

The North Carolina Elementary Mathematics Add-on License Project (NC EMAoL):
Building the Infrastructure to Support a Systemic and Sustainable Statewide Implementation

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The North Carolina Elementary Mathematics Add-on License Project is a coordinated effort between the North Carolina Department of Public Instruction (NCDPI), the University of North Carolina General Administration (UNCGA), statewide LEA representation at the school and district levels, and university faculty representation from colleges of education and arts and science. The collaborative statewide effort began spring 2008 when, through funding from the Burroughs Wellcome Fund and the Cisco Learning Institute, the NCDPI co-sponsored a weeklong retreat to design an Elementary Mathematics Specialist Program-of-Study for the North Carolina State Board of Education consideration. This initial effort gained focus and direction through the leadership of the UNCGA.

North Carolina Elementary Mathematics Add-on License

Unlike other licensing areas where individual universities establish a program of study to meet state licensing objectives, the NC State Board of Education charged the University of North Carolina System (UNCGA) with the establishment and maintenance of the program of study to support the Elementary Mathematics Add-on License. A consortium of seven UNC universities designed and piloted the program of study from 2009-2011. In 2011-2012 the consortium added an eighth university as they redesigned and piloted a blended online synchronous and asynchronous implementation model and had the series of six graduate courses approved for offering at each university. Each university is using the catalog descriptions and, as much as possible, the same course syllabi. A common end-of-program assessment system is used. While the information cited here is from the East Carolina University Graduate Catalog, similar results have already been approved at the North Carolina State University, University of North Carolina – Chapel Hill, University of North Carolina – Charlotte, University of North Carolina – Greensboro, Appalachian State University and the University of North Carolina – Wilmington. The program approval for North Carolina A & T State University is expected to be completed later this academic year.

1. The educational objectives of the program.

On July 9, 2009, the North Carolina State Board of Education approved a proposed program of study for an Elementary Mathematics Add-On License. The online program of study (six graduate level courses totaling 18 hours) focuses on the mathematical knowledge needed for successfully teaching mathematics at the elementary level (grades K through 5). Currently, elementary school teachers are considered generalists. The majority complete only one or two mathematics courses as part of their teacher preparation programs; therefore, they need additional coursework to build an essential understanding of mathematics, the process of learning mathematics, and children's mathematical thinking, thus giving them the knowledge and skills to be strong mathematics teachers. The coursework from the add-on licensure program also provides a foundation for additional

graduate coursework since the credits may also be applied toward a master's degree at the collaborating universities. The NC EMAoL project supports the design and implementation of a delivery model that will sustain the add-on licensure program and provide data to answer critical questions about the impact of the program on teachers and their students.

2. How the EMAoL courses meet the stated educational objectives.

The proposed program of study was developed by the UNCGA through a carefully crafted curriculum research and development process. In January 2009, the UNCGA established a statewide Advisory Board, charged to support the design and implementation of a graduate program of study (four to six courses) leading to an elementary mathematics license focused on the mathematical knowledge needed for successfully teaching mathematics at the elementary level. This included facilitating the design of a program-of-study, advising the UNCGA on its curricular content and communicating with mathematics and mathematics education faculty regarding the implementation of the program-of-study to meet the requirements for a NC State Board of Education elementary mathematics add-on license. The Advisory Board included Alan Mabe & Alisa Chapman (UNCGA), Sid Rachlin (ECU), Sarah Berenson (UNCG), Tyrette Carter (NC A&T), Jere Confrey (NCSU), Susan Friel (UNCCH), Katie Mawhinney (ASU), Kitty Rutherford (NCDPI), and Wendy Rich (Asheboro City Public Schools).

After a series of weekly meetings, the Advisory Board agreed that all courses in the proposed program of study would:

- Include graduate level expectations & accountability that balance direct instruction with project-oriented teaching methods
- Stress mathematical content needed to support the teaching of elementary mathematics, illustrating how a deeper understanding of subject matter can actually enhance problem solving, critical thinking, and other 21st century skills. Mathematical content strands include: number systems and operations; rational numbers and operations; spatial orientation and visualization; measurement and data analysis; fostering the development of algebraic reasoning including patterns structure, conjecture, generalizations and proof; and algebraic operations as generalized arithmetic. Courses stress the mathematical connections and representations across content strands.
- Provide connections to practice and the NC Standard Course of Study (currently this is the Common Core State Standards) with a focus on a thorough development of basic mathematical ideas and skills, with an emphasis on understanding the sequential nature of mathematics and the mathematical structures inherent in the content strands.
- Balance the needs of K-2 and 3-5 teachers with links to the mathematics content and skills students need to successfully learn middle grades mathematics.
- Enable 21st century professional learning communities for teachers that model the kinds of classroom learning that best promotes 21st century skills for students
- Cultivate teachers' ability to identify students' particular learning styles, intelligences, strengths and weaknesses
- Help teachers develop their abilities to use various strategies (such as formative assessments) to reach diverse students and to create environments that support differentiated teaching and learning
- Encourage knowledge sharing among communities of practitioners, using face-to-face, virtual and blended communications
- Support the use of technology to improve teaching and learning mathematics.

A statewide focus meeting was held in February 2008 to review and revision the program of study and to have the proposed program-of-study finalized later in the spring of 2009. The focus group totaled over fifty individuals and represented university mathematicians and mathematics educators from twelve UNC institutions, mathematics specialists from NCDPI and from school districts across the state. Participants at the meeting provided input on the design of the program of study, recommended curriculum writers and reviewers and advised the UNCGA on its implementation.

The proposed program of study recommended by the focus group includes six graduate courses. Each course is distinguished by a focus on a high-leverage teaching practice, a primary area of mathematics necessary for successfully teaching elementary school mathematics and a secondary area of mathematical content. The primary content area provides the context for exemplifying the high-leverage teaching practice. The secondary content area provides the context for demonstrating the transfer of the high-leverage teaching practice to other content strands. For example, the understanding and applying knowledge of learning trajectories is initially developed for rational numbers and their operations. The generalization of the role and application of learning trajectories is modeled using measurement as its secondary curriculum area. Each course also identifies the profound understanding of fundamental mathematics teachers develop and demonstrate through the program of study. The following chart provides an overview of the six courses.

| HIGH-LEVERAGE MATHEMATICS TEACHING PRACTICES | MATHEMATICAL CONTENT |
|---|---|
| Selecting, Designing, and Using Mathematical Tasks | Primary (80%): Number Systems & Operations (Place Value) Secondary (20%): Number Theory and Rational Numbers |
| Understanding and Applying Knowledge of Learning Trajectories | Primary (80%): Rational Numbers and Operations Secondary (20%): Measurement |
| Orchestrating Classroom Interactions | Primary (80%): Measurement Secondary (20%): Data Analysis |
| Fostering Reasoning through Discourse and Questioning | Primary (80%): Algebraic Reasoning; Including Patterns Structure, Conjecture, Generalizations and Proof Secondary (20%): Number Systems & Operations |
| Assessing Student Knowledge (Diagnosis and Intervention) | Primary (80%): Spatial Orientation And Visualization Secondary (20%): Early Number Concepts |
| Helping Teachers Develop as School-based Leaders | Primary (80%): Connecting, Relearning, and Integrating Content Areas—Mathematical Modeling Secondary (20%): From Number to Algebra |

Number Systems and Operations: Selecting, Designing, and Using Mathematical Tasks in the K-5 Classroom. Teachers build on their content knowledge of elementary school mathematics while exploring mathematical tasks through the lens of a practitioner. Teachers explore the role of effective mathematical tasks in teaching number systems and operations, emphasizing place value topics, and in teaching basic number theory and introductory rational number topics. As the first course in the program, the course focuses on the instructional role of constructing, analyzing, and/or selecting appropriate mathematical tasks to support student learning of mathematical concepts. The instructional activities – tasks, problems, and materials – with which students and teachers engage are a central component of mathematics instruction. How instructional activities are designed, with what mathematics potential, scope, and adaptability, matters for the work students do and their opportunities to learn. Teachers explore and implement specific research-based mathematical tasks with their students. This allows them to see how different types of mathematical tasks elicit different types of mathematical thinking in their students. These activities also provide teachers

with opportunities to examine the depth of their own understanding of mathematical ideas and to build on that content knowledge. Teachers learn how to construct effective mathematical tasks and how to analyze the nature and quality of instructional activities found in mathematics curriculum and resource materials. They also learn how to select and construct mathematical tasks for assessment purposes.

