EDEL 440  Elementary Mathematics Instruction

I. Descriptive Information

A. Course Number and Title:  EDEL 440 Elementary Mathematics Instruction

B. Catalog Description:  Approaches, materials, and methods for teaching mathematics in elementary grades.

C. Course Credit:  Three hours

D. Prerequisites  admission to the professional program
   completion of MATH 221 and 222
   Restricted to students in the BA program in elementary education

E. Intended Audience  Undergraduates majoring in elementary education

F. Instructor:  Megan Burton, PhD
   Department of Instruction and Teacher Education
   Wardlaw 105
   Phone:  (803) 777-2698   C (803) 338-1800
   email:  burton3@mailbox.sc.edu

G. Location  Rice Creek Elementary School

II. Course Goals and Learning Outcomes

A. Goal: To critically analyze curriculum and the process of teaching and learning mathematics in the elementary grades.

B. Objectives
   1. Demonstrate awareness of, and competence in, the mathematics topics appropriate for teaching elementary students as described by local, state, and national math standards documents and other professional organizations within math education such as NCTM.

   2. Design and conduct assessments of a child's development of understanding and achievement in particular areas of mathematics.

   3. Integrate technology and other resources and materials to meet diverse learning styles.

   4. Identify South Carolina Policies and mandates regarding administration of standardized tests in mathematics and compare these policies to those concerning testing of other school subjects.

   5. Describe cognitive and non-cognitive effects of various classroom approaches and strategies (e.g., cooperative or competitive, strategies and homogeneous or heterogeneous grouping) and analyze the approaches in light of the theorists' views about learning.

   6. Rationalize the selection of content, materials and teaching approaches in particular situations for particular students considering physical, intellectual, and emotional exceptionalities, and issues of sex, religious, or ethnic bias.
7. Develop strategies to communicate with families about children’s progress in mathematics.

### III. Required Texts and Other Readings


Materials needed to construct instructional charts, games, and other teaching resources. Daily access to email, printer, Blackboard, etc…

**Others Readings found at** [http://www.nctm.org/](http://www.nctm.org/)

### IV. Academic Requirements

1. **1 Day Lesson Plan: In Class**
   This assignment will allow you to explore creating a math lesson plan that involves inquiry, investigation, and discussion. In class your group will create a lesson plan and then present it to the class. You will include the components on the handout and those that will be used for your 2 day plans. You may bring outside materials, resources and laptops if you believe they would help in the planning process.

2. **Student Mathematics Games**
   Games are a central part of mathematics. Games develop familiarity with the number system, provide opportunity for practicing computation, encourage strategic thinking, develop fluency with numbers, and provide a school to home link. While students play games, the teacher is free to observe student’s work or to work with few students individually. The directions should be clear so that after initial modeling students can play this independently with a peer (without the teacher’s assistance). You will find at least 4 math games according to constructivist guidelines developed by Kamii (2000). These games should promote conversation between students, reasoning, problem solving, and/or number sense.

   At least one game should be designed and implemented with the children you assist this semester at Rice Creek. You will give this game to your classroom teacher at Rice Creek for future use. You will then prepare a handout describing the purpose and procedure of the games to give to your peers the day of the presentation. You will present this handout (or use projector and technology is possible) and summarize your experience in implementing the game. In addition this handout will be posted on the discussion board of Blackboard, so everyone can have a collection of game ideas from this experience. The rubric can be viewed on Blackboard.

