

**George Mason University**  
**College of Education and Human Development**  
**Elementary Education Program**

ELED 552 A01 – Mathematics Methods for the Elementary Classroom (ONLINE)  
3 Credits, Summer 2021  
ELED DL1 M-TR 10:30 AM - 12:35 PM

**Faculty**

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Office Hours: By appointment  
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**Prerequisites/Corequisites**

Admission to the elementary education licensure program.

**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.

**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.
- What it means to do mathematics and what it means to understand mathematics through individual, small group, and large group mathematical problem solving.
- Ways to represent understandings of mathematical concepts, communicate reasoning about mathematical ideas, and construct mathematical arguments.
- And read about ways children might represent mathematical concepts, looking at ways to help children build connections and see relationships among mathematical ideas.
- Characteristics of a classroom environment conducive to mathematical learning by reading and discussing the importance of mathematical tasks, mathematical tools, the roles of teachers and students, and the assessment of mathematical understanding.

In this course, we will take a stance of learning *for*, *from*, and *in* practice as follows:

**Learning *FOR* Practice** (Doing Mathematics): 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.

**Learning *FROM* Practice** (Examining Records of Practice): Records of practice—such as videotapes of lessons taught by yourself or others, students' work, and teachers' professional writing—will allow us to investigate the work of teaching mathematics and improve our own practice.

**Learning *IN* Practice** (Trying Things Out): Because teaching involves more than just having knowledge, you will be engaged 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 class will be delivered completely online with the use of synchronous and asynchronous class sessions (see schedule for specific dates). Online meetings will be via Zoom. Individual session formats vary and may include lecture, small group/large group discussion, hands-on, interactive work, student presentations, and cooperative learning. Practical applications of theory will be explored in group activities.

**Under no circumstances, may candidates/students participate in online class sessions (either by phone or Internet) while operating motor vehicles. Further, as expected in a face-to-face class meeting, such online participation requires undivided attention to course content and communication.**

Online Meeting Space: [Zoom Meeting](#) Room Meeting ID: 999 1355 4970 Passcode: 975935

### **Technical Requirements**

To participate in this course, students will need to satisfy the following technical requirements:

- High-speed Internet access with a standard up-to-date browser, either Internet Explorer or Mozilla Firefox is required (note: Opera and Safari are not compatible with Blackboard).
- Students must maintain consistent and reliable access to their GMU email and Blackboard, as these are the official methods of communication for this course.
- Students may be asked to create logins and passwords on supplemental websites and/or to download trial software to their computer or tablet as part of course requirements.
- The following software plug-ins for PCs and Macs, respectively, are available for free download:

- Adobe Acrobat Reader: <https://get.adobe.com/reader/>
- Windows Media Player: <https://support.microsoft.com/en-us/help/14209/get-windows-media-player>
- Apple QuickTime Player: [www.apple.com/quicktime/download/](http://www.apple.com/quicktime/download/)

## Expectations

- Course Week:  
Our course week will begin on the day that our synchronous meetings take place as indicated on the Schedule of Classes.
- Log-in Frequency:  
Students must actively check the course Blackboard site and their GMU email for communications from the instructor, class discussions, and/or access to course materials at least 4 times per week. In addition, students must log-in for all scheduled online synchronous meetings.
- Participation:  
Students are expected to actively engage in all course activities throughout the semester, which includes viewing all course materials, completing course activities and assignments, and participating in course discussions and group interactions.
- Technical Competence:  
Students are expected to demonstrate competence in the use of all course technology. Students who are struggling with technical components of the course are expected to seek assistance from the instructor and/or College or University technical services.
- Technical Issues:  
Students should anticipate some technical difficulties during the semester and should, therefore, budget their time accordingly. Late work will not be accepted based on individual technical issues.
- Workload:  
Please be aware that this course is **not** self-paced. Students are expected to meet *specific deadlines* and *due dates* listed in the **Class Schedule** section of this syllabus. It is the student's responsibility to keep track of the weekly course schedule of topics, readings, activities and assignments due.
- Instructor Support:  
Students may schedule a one-on-one meeting to discuss course requirements, content or other course-related issues. Students should email the instructor to schedule a one-on-one session, including their preferred meeting method and suggested dates/times.
- Netiquette:  
The course environment is a collaborative space. Experience shows that even an innocent remark typed in the online environment can be misconstrued. Students must always re-read their responses carefully before posting them, so that others do not consider them as personal offenses. *Be positive in your approach to others and diplomatic in selecting your words.*