Rational Numbers and Operations: Understanding and Applying Knowledge of Learning Trajectories in the K-5 Mathematics Classroom. This Elementary Mathematics Add-on License Course is distinguished by its focus on understanding and applying knowledge of learning trajectories. Working with learning trajectories develops an awareness of how to think of the complex interaction of mathematical concepts and how they deepen across grade levels. Rational number and measurement are the primary and secondary content topics addressed with an emphasis on how related concepts build across the elementary grades. Participants learn about the concepts of equipartitioning, fractions, ratio and rate, decimals and percents, proportional reasoning, and measurement through the lens of learning trajectories. They participate in problem-solving situations and explore basic principles related to how their students might approach such problems. Teachers learn to identify the prior knowledge necessary to support students' problem solving and how to push the students toward new levels of understanding. The teachers' profound mathematical understanding allows them to make connections among concepts and procedures that their students are learning, accept and encourage multiple solution strategies, stress basic ideas and dispositions in mathematics, and identify the coherence of their subject area within the elementary curriculum.

Data Analysis and Measurement: Orchestrating K-5 Mathematics Classroom Interactions. The course is designed to increase the statistical literacy of elementary teachers and to enable them to promote statistical literacy in the classroom. Statistical literacy is the ability to read and interpret data, the ability to think critically about statistics, and to use statistics as evidence in arguments. Utilizing the recommendations of the NCTM's Data Analysis and Probability Standard, elementary teachers learn to work with students to collect data, organize their own or others' data, and display the data in graphs and charts that is useful in answering questions. The course also includes learning methods for analyzing data and ways of making inferences and drawing conclusions from data. The basic concepts and applications of probability are also addressed, with an emphasis on the way that probability and statistics are related. Because measurement is a tool for data analysis, it is a secondary focus in the course. Numerical measurements are collected as data for many of the questions that need to be answered. Consideration of the important concepts related to measurement within the applied context of data analysis provides opportunities for developing understandings in both content areas. The course is conducted in a problem-based setting that emphasizes multiple methods of orchestrating classroom interactions.

Algebraic Reasoning: Fostering the Development of Algebraic Habits of Mind through Discourse and Questioning in the K-5 Mathematics Classroom. Algebra in the elementary grades or early algebra lays a foundation for all learners of mathematics. This course focuses on early algebra as generalized arithmetic and functions along with pedagogical practices centered on the importance of questioning in the mathematics classroom. Close attention is given to content knowledge in early algebra, how this knowledge relates to teaching, and the importance of early algebra in connection with both the National Council of Teachers of Mathematics Principles and Standards for School Mathematics and the North Carolina Standard Course of Study. The course is conducted in a problem-solving manner that emphasizes multiple representations of algebra, analysis of student thinking in algebra, and the processes of reversibility, flexibility, and the ability to generalize.

Geometry and Spatial Visualization: Assessing Student Knowledge (Diagnosis and Intervention) in the K-5 Mathematics Classroom. Teachers deepen their knowledge of geometry while exploring the high leverage teaching practice of assessment. Geometry topics include: properties of two and three-dimensional shapes, congruence, similarity, geometric transformations, spatial relationships, and visualization. A focus is placed on analyzing students' thinking using the van Hiele Levels of Geometric Thinking and the SOLO taxonomy. The use of clinical interviews to gather in-depth information about students' geometric thinking is introduced to teachers and is a key feature of one of the major projects for the course. Teachers also learn how to diagnose and correct common student errors by analyzing student work samples and video clips of students solving geometric tasks. Formative assessment strategies that include designing and modifying tasks

that build on and respond to student thinking as well as traditional and non-traditional summative assessment techniques are applied in the context of the learning and teaching of geometry and number concepts in K-5 classrooms.

Mathematical Modeling: Helping Teachers Develop as Elementary School-based Leaders in Mathematics. The leadership course serves as the capstone course in the Elementary Mathematics Add-on License (EMAoL). Mathematical content and pedagogy designed to equip elementary teachers to become mathematics teacher-leaders in school settings are provided. Pedagogical emphases include study of national, and state standards for mathematics teaching and learning; use of both large-scale and formative assessments to make instructional and curricular decisions; exploration of models for working with teachers as individuals or in groups; examination of curriculum and ways to modify tasks to meet state standards; examining teacher learning in mathematics education, including facilitating workshops, coaching and working with adult learners; critical issues such as mathematics reform, parent education and grant writing. As a capstone, the course models the integration of mathematical concepts and the integration of mathematics teaching throughout the elementary curriculum. Mathematical emphases include topics that are integrated within mathematical strands and with other curricula and the real world; a mathematical modeling approach to mathematics; curriculum that is modified to become more cognitively demanding; and tasks at the elementary level and beyond the elementary level.