3. **Math Website and Literature Evaluation:**
   Complete the webquest activity and literature evaluation sheet from Blackboard. The webquest activity is designed to provide an opportunity for students to explore virtual manipulatives and other mathematical resources that are available online to support student learning. The literature evaluation is to help students critically evaluate literature they might use in mathematics.
4. **2 Day Lesson Plans:**
The purpose of this assignment is to assess your general knowledge of lesson planning, and your ability to construct meaningful investigative mathematics lessons that incorporate state and local standards and meet the needs of a diverse group of students. You will complete 2 connected Standards-Based lessons for you field placement with the whole class. Whole class means that you are responsible for the instruction and management of the whole class, but this can be through group work, stations or a variety of ways. These plans will focus on sequentially developing the same concept over the course of 2 days. Lesson plans must be approved by your coaching teacher and the supervisor before actually teaching them. The grade will be based on your ability to implement inquiry based approaches in a meaningful context and the reflection that occurs after attempting these lessons.

The plan should follow the pedagogical practices we discuss in class (involving inquiry, dialogue, and conceptual understanding). If changes need to be made for implementation in your placement, you may note that at the end of the draft. If you are concerned about your ability to implement this type of lesson in your placement, please listen carefully to the discussion about this assignment and peruse the rubric. If you still have concerns you may schedule a time to meet with me. The plan will be graded based on the rubric posted on Blackboard and discussed in class. The lesson plan can be geared for a small group or the whole group. However, if it is for small groups, you will need to plan and explain what the entire class will be doing for math class while you work with small groups. The following are required in your plan:

1. **Topic** (you may choose from any area within the grades 2-5 mathematics curriculum)
2. **Purpose**
   a. Standards addressed (use SC current math curriculum standards) and objective
   b. Rationale (why these ideas are important)
3. **Prerequisite Knowledge to accomplish the task**
4. **Materials**
   a. Materials used in lesson
5. **Lesson Outline:**
   a) List the procedures for your “Launch, Investigate, Summarize” sections and suggest the amount of time that would be needed. Be sure students are investigating rather than mimicking.
   b) Be sure your plan includes opportunities for your student to use higher order thinking, explore a concept, and explain their thinking strategies.
6. **Assessment and Evaluation**
7. **References:** Good teachers use others’ ideas but they give credit to those who have helped.

5. **2 Day Lesson Reflection:**
The reflection will demonstrate understanding of teaching and learning mathematics drawing upon their experience teaching these lessons and upon professional readings and discussions in class. The paper will provide insight into what was learned about teaching, learning, and mathematics. The paper will also identify changes/ modifications
made based on student needs during any of the lessons or after informal assessments. The preservice teacher will demonstrate how informal and formal assessments of student needs drove instruction throughout the two days.

The reflection should be upon yourself as a teacher and your students as learners. The reflection should include comments that depict:

i. What you learned about children’s mathematics competence, knowledge of mathematics content/standards, and teaching a lesson?

ii. What adjustments did you make before and during instruction and why?

iii. What aspects of the lesson worked well? Why do you think it went well?

iv. What aspects of the lesson would you change the next time you teach this concept and why?

v. What readings and experiences at Rice Creek connect to your lessons?

6. **Kidwatching in Mathematics: Interview and Analysis**

Compilation

You will complete 1 reflection related to your experiences in the field and with your reading based on an interview. This is designed to help you make connections between the readings, mathematical content and your fieldwork. The reflection is also designed to support your development of your kidwatching project. This project that is due at the end of the semester will include a summary of what you did, observations, and recommendations. It is designed to help you make connections between the readings, mathematical content, and your fieldwork. It should also explicitly connect to the readings and/or class discussions to this experience. At the end of the semester you will write a reflection about your student that will include information gained from working with him/her and the previous assignment. You will share what you learned from this experience. The rubric can be viewed on Blackboard.

7. **Professionalism/ Class Experience** - Each week you will be responsible for a thirty minute activity to do with your small teacher(s). Initially this activity will be prepared by the instructor and emailed to you in advance. Then you will receive choices of activities. As the semester progresses, you will be responsible for selecting appropriate activities from websites given in class, the textbook, or your own resources. These activities will be the basis for your kidwatching project, so they should be aimed at the student’s instructional level, in order to identify strengths and areas for improvement. You are responsible for either printing and bringing supplies or contacting the instructor 1 week in advance for any supplies you might need.

