

George Mason University
College of Education and Human Development
Graduate School of Education
Elementary Education Program (ELED)

ELED 452.001 – Mathematics Methods for the Elementary Classroom
3 Credits, Spring 2024
Wednesdays 4:30 - 7:10 Thompson Hall L013 – Fairfax

Faculty

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Prerequisites/Corequisites

Enrollment is limited to students with a major in Elementary Education.

University Catalog Course Description

Introduces methods for teaching all children topics in arithmetic, geometry, algebra, probability, and statistics in elementary grades. Focuses on using manipulatives and technologies to explore mathematics and solve problems. Offered by School of Education. Limited to two attempts.

Course Overview

In this course, we will begin an inquiry into mathematics teaching and learning that will guide you in your first teaching job and give you the tools that will enable you to continue to inquire and learn as part of your work as a teacher. Class sessions will be interactive and will include a variety of hands-on experiences with concrete and virtual manipulatives appropriate for elementary school mathematics. We will explore the teaching of mathematics, investigating both what to teach and how to teach it. We will explore what it means to do mathematics and what it means to understand mathematics through individual, small group, and large group mathematical problem solving. We will investigate ways to represent understandings of mathematical concepts, communicate reasoning about mathematical ideas, and construct mathematical arguments. We will investigate and read about ways children might represent mathematical concepts, looking at ways to help children build connections and see relationships among mathematical ideas. We will explore characteristics of a classroom environment conducive to mathematical learning by reading about and discussing the importance of mathematical tasks, mathematical tools, the roles of teachers and students, and the assessment of mathematical understanding.

- Doing Mathematics (Learning for practice): We will build our own knowledge of mathematics by closely investigating ideas in number sense and fraction concepts. Additionally, we will engage in several math tasks, extending our knowledge of mathematics and students' thinking, which will provide the foundation for your professional decision making.
- Examining Records of Practice (Learning from practice): Records of practice—such as videotapes of lessons taught by yourself or others, students' work, and teachers' professional writing—allow us to investigate the work of teaching mathematics and improve our own practice.
- Trying Things Out (Learning in practice): Because teaching involves more than just having knowledge, we want you to engage in enacting the practices we are investigating as much as possible, so that you are developing the skills and professional decision-making that will make you a successful teacher.

Course Delivery Method

This course will be delivered using a face-to-face seminar format. The course site will be available on January 17, 2024

Learning activities include the following:

- Class lecture and discussion
- Small group/large group activities and discussion
- Hands-on activities
- Student presentations
- Video and other media supports
- Collaboration with peers
- Electronic supplements and activities via Blackboard
- Asynchronous online modules

Learner Outcomes or Objectives

This course is designed to enable students to do the following:

1. Know what constitutes the essential topics in mathematics of the modern early and intermediate grades school program.
2. Identify and use selected manipulatives and technology such as linking cubes, attribute blocks, geoboards, base-10 blocks, fraction circles, tangrams, calculators, and computers to teach appropriate mathematics content topics in the early and middle grades.
3. Identify and use various instructional strategies and techniques (cooperative and peer group learning, activity centers, laboratories and workshops, teacher-directed presentations, etc.) to teach mathematical content topics appropriate for the early and intermediate grades to all children, including those from non-mainstreamed populations.
4. Identify and use alternative methods for assessing students' work in mathematics in the early and intermediate grades.

5. Solve problems in the mathematical content areas of logic, number theory, geometry, algebra, probability, and statistics appropriate for adaptation to the early and intermediate grades.
6. Know and explain the learning progression in relation to the standards-based mathematics curriculum, the key elements of the National Council of Teachers of Mathematics Principles and Standards for School Mathematics, and the key elements of the Virginia Standards of Learning for Mathematics.
7. Understand the multiple representations of mathematical concepts and procedures.
8. Understand and use the five processes—reasoning mathematically, solving problems, communicating mathematics effectively, making mathematical connections, and using mathematical representations—at different levels of complexity.
9. Explore the contributions of different cultures toward the development of mathematics, and the role of mathematics in culture and society.
10. Understand the relationship of math to science, the design process, and technology.
11. Understand, possess, and integrate the knowledge, skills, dispositions, and processes needed to support learners’ achievement in an interdisciplinary manner in Virginia’s Foundation Blocks for Early Learning: Comprehensive Standards for Four-Year-Old’s and the Virginia Standards of Learning in English, mathematics, history and social science, science, and computer technology.

