education Elementary Education program must adhere to the Department's <i>Conceptual Framework</i>, which is grounded in the wisdom of past and contemporary educators, practitioners, and theoreticians. The Michigan documents were among the resources for the development of the Education Department's statement. While all the Education courses involve the students in using the <i>MCF</i> and other documents from the state as well as national and professional organizations in the candidates' classroom activities, presentations, and documents; the following courses concentrate on teaching the candidates how to use such resources in their preparation and instruction in the K-8 classroom: EDU 441 (Elementary Science Methods), EDU 442 (Social Science methods), EDU 443 (Reading Methods), and EDU 448 (Language Arts and Reading Methods). Most relevant, the Van de Walle textbook used in EDUC 449 (Methods and Materials of Instruction of Mathematics in the Elementary and Middle Schools), is correlated with NCTM's <i>Principles and Standards for School Mathematics</i> and notes about them accompany the topics presented. Candidates are expected to use these documents in their design of and presentation of practice lessons, orally and in writing. During their Student Teaching experience, candidates use the objectives and resources of the school district to which they are assigned. They are placed in districts that have aligned their curriculum to state standards.</p>
2.9	<p>Programs prepare prospective teachers who can work on an interdisciplinary team and in an interdisciplinary</p>	<p>Major: Both Mathematics and Education professors prepare students to communicate about their subject area to a variety of audiences from</p>	<p>Minor: Both Mathematics and Education professors prepare students to communicate about their subject area to a variety of audiences from</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
2.9 (cont.)	<p>environment.</p> <p>Programs prepare prospective teachers who can work on an interdisciplinary team and in an interdisciplinary environment.</p>	<p>colleagues to parents and broader communities. EDU 400 (Introduction to Education) includes students from all academic areas. As they work in their groups and on their field study, they regularly explain and discuss their ideas with students from other areas. The Education courses that all students take (EDU 420 or 525—philosophy and policy; EDU 440 or 514—schools and society; EDU 432 or 513—psychology) require students to complete projects related to specifics of their academic areas. Mathematics students must present their work to this interdisciplinary group of classmates who are with them in these Education courses. In SED 460 or 560, which teaches candidates to deal with students who have exceptional needs, the candidates learn how to adapt general education objectives to special needs. Mathematics majors and minors learn how to communicate with the general education teacher as well as those from other disciplines. Group projects in the education technology courses, EDU 459 and 600, are deliberately cross-disciplinary, which ensures more practice in communicating mathematical knowledge to others. Once again, the elementary methods courses (EDU 441, 442, 443, and 448), which all elementary candidates take together, encourage students to include interdisciplinary practices as they learn to teach children how to read and the unique practices for their specific subject areas. In the math methods course, EDU 449, students learn how to use writing, discussions, and interviews to help children learn mathematical skills. They also design lessons and present them to their classmates which involve the use of mathematics in real life. Because all elementary candidates take this course, such lessons require students to consider how to communicate with students from</p>	<p>colleagues to parents and broader communities. EDU 400 (Introduction to Education) includes students from all academic areas. As they work in their groups and on their field study, they regularly explain and discuss their ideas with students from other areas. The Education courses that all students take (EDU 420 or 525—philosophy and policy; EDU 440 or 514—schools and society; EDU 432 or 513—psychology) require students to complete projects related to specifics of their academic areas. Mathematics students must present their work to this interdisciplinary group of classmates who are with them in these Education courses. In SED 460 or 560, which teaches candidates to deal with students who have exceptional needs, the candidates learn how to adapt general education objectives to special needs. Mathematics majors and minors learn how to communicate with the general education teacher as well as those from other disciplines. Group projects in the education technology courses, EDU 459 and 600, are deliberately cross-disciplinary, which ensures more practice in communicating mathematical knowledge to others. Once again, the elementary methods courses (EDU 441, 442, 443, and 448), which all elementary candidates take together, encourage students to include interdisciplinary practices as they learn to teach children how to read and the unique practices for their specific subject areas. In the math methods course, EDU 449, students learn how to use writing, discussions, and interviews to help children learn mathematical skills. They also design lessons and present them to their classmates which involve the use of mathematics in real life. Because all elementary candidates take this course, such lessons require students to consider how to communicate with students from other disciplines. During their Student Teaching</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