This course is designed to allow opportunities to ask questions, contribute to class discussion, and share relevant experiences. Therefore, *participation and professionalism are extremely important.* Requirements for acceptable participation/professionalism include prompt, timely, and consistent attendance; attentiveness; verbal contributions to small group and whole class discussions; reflection of a positive attitude about learning and class participation; and respecting and supporting the needs of others, including the professor. Participation includes completing all assignments which facilitate the class and/or cohort experience including displaying materials, sharing teaching ideas and examples.
of classroom incidents, writing productively and correctly in all written assignments, and bringing in other materials/information as requested. Actively participate in class in ways that reflect your preparation including thoughtful completion of required readings.

You will receive 1 point for your professionalism/class experience each week. This point can only be earned when you are in class, because the small teacher depends on you each week. The additional 5 points are for the overall professionalism you displayed throughout the course for your peers and the instructor. The criteria for these five points are described above and in the administrative requirements section below.

V. Administrative Requirements

1. Class attendance and participation. Given the small number of class meetings, attendance is extremely important. Each session builds on the previous one. If you are absent, try to obtain the information you missed from another class member. You are held responsible for all information from each class session whether you are present or not. Absences affect not only yourself, but also the small teacher that depends on you each week. You will receive 1 point each week for your preparation and time you spend with your small teacher. If you are absent more than 1 time or repeatedly tardy, this will be reflected in your overall professionalism/classroom experience grade. More than 2 absences may result in failure of the class, due to the material missed that cannot be regained. You are required to report your reasons to the instructor for any tardiness or absences. Students who have an excused absence (e.g., doctor's excuse or death in the family) may gain the knowledge from class in an alternative form that includes significant extra work that they plan and implement. The student's plan to re-earn points must be approved by the professor in advance and it is the student’s responsibility to contact the professor within a week of the absence to request this option.

2. All assignments are to be turned in on time. All assignments should be posted on Blackboard by midnight the day before class unless otherwise noted. If problems are occurring with Blackboard, assignments may be emailed by the time due and will be accepted. For assignments turned in late, 10% will be deducted per late day or any fraction thereof (including weekends and holidays).

3. Some assignments will involve integrating readings & websites into your reflections & lessons. Plagiarism is the act of representing words, data, works, ideas, computer program or output, or anything not generated by the student as his or her own. Plagiarism may be inadvertent or purposeful; however, plagiarism is not a question of intent. All suspected incidences of plagiarism must be reported by the course instructor to the Assistant Dean of the College of Education. Plagiarism is considered a serious act of academic misconduct and may result in a student receiving an “F” in the course and being suspended from the University. Please be sure to cite any outside sources used in work. Also all work is to be done individually unless otherwise specified.
4. Use of Blackboard system, internet, and email for communication and instruction is required. If you do not have access to a computer, you may ask to use your school site’s computer outside of your field placement time or you may use the computers on campus. All assignments must be submitted in 12 font Times New Roman or Arial font in either rich text or Microsoft Word format unless directions were given to use PowerPoint or Excel. All reflections should be double-spaced. All documents should be saved with the file title having the student’s last name and a main word from the assignment in it. For example math games could be titled “Burton Games.” Lesson 1 could be titled “Burton Lesson 1.” Files will not open if they have characters beyond letters, numbers, and spaces. Therefore, please do not use dashes, punctuation or any other forms not previously listed. Finally please ensure your entire name is on the assignment and not just in the file name. It is the students’ responsibility to check the assignment, once submitted, to ensure it went through properly.

5. Policies relating to students with disabilities- Students with disabilities are encouraged to contact the instructor to discuss any accommodations needed to fulfill course requirements. In order to receive reasonable accommodations from the instructor, students must have certified eligibility through the Office of Student Disability Services. Any student with a documented disability should contact the Office of Student Disability Services at 777-6142 to make arrangements for appropriate accommodations.