3. The need for the proposed program.

A growing number of national reports call for the placement of mathematics specialists in elementary schools. These reports (The Mathematical Education of Teachers, 2001; Adding It Up: Helping Children Learn Mathematics, 2001; National Council of Teachers of Mathematics Principles and Standards of School Mathematics, 2000; No Common Denominator, 2008; and Foundations for Success: The Final Report of the National Mathematics Advisory Panel, 2008) have converged around this common idea. Each report calls for qualified Elementary Mathematics Specialists to be placed in schools as a resource for improving instruction. States such as Virginia, Georgia, and Ohio have already established statewide licensure programs for elementary mathematics specialists. Projects such as the North Carolina Partnership for Improving Mathematics and Science (NCPIMS) have demonstrated that school-based Elementary Mathematics Specialists can serve as a resource in professional development, teaching, curriculum development and implementation, mentoring new teachers, and parent and community education. Some see this movement as paralleling the national Reading First Initiative with a mathematics initiative. But unlike reading, there is no infrastructure in place to support this effort in mathematics. Most elementary teachers are much less prepared to teach mathematics than they are to teach reading.

At the national level, this need has been recognized in a 2010 joint position of the Association of Mathematics Teacher Educators (AMTE), the Association of State Supervisors of Mathematics (ASSM), the National Council of Supervisors of Mathematics (NCSM), and the National Council of Teachers of Mathematics (NCTM).

The AMTE, ASSM, NCSM, and NCTM recommend the use of Elementary Mathematics Specialists (EMS) in PK–6 environments to enhance the teaching, learning, and assessing of mathematics in order to improve student achievement. We further advocate that every elementary school have access to an EMS. Districts, states/provinces, and higher education should work in collaboration to create: (1) advanced certification for EMS professionals and (2) rigorous programs to prepare EMS professionals. EMS professionals need a deep and broad knowledge of mathematics content, expertise in using and helping others use effective instructional practices, and the ability to support efforts that help all PK–6 students learn important mathematics.

Programs for EMS professionals should include foci on mathematics content knowledge, pedagogical knowledge, and leadership knowledge and skills.

The Association of Mathematics Teacher Educators went further and published a 2010 set of *Standards for Elementary Mathematics Specialists: A Reference for Teacher Credentialing and Degree Programs*. The objectives provided in the MATE course proposals have been linked to these standards.

4. The EMAoL Curriculum Research & Development Team.

During the summer of 2009, the UNCGA commissioned fifteen graduate faculty members from seven UNC universities to coordinate the design of the six courses. By the end of that academic year, course syllabi were reviewed and finalized. Funding to support the development and pilot of the program of study was provided by the Cisco Learning Institute, the Burroughs Wellcome Fund, the UNC General Administration, the US Department of Education, and the North Carolina Model Teacher Education Consortium.

The EMAoL Curriculum Research and Development Team was established in the summer of 2009. Each course was developed by a team of two faculty members. Each faculty member piloted his/her course with one of two pilot cohorts of K-5 teachers. When possible the pilots for a course occurred during different semesters to enable the developers to revise and test two versions of their curriculum. One pilot was offered in the Guilford County Schools by graduate faculty from UNCG, UNCC, and ASU. The other was offered in the Cumberland County Schools by graduate faculty from UNCH, NCSU, ECU and UNCW.

A team of three evaluators (including math specialists from Asheboro City Schools, Randolph County Schools and NC PDI) participated as students in all six courses offered to the Guilford County teachers. After each class session they submitted a written evaluation including their sense of how well the lesson was meeting both course and program objectives. They also suggested ways that the material might be revised to make it provide a better fit with the NC Standard Course of Study. The Cumberland County Schools K-5 Math Specialist also served as an evaluator. She reviewed the session evaluations prepared by the others and discussed similarities and differences in the implementation in her cohort. Each of the four evaluators holds a masters degree.