Additionally, this course supports the CEHD Core Values of collaboration, ethical leadership, research-based practice, social justice, and innovation. Statements of these goals are at <http://cehd.gmu.edu/values/>.

Professional Standards (Interstate Teacher Assessment and Support Consortium (InTASC))

Upon completion of this course, students will have met the following professional standards:

Course Student Outcomes (above)	InTASC Standard
A. Essential math	#4
B. Planning and Teaching using manipulatives	#7
C. Instructional Strategies	#8
D. Assessing	#6
E. Problem Solving	#5
F. Learner Development and understanding of Learning Progression	#1 & #2

Course & PBA	InTASC
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452 Math Learning Trajectory Assessment and Planning Project	#4 Content Knowledge #1 & #2 Learner Development & Differences #6 Assessment
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Required Texts

Van De Walle, J., Karp, K. S., & Bay-Williams, J. M. (2018). Elementary and Middle School Mathematics: Teaching Developmentally (10th edition). Pearson. (2019:9780134802084)

Course Performance Evaluation

Students are expected to submit all assignments on time in the manner outlined by the instructor (e.g., Blackboard, VIA).

- **Assignments and/or Examinations**

- A. Math Autobiography (10%)**

- At the beginning of the semester, students will write a brief autobiography (approximately 2 pages) that reflects on their past experiences as learners and doers of mathematics. Questions to prompt the reflection will be provided on Blackboard. (Initial autobiography worth 5 points.)
 - At the end of the semester, students will write a reflection on their math autobiography in light of their learning and growth throughout the semester. (Final autobiography reflection worth 5 points.)

- B. Reading Log (10%)**

You will analyze each reading in terms of its connection to your school site and your unit. Students must connect and cite the reading to their reflection so that it is evident that the student both read the material and connected to the material. Record these responses in your longitudinal reading log for each reading. Use the following template:

- 3 – Questions
- 2 – Connections
- 1 – Surprise or Aha moment that you had

- C. Video tutorial (10%)**

You will create a video for parents that explains how you will use a math tool, manipulative, or diagram to teach a specific standard. The video must be 2-5 minutes long and include examples of how the tool is used, and the connection to the traditional algorithm or strategy.

- D. Participation (10%)**

A commitment to participation in class discussions and course activities depends heavily and primarily on the regular attendance and participation of all involved. Participation will include taking part in discussions informed by critical reading and thinking, leading discussions about selected mathematics problems, and sharing with the class the products of various writing, reflection, lesson planning, and field

experience assignments. The expectations, demands and workload of this course are professional and high. This requires students to consider data using different strategies and a variety of manipulatives and resources. During math work time, students should be developing strategies and non-traditional algorithms for the entire work time or discussing and sharing algorithms with each other. During math-talk and discussion times, students should be actively engaged by voicing or typing their thoughts and connecting to topics presented during the discussion.

Participation in this course requires a commitment to reading reflectively and critically the assigned readings. The readings will be used to provide a framework and coherent theme to the course content. They have been selected to introduce themes in professional development as well as research and critical commentary on current issues in mathematics education.

E. Learning Trajectory Assessment and Planning Project: Course Performance Based Assessment (60%)

To plan effective instruction, you will need to know how to assess children's knowledge of mathematical concepts. For this project, you will go through the assessment-planning-teaching cycle with one focal student in your field placement classroom. You will identify one specific topic taught to the student's grade level and research the learning trajectory (LT) for that topic. Then you will develop an individualized assessment and instructional plan for the student with the learning trajectory for the topic in mind.

- **Other Requirements**

It is your responsibility to attend all class sessions. Please report your reasons for any absences to the instructor in writing. It is your responsibility to be on time for each class session. Please report your reasons for any tardiness to the instructor in writing.

Class materials will be posted for each class session on Blackboard. Students are responsible for reviewing these materials and submitting required artifacts (where appropriate) to online class discussion boards. All assignments are to be turned in to your instructor on time. Late work will not be accepted for full credit. Assignments turned in late will receive a 10% deduction from the grade per late day or any fraction thereof (including weekends and holidays).