		<p>other disciplines. During their Student Teaching experience, candidates are involved in activities with the entire school and are evaluated on their ability to communicate with a variety of adult audiences, including parents.</p>	<p>experience, candidates are involved in activities with the entire school and are evaluated on their ability to communicate with a variety of adult audiences, including parents.</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
2.10	Programs introduce and involve prospective teachers in the professional community of mathematics educators.	<p>Major: Throughout their tenure in the teacher education program, teacher candidates are presented with information about, and encouraged to become involved in, in a wide-variety of professional organizations, NCTM among them. Education professors encourage their students to become involved in subject specific conferences at sites as well as through use of computers and other interactive electronic means such as teleconferencing and web sites. For example, in EDU 443 (Teaching Reading in the Elementary and Middle Schools), students learn to explain strategies for teaching literacy and study skills for various content areas. Mathematics majors and minors are expected to explore sites related to their subject area. In EDU 459 (Instructional Technology), students are engaged in identifying technology resources for ongoing professional development and as a means of keeping current with emerging technologies. During their Student Teaching experience, candidates observe the calendar of the schools to which they are assigned. The evaluation forms include evaluation of professional behavior and participation in professional activities. Candidates, therefore, do attend district in-services and other professional activities with their Co-operating Teacher. The Student Teaching Seminars provide practical and immediate opportunities to be involved in professional communities.</p>	<p>Minor: Throughout their tenure in the teacher education program, teacher candidates are presented with information about, and encouraged to become involved in, in a wide-variety of professional organizations, NCTM among them. Education professors encourage their students to become involved in subject specific conferences at sites as well as through use of computers and other interactive electronic means such as teleconferencing and web sites. For example, in EDU 443 (Teaching Reading in the Elementary and Middle Schools), students learn to explain strategies for teaching literacy and study skills for various content areas. Mathematics majors and minors are expected to explore sites related to their subject area. In EDU 459 (Instructional Technology), students are engaged in identifying technology resources for ongoing professional development and as a means of keeping current with emerging technologies. During their Student Teaching experience, candidates observe the calendar of the schools to which they are assigned. The evaluation forms include evaluation of professional behavior and participation in professional activities. Candidates, therefore, do attend district in-services and other professional activities with their Co-operating Teacher. The Student Teaching Seminars provide practical and immediate opportunities to be involved in professional communities.</p>
2.11	Programs prepare prospective	Major:	Minor:

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
	<p>teachers to understand, use, and evaluate district mathematics curricula and to deliver the curriculum to each student.</p>	<p>In EDU 449 (Methods and Materials of Instruction for Mathematics in the Elementary and Middle Schools), students analyze a mathematics teacher’s guide or manual and rate it according to appropriate student objectives, measurable assessments linked to objectives, and the quality of the strategies for helping students learn. During their Student Teaching experience, candidates are to use the district’s mathematics curriculum and textbooks to teach all students the expected mathematical knowledge and skill. “Delivery of Instruction” is the major component of all the evaluations completed by the Cooperating Teacher and University supervisor.</p>	<p>In EDU 449 (Methods and Materials of Instruction for Mathematics in the Elementary and Middle Schools), students analyze a mathematics teacher’s guide or manual and rate it according to appropriate student objectives, measurable assessments linked to objectives, and the quality of the strategies for helping students learn. During their Student Teaching experience, candidates are to use the district’s mathematics curriculum and textbooks to teach all students the expected mathematical knowledge and skill. “Delivery of Instruction” is the major component of all the evaluations completed by the Cooperating Teacher and University supervisor.</p>
3.0	FIELD BASED EXPERIENCES		
3.1	<p>Programs provide prospective teachers with a sequence of planned opportunities prior to student teaching to observe and participate in K-8 mathematics classrooms with qualified teachers. Experiences include observing, tutoring, mini-teaching, and planning mathematics activities and lessons for different mathematics courses and levels.