From 2009-2012, the EMAoL Curriculum Research and Development Team met two to three times per year to coordinate efforts, consider revisions to their courses, work on the design of the end of program assessments, develop recruitment plans, and correlate campus offerings. The evaluation team participated in these discussions and added the perspective of someone who has completed all six courses in the program of study.

Students participate in the EMAoL program in 15-25 member cohorts at each partner university. The first ECU cohort began Fall 2011 and will end their program of study in Fall 2012. The courses were offered in the following sequence:

| | | |
|---------------------|-----------------------|---------------------|
| Fall 2011—MATE 6058 | Spring 2012—MATE 6060 | Fall 2012—MATE 6062 |
| Fall 2011—MATE 6059 | Spring 2012—MATE 6061 | Fall 2012—MATE 6063 |

Over half of the teachers in the ECU cohort extended this coursework to earn a masters degree in mathematics education and extend their license to the teaching of middle grades mathematics.

5. A statement of how the effectiveness of the EMAoL Program of Study is evaluated.

The consortium promotes opportunities for professional development of participating faculty to strengthen and enhance the program and its course offerings. Every sixth year, the consortium will conduct a self-study and review its operating procedures by surveying participating departments, faculty, students, and program administrators. This review is reported to the University of North Carolina—Office of the President.

At the time of each six-year review of the operating procedures, the program of study is reviewed. Since the program-of-study was designed with the NC Department of Public Instruction and approved by the NC State Board of Education to meet a specific licensing need, the consortium continues to work with NC DPI to review and when necessary update the approved program-of-study. This review is reported to the NC State Board of Education.

In order to receive an Elementary Mathematics Add-On License, an applicant must:

- Have a minimum of three years teaching experience (i.e., hold a Standard Professional 2 NC Teaching License).
- Successfully complete an approved Elementary Mathematics Add-On License Program-of Study. The Program-of-Study is developed and offered by the University of North Carolina System in collaboration with the NC Department of Public Instruction. To assure consistency of program, any university approved by the UNC System to offer the program-of-study need to include all six courses. Credit for the six courses is transferable among the participating UNC institutions. The successful completion of the program-of-study will require grades of B or better on all courses.
- Earn a passing grade on a comprehensive exam of their understanding of mathematics fundamental for the teaching of elementary mathematics, of the process of learning elementary mathematics, and of children's mathematical thinking. The exam draws on national models and is aligned with challenging state academic content standards and student achievement standards and developed in consultation with core content specialists, teachers, principals and school administrators. The comprehensive exam, was developed by George Bright, with the EMAoL Curriculum R&D Team, and piloted spring 2011 with the two cohorts of teachers. The intent is for a common exam to be administered at each UNC consortium university.
- Complete a series of journal entries that give an overview on what the candidate has learned and how it has affected his or her teaching.

6. A quality enhancement plan addressing how deficiencies are managed.

Unlike other programs where individual universities establish a program of study to meet state licensing objectives, the UNCGA has been charged with the establishment and maintenance of the program of study to support the Elementary Mathematics Add-on License. Therefore, it is the charge of the UNC Consortium of Universities to monitor the program of study and assure that it continues to meet state needs. This is accomplished at annual meetings of program coordinators from each participating institution and SEA Leaders for the NCDPI. The common end of program assessments will also help with suggesting any needed revision.

7. The faculty associated with or contributing to the EMAoL pilot and implementation, either by teaching one or more of the courses associated with the program or participating in the design of the course sequence, include:

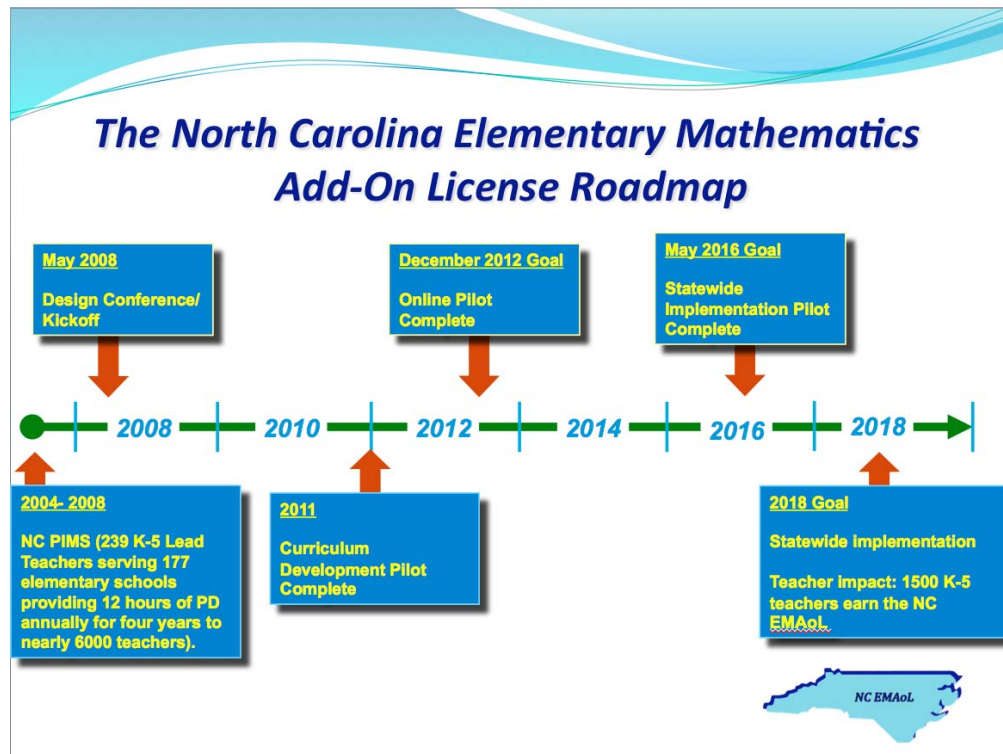
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|--|---|--|
| Appalachian State University Tracy Goodson-Espy Kathleen Lynch-Davis | East Carolina University Ron Preston Katie Schwartz Sid Rachlin* | North Carolina State University Karen Hollebrands Temple Walkowiak |
| UNC-Chapel Hill Susan Friel | UNC-Charlotte Drew Polly David K. Pugalee | UNC-Greensboro Kerri Richardson Carol Seaman |
| UNC-Wilmington Tracy Hargrove Shelby Morge | NC A&T State University Tyrette Carter | |

* EMAoL Coordinator

8. The NC EMAoL Implementation Timeline.

The UNCGA plan for designing and implementing the program of study required for the North Carolina Elementary Mathematics Add-On License (EMaOL) is divided into four phases. In the first phase (*Designing the Program of Study*) fifteen faculty members from seven UNC universities collaborated on the development

and pilot of the six graduate courses that make up the program-of-study.



PHASE ONE—PART I (2009-2010) was funded by the ECU QUEST VII Supplemental K-5 Mathematics Project, the UNC General Administration and the North Carolina Model Teacher Education Consortium (MTEC). This funding supported the development and pilot of four of the six courses in the Elementary Mathematics Add-on License Program of Study.

PHASE ONE—PART II (2010-2011) was funded by the ECU QUEST VIII Supplemental K-5 Mathematics Project, the UNC General Administration and the North Carolina Model Teacher Education Consortium (MTEC). It supported:

1. The development and piloting of the remaining two courses in the Elementary Mathematics Add-on License Program of Study.
2. The design and pilot of a comprehensive exam of the understanding of mathematics fundamental for the teaching of elementary mathematics, the process of learning elementary mathematics, and children's mathematical thinking.
3. The development and pilot a portfolio assessment that provides an overview on what the pilot teacher has learned and how it has affected his or her teaching, and
4. The demonstration of the link between the successful completion of the Elementary Mathematics Add-on License Program of Study and teachers' interest in and willingness to extend their studies to the completion of an MAEd in Mathematics Education that extends their specialized mathematics content knowledge from grade 5 to grade 9. The Praxis II test on Middle Grades Mathematics provides evidence of the successful completion of this objective.

PHASE TWO (2011-2013) builds the infrastructure to support a systemic and sustainable online statewide implementation of the EMAoL Program-of-Study. The goals of Phase Two include:

1. Creating a statewide cadre of *Lead Teachers* who can assist university faculty in the offering of the graduate courses. In order to assist in the offering of the graduate courses, a *Lead Teacher* will need to earn the NC Elementary Mathematics Add-on License and to have completed a master's degree in an appropriate field.

2. Designing the delivery system for implementing the program of study statewide. This includes both the design of a DE model for offering the courses and the creation of a consortial agreement for the shared offering of the program of study by NC universities..