- **Grading**

UNDERGRADUATE GRADING SCALE

Grade	Grading Scale	Interpretation
A+	97-100	<i>Represents mastery of the subject through effort beyond basic requirements</i>
A	93-96	
A-	90-92	
B+	87-89	<i>Reflects an understanding of and the ability to apply theories and principles at a basic level</i>
B	83-86	
B-	80-82	
C+	77 – 79	
C	73 – 76	
C-	70-72	<i>Denotes an unacceptable level of understanding and application of the basic elements of the course. Grade does not meet the minimum requirement for licensure courses.</i>
D	60-69	
F	<69	

Professional Dispositions

See <https://cehd.gmu.edu/students/policies-procedures/>

Students are expected to exhibit professional behaviors and dispositions at all times.

In addition to being punctual, students are expected to actively participate and engage in assignments and class discussions. In order to maintain a focused class, devices and cell phones are to be used exclusively for the current class topic. Examples of this include searching for math standards, videos of mathematical algorithms, taking pictures of manipulatives, etc. Emailing, texting, shopping, and other forms of communication and social media are not permitted during class time unless it is directly related to the activity. In addition, students should refrain from grading papers and preparing lesson materials for their school placements during class time.

Class Schedule

Date & Topic	Topic	Reading
1/17	Graphing to know you! How Do Children Learn Mathematics? Overview of NCTM 8 Teaching Practices Building classroom norms	Van de Walle Chapter 1 Preview in class

	Building a Strength Based Classroom Supplemental: Watch -https://youtu.be/rFGVS4AOwl8	
1/24	Early Number Sense Teaching Through Problem Solving & Math Modeling	Chapter 1
1/31	Tasks & math pedagogies	Chapters 2 and skim 10
2/7	Developing Whole-Number and Place Value Concept	Van de walle Chapter 8,11
2/14	Problem Situations 5 Practices for Math Discourse NCTM Principles & Standards	Van de walle Chapter 4 & 5
2/21	Developing Student Strategies for Addition & Subtraction	Van de walle Chapter 8,11
2/28	Planning for Group Lesson	Van de walle Chapter 9 & 12 for October 5
3/13	Multiplication and Division	Van de walle Chapter 9 & 12
3/20	Algebraic Reasoning	Van de walle Chapter 13
3/27	Developing Fraction Concepts Routine: Same & Different	Van de walle Chapter 14
4/3	Developing Fraction & Decimal Computation	Van de walle Chapter 15 & 16
4/10	Proportional Reasoning	Van de walle Chapter 17 proportional reasoning

4/17	Measurement	Van de walle Chapter 18. Developing Measurement/
4/24	Geometry	Van de walle Chapter 19. Geometric Thinking

Note: Faculty reserves the right to alter the schedule as necessary, with notification to students.

Core Values Commitment

The College of Education and Human Development is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles: <http://cehd.gmu.edu/values/>.

GMU Policies and Resources for Students

Policies

- Students must adhere to the guidelines of the Mason Honor Code (see <https://catalog.gmu.edu/policies/honor-code-system/>).
- Students must follow the university policy for Responsible Use of Computing (see <https://universitypolicy.gmu.edu/policies/responsible-use-of-computing/>).
- Students are responsible for the content of university communications sent to their Mason email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students **solely** through their Mason email account.
- Students with disabilities who seek accommodations in a course must be registered with George Mason University Disability Services. Approved accommodations will begin at the time the written letter from Disability Services is received by the instructor (see <https://ds.gmu.edu/>).
- Students must silence all sound emitting devices during class unless otherwise authorized by the instructor.

Campus Resources

- Support for submission of assignments to VIA should be directed to viahelp@gmu.edu or <https://cehd.gmu.edu/aero/assessments>. Questions or concerns regarding use of Blackboard

should be directed to

<https://its.gmu.edu/knowledge-base/blackboard-instructional-technology-support-for-students/>.

- For information on student support resources on campus, see <https://ctfe.gmu.edu/teaching/student-support-resources-on-campus>

Notice of mandatory reporting of sexual assault, sexual harassment, interpersonal violence, and stalking:

As a faculty member, I am designated as a “Non-Confidential Employee,” and must report all disclosures of sexual assault, sexual harassment, interpersonal violence, and stalking to Mason’s Title IX Coordinator per [University Policy 1202](#). If you wish to speak with someone confidentially, please contact one of Mason’s confidential resources, such as [Student Support and Advocacy Center](#) (SSAC) at 703-380-1434 or [Counseling and Psychological Services](#) (CAPS) at 703-993-2380. You may also seek assistance or support measures from Mason’s Title IX Coordinator by calling 703-993-8730, or emailing titleix@gmu.edu.

For additional information on the College of Education and Human Development, please visit our website <https://cehd.gmu.edu/students/> .