Remember that you are not competing with classmates, but sharing information and learning from others. All faculty are similarly expected to be respectful in all communications.

- Accommodations:

Online learners who require effective accommodations to insure accessibility must be registered with George Mason University Disability Services.

### **Learner Outcomes or Objectives**

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

- A. Know what constitutes the essential topics in mathematics of the modern early and intermediate grades school program.
- B. 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.
- C. 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.
- D. Identify and use alternative methods for assessing students' work in mathematics in the early and intermediate grades.
- E. 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.
- F. 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.
- G. Understand the multiple representations of mathematical concepts and procedures.
- H. 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
- I. Explore the contributions of different cultures toward the development of mathematics, and the role of mathematics in culture and society.
- J. 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-Olds 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:

<b>Course Student Outcomes (above)</b>	<b>INTASC Standard (2013)</b>
A. Essential math	#4 Content Knowledge
B. Planning and Teaching using manipulatives	#7 Planning for Instruction
C. Instructional Strategies	#8 Instructional Strategies
D. Assessing	#6 Assessment
E. Problem Solving	#5 Application of Content
F. Learner Development and understanding of Learning Progression	#1 Learner Development, #2 Learner Differences
G. Multiple Representations	#4 Content Knowledge, #5 Application of Content
H. Five Processes	#4 Content Knowledge, #5 Application of Content
I. Contributions	#4 Content Knowledge, #5 Application of Content

## Required Text

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

Other readings as assigned.

Access to the Internet, Zoom and [Blackboard](#) are required.

## Assignments

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

- **Daily Participation, Interactive Notebook, Facilitating Reading Discussion, and Professional Dispositions (25 points)**

*Addresses Learner Outcomes: A, B, C, D, E, F, G*

Reading and activity reflections will be done via daily Interactive Notebook entries. During class meetings, students are expected to analyze and reflect on solution strategies, provide differentiated approaches to center activities, and actively participate in class discussions by applying class readings. This work will be collected and kept in a mathematics methods digital interactive notebook shared with the instructor in Google Slides. Professional dispositions are to be displayed at all times while interacting with the instructor and other students.

Students are expected to contribute to both group and class discussions and activities online as well as genuinely listen to peers as they do the same. The instructor may also call on students in order to maximize classroom opportunities to hear from ALL of the students enrolled in the course. Remember, participation is more than just talking. Participation should raise the level of academic discourse, which may include asking questions and encouraging exploration, consideration, and learning. To be active participants in class, you must complete all pre-assigned readings and tasks before the class session for which they are assigned.

- **[Lesson #1 Rehearsal: Math Routine \(15 points\)](#)**

*Addresses Learner Outcomes: A, B, C, D, E, F, G*

With a small group, you will plan, teach, and complete a reflection for a Math Routine taught to your classmates during the summer course. Each 10-15 minute Math Routine will include the six essential elements of Math Routine and address a mathematical concept. A [Math Routine lesson plan template](#) will be provided, to which you will add your anticipated student responses and your expected series of questions.

Each group is expected to: 1) prepare any materials needed for the Math Routine; 2) anticipate possible student responses to the problems presented and; 3) plan an expected sequence of

follow-up questions. See the rubric on Blackboard for more detail and [Math Routine Menu](#) on Blackboard.