</p>	<p>Major: As explained in Section 5 of this report, once candidates begin their Education program, they participate in a sequence of planned opportunities prior to student teaching to observe and participate in K-8 mathematics classrooms with qualified teachers. Potential mathematics teacher candidates would choose a K-8 mathematics classroom for observation, participation, and study in EDU 400 (Introduction to Education) as part of their field experience and report their findings in their case study. In the other core education courses (EDU 420 or 525, EDU 440 or 514, EDU 459 or 600, SED 460 or 560, 432 or 513), students visit K-12 schools appropriate to their endorsement level and use their findings and observations in class discussions and their assigned projects. The exact requirements vary from service learning projects to interviews of school personnel to actually working with a K-8 teacher. Mini-teaching presentations with peer review are</p>	<p>Minor: As explained in Section 5 of this report, once candidates begin their Education program, they participate in a sequence of planned opportunities prior to student teaching to observe and participate in K-8 mathematics classrooms with qualified teachers. Potential mathematics teacher candidates would choose a K-8 mathematics classroom for observation, participation, and study in EDU 400 (Introduction to Education) as part of their field experience and report their findings in their case study. In the other core education courses (EDU 420 or 525, EDU 440 or 514, EDU 459 or 600, SED 460 or 560, 432 or 513), students visit K-12 schools appropriate to their endorsement level and use their findings and observations in class discussions and their assigned projects. The exact requirements vary from service learning projects to interviews of school personnel to actually working with a K-8 teacher. Mini-teaching presentations with peer review are included in the elementary methods courses: EDU 441, 442, 443,</p>

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
		included in the elementary methods courses: EDU 441, 442, 443, and 448. In EDU 449, Mathematics Methods, candidates regular present to their classmates for critiquing carefully prepared lessons about specific mathematics topics. They also conduct observations in the instructor's elementary classroom as well as other elementary and middle school mathematics classroom. They arrange to assist with or to teach a lesson during those experiences.	and 448. In EDU 449, Mathematics Methods, candidates regular present to their classmates for critiquing carefully prepared lessons about specific mathematics topics. They also conduct observations in the instructor's elementary classroom as well as other elementary and middle school mathematics classroom. They arrange to assist with or to teach a lesson during those experiences.
3.2	Programs provide prospective teachers with a full-time student teaching experience in K-8 mathematics that is supervised by a qualified teacher and a university or college supervisor with K-8 teaching experience and is knowledgeable regarding K-8 mathematics.	As indicated in previous standards and in Section 2 of this report, candidates complete a student teaching assignment in an elementary or middle school K-8 classroom which includes teaching children mathematics. The contract consists of a full-day, 14 week contact, resulting in 8-10 semester hours of academic credit. The placement site provides opportunities for the student teacher, during the course of the semester, to assume gradually the full teaching responsibilities of the Co-operating Teacher. The student teacher is supervised by a co-operating teacher knowledgeable about all elementary subjects as well as a University Supervisor who visits the classroom at intervals to observe teaching and to make suggestions and evaluations as necessary. Both the Cooperating Teacher and the University Supervisor complete the evaluation forms displayed in the <i>Student Teaching Handbook</i> appendix.	As indicated in previous standards and in Section 2 of this report, candidates complete a student teaching assignment in an elementary or middle school K-8 classroom which includes teaching children mathematics. The contract consists of a full-day, 14 week contact, resulting in 8-10 semester hours of academic credit. The placement site provides opportunities for the student teacher, during the course of the semester, to assume gradually the full teaching responsibilities of the Co-operating Teacher. The student teacher is supervised by a co-operating teacher knowledgeable about all elementary subjects as well as a University Supervisor who visits the classroom at intervals to observe teaching and to make suggestions and evaluations as necessary. Both the Cooperating Teacher and the University Supervisor complete the evaluation forms displayed in the <i>Student Teaching Handbook</i> appendix.
3.3	Programs provide prospective teachers with time to confer with the supervising teacher and to do instructional planning.	School districts and the Cooperating Teachers agree and provide that Student Teachers will have regular K-8 planning time during the school day. Further, they agree to confer regularly with the Student Teacher on her/his progress and to spend time assisting the Student Teacher with planning and assessment work. They also agree to provide time for the Student Teachers to attend the Seminars, a minimum of 5 Student	School districts and the Cooperating Teachers agree and provide that Student Teachers will have regular K-8 planning time during the school day. Further, they agree to confer regularly with the Student Teacher on her/his progress and to spend time assisting the Student Teacher with planning and assessment work. They also agree to provide time for the Student Teachers to attend the Seminars, a minimum of 5 Student Teaching

No.	Standard/Guideline	Courses and/or Experiences that Fulfill the Standards for Elementary Programs	
		<p>Teaching seminars held during the term. Students are not to be used as substitute teachers. Policies and procedures exist to manage the Student Teaching experience and to make adjustments as needed. Such action can originate with any of the participants and proceed from the Cooperating Teacher and University Supervisor to the Student Teacher Director, the Department Chair, and Associate Dean/Certification Officer.</p>	<p>seminars held during the term. Students are not to be used as substitute teachers. Policies and procedures exist to manage the Student Teaching experience and to make adjustments as needed. Such action can originate with any of the participants and proceed from the Cooperating Teacher and University Supervisor to the Student Teacher Director, the Department Chair, and Associate Dean/Certification Officer.</p>