Because the additional MTEC funding was added to the support provided by ECU's Quest VIII Supplemental K-5 Mathematics Award, it was possible to initiate Phase Two with a new cohort of teachers. In order to test both the appropriateness of the delivery system for reaching teachers across the state and the nature of the role *Teacher Leaders* play in course offerings, the teachers in the new cohort were drawn from four sources: Asheboro City Schools (ACS), Randolph County Schools (RCS), Cumberland County Schools (CCS) and across the state. The K-5 Mathematics Specialists from ACS and RCS provided models for the role of Teacher Leaders. Each completed the EMAoL and holds a masters degree. These teachers responded to a general call submitted through the NCDPI Elementary Mathematics List Serve. Twenty-five teachers were selected to participate in this cohort. Of the original teachers, 16 completed two of the six EMAoL online courses. Shelby Morge (UNCW) was one of the original developers of the Rational Number Course. She assisted Sid Rachlin in teaching the course in fall 2011. Susan Friel (UNC-CH) is one of the developers of the Number Course. She is assisted Katie Schwartz in teaching the number course in fall 2011. The courses were offered in a blend of two face-to-face classes and a mix of synchronous (Centra) and asynchronous (Blackboard) online classes.

PHASE TWO—PART I(2011-2012) was supported through the QUEST IX funding. It continued to address the Phase Two components. Two additional courses were reformatted and piloted with 14 of the original participants in a blend of synchronous and asynchronous instruction. The Algebra Course was taught by Katie Schwartz (one of the original developers). The Data/Measurement Course was team-taught by Shelby Morge (UNCW), Susan Friel (UNC-CH) and Sid Rachlin (ECU). A UNC-CH cohort of 14 teachers joined with the ECU cohort. Two CCS K-5 Math Specialists served as project evaluators through their role as Lead Teachers. Since they completed the courses with faculty from ECU and UNCW in a face-to-face format, they were able to contrast the two learning environments. As Lead Teachers they evaluated the online interactions of the 15 QUEST IX teachers. Two face-to-face Saturday meetings were held with the teachers in January and April.

A CCS cohort of 13 ECU masters degree students completed their coursework including the six courses required for the EMAoL. With their May graduation they became available to support the scaling up the EMAoL offerings.

PHASE TWO—PART II(2012-2013)is being supported with QUEST X funding. The last two courses are currently being reformatted and piloted in a blend of synchronous and asynchronous instruction. The Geometry Course is taught by Katie Schwartz (with Susan Friel, UNC-CH).THE UNC-CH cohort of 15 teachers is again participating in the class with the ECU cohort to verify that the DE format can support classes of thirty teachers.

The Leadership Course is being taught by Sid Rachlin (with Susan Friel, UNC-CH). Two CCS K-5 Math Specialists continue to serve as Lead Teachers. Since they completed the courses with faculty from NCSU and ECU in a face-to-face format, they were able to contrast the two learning environments. As Lead Teachers they evaluate the online interactions of the 14 QUEST X teachers. Two face-to-face meetings will be held with the teachers in October and December. The Lead Teachers will also monitor the extent to which the courses help teachers to implement the Common Core State Standards.

Phase Two also includes a statewide review and dissemination of the EMAoL program of study at the K-12 and university levels. QUEST X teachers will present separate sessions at the 2012 Annual meeting of the North Carolina Council of Teachers of Mathematics, documenting their implementation of what they've learned in their EMAoL courses. The 2012-13 EMAoL Curriculum Research and Development team of sixteen faculty members from eight UNC institutions will provide a working meeting for LEA leadership to review and disseminate information about the EMAoL Program of Study..

PHASE THREE (2013-2015) involves the pilot of a scale up model for a statewide implementation of the online Program of Study leading to the NC Mathematics Add-On License. This pilot will build on the development and implementation of a UNC Collaborative Agreement that supports teams of universities offering the EMAoL Program of Study. The successful implementation of this statewide effort is dependent on financial support for the teachers seeking to complete the EMAoL Program of Study.

PHASE FOUR (2015-) involves the establishment of an annual replication of the statewide implementation model. The number of teachers completing the Program of Study each year is dependent on the university triads that will offer the courses. Each year an additional 120-200 teachers can earn the Elementary Mathematics Add-On License.