- **[Lesson #2 Rehearsal: Problem-Based /Student Learning Progression \(15 points\)](#)**

*Addresses Learner Outcomes: A, C, D, E, F, G, H, I*

[http://www.doe.virginia.gov/testing/sol/standards\\_docs/mathematics/2016/rich/index.shtml](http://www.doe.virginia.gov/testing/sol/standards_docs/mathematics/2016/rich/index.shtml)

This lesson will be taught by a small group and presented to your classmates as a simulated lesson. Each group is expected to: 1) complete a [Google Slide Deck](#) and share it with your instructor before class; 2) anticipate possible student responses by solving the problem using all three representations (concrete, pictorial, abstract); 3) select and sequence student responses for sharing out and make connections between solutions; 4) reflect on lesson and equitable teaching practices.

- **Practice-Based Teaching Activity Using [NCTM 8 Teaching Practices](#): (15 points)**

*Addresses Learner Outcomes: A, C, D, E, F, G, H*

Being able to decompose a planned and enacted lesson for high quality mathematics instruction is essential. This assignment will allow you to demonstrate your knowledge in determining the essential components of a high-quality mathematics lesson. Students will be provided with video vignettes to evaluate using the NCTM 8 Teaching Practices Observation Tool (3 activities)

- **[Individualized Assessment and Instruction Plan: \(30 points\)](#)**

Course Performance-Based Assessment (PBA)

*Addresses Learner Outcomes: A, B, C, D, F, H, I*

In order to plan effective instruction, you will need to know how to assess children's knowledge of mathematical concepts. One way to assess children's thinking is a diagnostic assessment. This assignment has two parts: (1) Design a plan for the assessment within a conceptual learning trajectory, assessing a specific mathematics topic using concrete, pictorial and abstract representations; (2) Use research around learning trajectories to describe the learning progression, strategies, and misconceptions around this topic; and (3) Based on the research, prescribe an instructional plan and present this in class.

- **Other Requirements**

- **Attendance:** It is your responsibility to attend all class sessions. You are held accountable for all information from each class session whether you are present or not. Reasons for any absence must be reported to the instructor in writing.
- **Tardiness:** It is your responsibility to be on time for each class session. Reasons for any absence must be reported to the instructor in writing.

*Note: Faculty reserve the right to add, alter, or omit any assignment as necessary during the course of the semester. You will always receive advance notice of any modifications. Bookmark this link to access the most current schedule of readings and due dates.*

- **Assignment Overview**

Week 1	Week 2	Week 3	Week 4	Week 5
Video Vignette #1: NCTM Teaching Practice	Math Routines (Rehearsals) for Primary and Upper Grades Math  Video Vignette #2: NCTM Teaching Practice	Math Routines (Rehearsals) for Primary and Upper Grades Math  Video Vignette #3: NCTM Teaching Practice	Problem-Solving Rehearsals 5 practices with Student Analysis	Individualized Assessment and Instruction Plan Share
Interactive Notebook (daily)	Interactive Notebook (daily)	Interactive Notebook (daily)	Interactive Notebook (daily)	Interactive Notebook (daily)
	PBA: Individualized Assessment and Instruction Plan			

### Grading

Assignment	Due Dates	Points	Percentage of final grade
Class participation	Daily	25	25
Math Routine	See schedule	15	15
Problem-Based Lesson	Selected date	15	15
Teaching Vignettes Analysis (3)	See schedule	15	15
PBA: Individualized Assessment and Instruction Plan	See schedule	30	30
<b>Total</b>		<b>100</b>	<b>100</b>

### Attendance Policy

Attendance in the course is mandatory. You are held accountable for all information from each class session whether you are present or not. Reasons for any absence must be reported to the instructor in writing. Attendance is tied into your participation grade. If you are not in class, you are not participating.



## Late Work

Work is due on the announced due date. All late work will incur a penalty of 10 percent for each day late. The only exception to this is for those students with excused absences (see Attendance Policy above).