### VI. Evaluation and Grading

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Value</th>
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<tbody>
<tr>
<td>In Class 1 Day Lesson Plan</td>
<td>12 points</td>
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<tr>
<td>Math Games Assignment</td>
<td>15 points</td>
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<tr>
<td>Math Website Assignment</td>
<td>5 points</td>
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<tr>
<td>Math Literature Assignment</td>
<td>5 points</td>
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<tr>
<td>2 Day Lesson Plan</td>
<td>10 points</td>
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<tr>
<td>2 Day Lesson Reflection</td>
<td>5 points</td>
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<tr>
<td>Kidwatching Assignments</td>
<td>30 points total</td>
</tr>
<tr>
<td>a. Interview and Analysis</td>
<td>a. 9 points</td>
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<tr>
<td>b. Compilation</td>
<td>b. 21 points</td>
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<tr>
<td>Professionalism/ Class Experiences</td>
<td>15 points</td>
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<tr>
<td>Initial Survey/ Course Evaluation</td>
<td>3 points</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100 points</strong></td>
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</tbody>
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The South Carolina Standard Grading Scale will be used to determine grades for this course.
A = 93-100  
B+ = 89-92  
B = 82-88  
C+ = 79-81  
C = 72-78  
D+ = 69-71  
D = 65-68  
F = 64 and below

VII. Major topics

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Standards and Goals of Mathematics Education</td>
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<td></td>
<td>Learning Math with Understanding</td>
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<td>2</td>
<td>Problem Solving</td>
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<td></td>
<td>Geometry</td>
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<td>3</td>
<td>Measurement</td>
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<td></td>
<td>Lesson Planning</td>
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<td>4</td>
<td>Student-Centered Instruction</td>
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<td></td>
<td>Ethnomathematics</td>
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<td>5</td>
<td>Numbers and Number Sense</td>
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<td></td>
<td>Assessment</td>
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<td>6</td>
<td>Computation and Computational Tools</td>
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<td>Testing</td>
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<td>7</td>
<td>Technology/ webquest</td>
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<td>8</td>
<td>Standard and Alternative Computational Algorithms</td>
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<td></td>
<td>Differentiation</td>
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<td>9</td>
<td>Algebra</td>
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<td></td>
<td>Data Analysis</td>
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<td>10</td>
<td>Parental Involvement</td>
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<td>Fractions</td>
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<tr>
<td>11</td>
<td>Management</td>
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<td></td>
<td>Assessment</td>
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<tr>
<td>12</td>
<td>Ratio, Proportion, and Percent</td>
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<td></td>
<td>Democracy in the Classroom</td>
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</table>

VIII. Modes of Instruction

This class will include discussions, explorations, PowerPoint direct instruction, web quests, group projects, and one on one inquiry with an elementary student. Each of these modes are to facilitate student growth in understanding the diverse needs of students based on culture, cognition, personality, and conceptual understandings. Preservice teachers will be challenged to begin to understand student thinking and learning. Then planning for ways to challenge and promote growth based on student needs will be explored.

Bibliography


Selected readings from *Teaching Children Mathematics* (to be provided by the instructor)

Some of the articles include:

- From the classroom: Designing and implementing worthwhile tasks by Breyfogle and Williams. December 2008
- Disequilibrium and questioning in the primary classroom: Establishing routines that help students learn by Carter. October 2008
- Learning to think and thinking to learn. by Kline. October 2008
- Identifying opportunities to connect parents, students, and math by Fagan. August 2008
- Assessing students’ levels of understanding multiplication through problem writing by Drake and Barlow. December 2007
- Gaining insights into children’s geometric knowledge by Mack. November 2007
- Talking Math by Amos. September 2007
- Measure up for understanding: Reflect and Discuss by Doughterty and Venenciano. May 2007.
- Developing students’ mathematical reasoning through games by Olson. May 2007.

Other Readings found at [http://www.nctm.org/](http://www.nctm.org/)