## Grading Policies

The mathematics education courses in GMU's Elementary Education Program integrate pedagogy and mathematics content appropriate for the elementary school grades. For students to earn a grade of A in the course, they must demonstrate excellence in *both* the pedagogical knowledge and the content knowledge of the mathematics appropriate at their level of teaching. Thus, the grading in the course is structured to help evaluate fairly student excellence in both areas. Problem sets and assessment work focuses primarily on ascertaining student excellence in handling mathematics content appropriate for the elementary grades, and represents 50% of students' grades. Pedagogical knowledge is ascertained primarily from readings, assignments and participation in the course, and represents 50% of students' grades. Therefore, students who demonstrate excellence in both pedagogical knowledge and content knowledge receive grades of A.

The grading scale for this course is as follows:

Grade	GRADING	Grade Points	Interpretation
A	93-100	4.00	Represents mastery of the subject through effort beyond basic requirements
A-	90-92	3.67	
B+	87-89	3.33	Reflects an understanding of and the ability to apply theories and principles at a basic level
B	83-86	3.00	
B-	80-82	2.67	
C+	77-79	2.33	Denotes an unacceptable level of understanding and application of the basic elements of the course
C	73-76	2.00	
C-*	70-72	1.67	
D	60-69	1.00	
F*	<69	0.00	

- \* Note: "C-" is not satisfactory for a licensure course;  
"F" does not meet the requirements of the School of Education.

## Professional Dispositions

Students are expected to exhibit professional behaviors and dispositions at all times. (See Elementary Education Program Handbook).

## 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

University Libraries <https://library.gmu.edu>

Questions or concerns regarding use of Blackboard should be directed to <https://its.gmu.edu/knowledge-base/blackboard-instructional-technology-support-for-students/>.

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

As a faculty member, I am designated as a “Responsible Employee,” and must report all disclosures of sexual assault, 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 from Mason’s Title IX Coordinator by calling 703-993-8730, or emailing [titleix@gmu.edu](mailto:titleix@gmu.edu).

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

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

### **Emergency Procedures**

You are encouraged to sign up for emergency alerts by visiting the website <https://alert.gmu.edu>. There are emergency posters in each classroom explaining what to do in the event of crises. Crisis in Education App at: <https://itunes.apple.com/us/app/in-case-of-crisis-education/id476578079?mt=8>

### **Course Materials and Student Privacy**

- All course materials posted to Blackboard or other course sites are private; by federal law, any materials that identify specific students (via their name, voice, or image) must not be shared with anyone not enrolled in this class.
- Video recordings of class meetings that include audio or visual information from other students are private and must not be shared.
- Live video conference meetings (e.g. Collaborate or Zoom) that include audio or visual information from other students must be viewed privately and not shared with others in your household.
- Some/all of your CEHD synchronous class meetings may be recorded by your instructor to provide necessary information for students in this class. Recordings will be stored on Blackboard (or another secure site) and will only be accessible to students taking this course during this semester.

## Class Schedule

These topics and activities are subject to change to be responsive to the pace of the course.

	<b>Active Learning and Discussion Emphasis</b>	<b>Readings Due</b>	<b>Assignments Due</b>
Week 1 May 17-21	<u>Number and Data Sense</u> <ul style="list-style-type: none"> <li>● Building classroom norms</li> <li>● Teaching through problem-solving</li> <li>● <a href="#">Math Routines</a></li> </ul>	Chapters 1, 2, 3, 7 Content Ch. 8, 9	Daily Interactive Notebook  Video Vignette Analysis
Day 1	<ul style="list-style-type: none"> <li>● Getting to know you!</li> <li>● How Do Children Learn Mathematics?</li> <li>● Overview NCTM Teaching Practices</li> </ul>	Chapters 1 & 2	
Day 2	<ul style="list-style-type: none"> <li>● Teaching Through Problem Solving</li> <li>● 5 Practices for Math Discourse<sup>[SEP]</sup></li> <li>● NCTM Principles &amp; Standards<sup>[SEP]</sup></li> </ul>	Chapter 3	
Day 3	<ul style="list-style-type: none"> <li>● Early Number Sense</li> <li>● Developing Meanings for the Operations</li> </ul>	Chapters 7 and 8	
Day 4	<ul style="list-style-type: none"> <li>● Developing Basic Fact Fluency</li> <li>● ONLINE CLASS Assignment: Video Vignette Activity #1</li> <li>● Choose a Math Routine</li> </ul>	Chapter 9	Video Vignette Analysis #1
Week 2 May 24-28	<u>Computation &amp; Operations</u> <ul style="list-style-type: none"> <li>● Equity Focused Instruction</li> <li>● Math Routine Rehearsals</li> <li>● Teaching Mathematics Equitably</li> </ul>	Chapters 4, 5, 6 Content Chapters 10, 11, 12, 13	Math Routines  Daily Interactive Notebook  Video Vignette Analysis
Day 5	<ul style="list-style-type: none"> <li>● Planning in the Problem-Based Classroom</li> <li>● Creating Assessments</li> </ul> <p>**Number Routines**</p>	Chapters 4, 5	Number Routine Slides and <b>Q/A</b> : Questions to make math visible and <b>Anticipation</b> of student thinking

Day 6	<ul style="list-style-type: none"> <li>Teaching Mathematics Equitably to ALL Children</li> <li>Developing Whole-Number Place-Value Concepts</li> </ul> <p>** Number Routines**</p>	Chapter 6, 10	
Day 7	<ul style="list-style-type: none"> <li>Developing Strategies for Addition and Subtraction Computation</li> <li>Developing Strategies for Multiplication and Division Computation</li> </ul> <p>** Number Routines**</p>	Chapter 11, 12	
Day 8	<ul style="list-style-type: none"> <li>Developing Algebraic Thinking</li> <li>Mathematical Modeling</li> <li>CLT- Rich Task VDOE</li> <li>Vignette Activity #2</li> <li>NCTM teaching practices</li> </ul>	Chapter 13	Video Vignette Analysis #2
Modified Week 3 May 31-June 4	<u>Fractions and Decimals</u> <ul style="list-style-type: none"> <li>Math Routine Rehearsals</li> </ul>	Content Chapters: 14, 15, 16, 17	Continue Math Routines  Daily Interactive Notebook  Video Vignette Analysis
Day 9	Teacher Work day	Chapter 14.	
Day 10	<ul style="list-style-type: none"> <li>Developing Fraction Concepts and Operations</li> </ul> <p>** Number Routines**</p>	Chapter 15.	
Day 11	<ul style="list-style-type: none"> <li>Developing Decimal and Percent Concepts and Decimal Computation</li> </ul> <p>** Number Routines**</p>	Chapter 16.	
Day 12	<ul style="list-style-type: none"> <li>Ratios, Proportions, and Proportional Reasoning</li> <li>CLT - Vignette Activity #3</li> <li>NCTM teaching practices</li> </ul>		Video Vignette Analysis #3

	Routine: How many fit (decimal squares) Task:		
Week 4 June 7-10	<u>Measurement, Geometry, Data</u> <ul style="list-style-type: none"> <li>● Collaborative Problem-based Lessons Co-teach</li> </ul>	Content Chapters: 18, 19, 20	Co-teach Collaborative Problem Based Lessons  Daily Interactive Notebook
Day 13	<ul style="list-style-type: none"> <li>● Developing Measurement Concepts</li> </ul>	Chapter 18.	
Day 14	<ul style="list-style-type: none"> <li>● Developing Geometric Thinking and Concepts</li> </ul>	Chapter 19.	<b>Slides and Q and A</b> Problem-Based Lesson Slides and <b>Q and A:</b> Questions to make math visible and <b>Anticipation</b> of student thinking
Day 15	<ul style="list-style-type: none"> <li>● Developing Concepts of Data and Statistics</li> </ul>	Chapter 20.	
Day 16	CLT- work on final project share-out slides		
Week 5 June 14-17	<u>Proportional Reasoning, Probability, Integers</u> <ul style="list-style-type: none"> <li>● Probability games</li> <li>● Individualized Assessment and Instruction Plan Share out</li> </ul>	Content Chapters 17, 21, 22	PBA Individualized Assessment and Instruction Plan  Daily Interactive Notebook
Day 17	<ul style="list-style-type: none"> <li>● Proportional reasoning</li> </ul>	Chapter 17.	
Day 18	<ul style="list-style-type: none"> <li>● Probability Game Day!</li> </ul>	Chapter 21.	Final Project DUE
Day 19	<ul style="list-style-type: none"> <li>● Integers Integers Mini-Lesson - How to use algebra tiles for integers</li> </ul>	Chapter 22.	PBA Report Share Symposium
Day 20	Course Reflection		PBA Report Share Symposium

## Assessment Rubrics

### Lesson #1 Rehearsal: Math Routine (15 points)

<b>Part A Plan:</b> Design a slide of the number routine with brief launch and summary of the routine; identify the goal of the routine and the <b>Virginia SOL</b> addressed in the routine; pinpoint <b>Anticipated</b> student responses along the learning progression; include <b>Questions</b> for making math visible, encouraging justification and reflection, and orienting students to other ideas or extending on other's ideas.	5 points
<b>Part B Teach:</b> Implement the routine, facilitate discourse, make connections between students' contributions	5 points
<b>Part C Reflect:</b> After enacting the routine, reflect on how the lesson supports math learning and equitable teaching practices for student learning.	5 points
<b>Total Points</b>	15

### Math Routine Quick Plan

See [Math Routine lesson plan](#) template and [Resources to Spark Mathematical Discussions](#) on Blackboard.

<b>Math Goal using Routine &amp; SOL connection:</b>		
<b>Math Routine Slide Image 1</b>	<b>Math Routine Slide Image 1</b>	<b>Math Routine Slide Image 1</b>
<b>Anticipated Student Responses</b>		
<b>Posing Purposeful Questions</b>		
<b>Questions to Make Math Visible</b>	<b>To Encourage Justification and Reflection</b>	<b>To orient students to other ideas/extend on other's ideas</b>
<b>Reflection:</b> After enacting the routine, reflect on how the lesson supports equitable teaching practices for student learning.		

**Lesson #2 Rehearsal: Problem-Based / Student Learning Progression Lesson (15 points)**

Refer to [VDOE task site](#) and [Google Slide template](#) on Blackboard.

<b>Part A: Plan:</b> Design a slide of the problem-solving task; identify the SOL standards and targeted learning trajectories; include brief launch;	5 points
<b>Part B: Teach: Anticipate</b> student responses along the learning progression. Plan Includes <b>Questions</b> for Making Math Visible and encouraging justification and equitable participation, <b>Select</b> and <b>Sequence</b> your classmates' responses	5 points
<b>Part C:</b> After enacting the problem-solving task, reflect on how the lesson supports equitable teaching practices for student learning.	5 points
<b>Total Points</b>	15



# Individualized Assessment and Instruction Plan Task

George Mason University College of Education and Human Development  Elementary Education Program

In the Elementary Education program, the Individualized Assessment and Instruction Plan Task is completed during EDCI 552 and is assessed by the instructor. The candidate must earn a score of 3 to be successful on this assignment. If a student does not earn a 3 on the assignment, they must meet with the course instructor or assessor prior to resubmitting. The data from this assessment are used to identify both best practice and identified gaps in developing and assessing a specific lesson plan to impact on individual learning.

## STANDARDS

- **InTASC Standards:** 1, 2, 5, 6, 7, 8
- **CAEP Standards:** 1.1, 1.3, 1.4, 1.5
- **VDOE Standards:** 1, 2, 3, 4, 5

**INTASC Standard #1: Learner Development.** The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences. )

**INTASC Standard #2: Learning Differences.** The teacher uses understanding of individual differences and diverse cultures and communities to ensure inclusive learning environments that enable each learner to meet high standards)

**INTASC Standard #4: Content Knowledge.** The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make the discipline accessible and meaningful for learners to assure mastery of the content.

**INTASC Standard #5: Application of Content.** The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues

**INTASC Standard #6 Assessment.** The teacher understands and uses multiple methods of assessment to engage learners in their own growth, to monitor learner progress, and to guide the teacher's and learner's decision making

**INTASC Standard #7: Planning for Instruction.** The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.

**INTASC Standard #9: Professional Learning and Ethical Practice.** The teacher engages in ongoing professional learning and uses evidence to continually evaluate his/her practice, particularly the effects of his/her choices and actions on others (learners, families, other professionals, and the community), and adapts practice to meet the needs of each learner.

## THEMES

-  **Technology**
-  **Diversity**
-  **College & Career Ready**

## ASSESSMENT OBJECTIVES

- The candidate will use knowledge of individual learning differences and assessment to develop an instructional plan for a learner with developmental, learning, physical or linguistic differences.
- The candidate will develop an assessment of learner progress.

## RATIONALE

Lesson planning is an essential skill for an educator. A lesson plan is a road map for instruction. When planning teachers and teacher candidates need to answer four main questions:

- Who are my learners? (Context/Learner Needs)
- What do the learners need to know and be able to do? (Objectives/Goals)
- How will I get all learners to know and do the new tasks? (Teaching and learning strategies)
- How will I know the learning objectives were achieved? (Goals/Outcomes/Assessments)

The first step in planning is aligning the learning objectives with the goals/outcomes/assessments for the lesson. This should include considerations based on learner abilities, challenges, and prior knowledge. Before developing specific learning activities, determine how you will assess if learners have met the lesson objectives. Once you know how you will assess learning, you can develop activities that align instruction with the assessment. Additionally, a teacher must consider learner prior knowledge, how to differentiate to meet learner needs, and how to do so within the time allotted. Lesson plans include pacing, transitions, checking for understanding, and ideas for re-teaching or extending learning based upon learner needs.

The planning process is the same whether you are planning a lesson for a class or for an individual. For this assessment you will develop an instructional plan for a learner with developmental, learning, physical or linguistic differences, including a plan for assessing the learner's progress.

## **ASSESSMENT DIRECTIONS**

Candidates will develop an individualized plan for a child with learning trajectory in mind. The Individualized Assessment and Instruction Plan should include the following sections:

**Part 1. Description of the Learning Progression** (3-5 pages) using your text, the learning progression document and other research around learning progression, describe the learning progression around your specific math concept. The candidate includes descriptions with specific examples from the research literature.

- 1a. Description of the learning progression.** Summarize the research around the learning progression around the topic chosen.
- 1b. Description of common teaching and learning strategies.** What are some of the common teaching strategies and the ways in which students develop the skills and understandings?
- 1c. Description of Student conceptions and misconceptions.** Specific references are made to common conceptions and misconceptions one might attend to based on the research on the learner development using the text and progression document.

## **Part 2. Learning Progression Assessment Tasks with Purposeful Questions (3-5 pages)**

- 2a. Enact Assessment tasks with multiple representations.** Uses multiple and appropriate types of assessment tasks with multiple representations including pictorial, numeric, verbal and hands-on manipulatives to assess student thinking and identify each learner's needs.
- 2b. Assessment of student's mathematical understanding based on purposeful questions.** Design and administer an assessment with tasks aligned and with prepared questions that gather information about student's interest, background and cultural information as well as specific questions linked to the tasks that probe thinking, and makes math visible.
- 2c. Geared up and geared down with rationale on conceptual development.** Considers learner differences and has at least three (3) differentiated tasks geared up and down with one technology app-and to develop differentiated learning experiences.

**Part 3. Learning Goal and Instructional Activities (3- 5 pages)** . As teacher candidate (TC) describes data from part 2, the TC sets learning goal and a set of activities that will advance the learner along the developmental learning trajectory.

**3a. Learning Goal** (aka: target, benchmark, expectation). What should they learn? Identify learning goals within the learning progression and develop a rationale that supports why the objectives/goals are meaningful learning outcomes. (Virginia Standards of Learning (SOLs), College-and-Career-Ready skills, and other content specific objectives should be included in lesson plans.)

**3b. Set of activities matched to each of the levels of thinking in that path that help children develop the next higher level of thinking.** How will you teach, and how will the individual learn? Describe at least three evidence-based instructional strategies that address the identified learning objectives/goals and reflect the learners' developmental skill levels and abilities, interests and educational needs. Include the use of technologies used to address learning needs. Write a rationale for each showing how the strategies support learning and success for this learner.

**3c. Developmental path along which children develop to reach that goal.** What are the levels? Provide a rationale for instructional adaptations and accommodations needed. How will I know the learning objectives/goals were achieved? Write a plan for the assessment (Look fors) and documentation of the learners' progress toward the identified objectives/goals.

**Part 4. Reflection** (1-2 pages) and be ready to share with a brief set of slides

**How did the assessment help you understand the student's learning trajectory and where he or she is within the learning progression?**

What did you learn about learning trajectories? Reflect on your questioning skills? Did you plan for a variety of questions (i.e. gathering, probing, making math visible, reflecting & justifying questions)? What might you learn about how children learn mathematics from this assessment? How might a teacher use the diagnostic mathematics assessment to assess children?



## Individualized Assessment and Instruction Plan RUBRIC

George Mason University College of Education and Human Development  Elementary Education Program




In the Elementary Education program, the Individualized Assessment and Instruction Plan Task is completed during EDCI 552 and is assessed by the instructor. The candidate must earn a score of 3 to be successful on this assignment. If a student does not earn a 3 on the assignment, they must meet with the course instructor or assessor prior to resubmitting. The data from this assessment are used to identify both best practice and identified gaps in developing and assessing a specific lesson plan to impact on individual learning.

### SCORING GUIDELINES

- **3 (Exemplary Standard):** Candidates receive a score of 3 if they perform at an exemplary level.. There is evidence that candidates have done additional research, identified additional resources, and/or demonstrate exceptional understanding and application of the standard.
- **2(Meets Standard):** This score reflects that candidates have met the standard at the level expected at this point in their program. Candidates who receive a 2 have successfully met the standard.
- **1 (Approaches Standard):** Candidates receive this score when their understanding and effort does not meet the target but shows basic understanding of the content being assessed.
- **0 (Does Not Meet Standard):** Candidates who do not submit work, and/or who submit work that is clearly below the expectations for a candidate at this point in their program.

Learning Trajectory based Student Assessment				
Performance	Does Not Meet  Standard (0)	Approach es Standard (1)	Meets Standard (2)	Exemplary Standard (3)
<b>Part 1. Description of the Learning Progression</b> (3-5 pages) using your text, the learning progression document and other research around learning progression, describe the learning progression around your specific math concept. The candidate includes descriptions with specific examples from the research literature.				
<b>1a. Research on Description of the learning progression.</b> Summarize the research around the learning progression around the topic chosen.  <b>InTASC 1 &amp; 2; VDOE 1;</b> 	The candidate does not describe the learning progression using multiple resources (text, Learning progression documents and other research).	The candidate describes briefly the learning progression without any references.	The candidate describes the learning progression only using one resource (text, Learning progression documents and other research).	The candidate describes in depth the learning progression using multiple resources (text, Learning progression documents and other research).

<p><b>1b. Research on Description of common teaching and learning strategies.</b> What are some of the common teaching strategies and the ways in which students develop the skills and understandings?</p> <p>InTASC 2; VDOE 4</p>	<p>The candidate does not describe the common teaching and learning strategies for the specific concept varying the strategies based on learning trajectory..</p>	<p>The candidate describes briefly the common teaching and learning strategies for the specific concept varying the strategies based on learning trajectory.</p>	<p>The candidate describes the common teaching and learning strategies for the specific concept varying the strategies based on learning trajectory but only uses one resource.</p>	<p>The candidate describes in depth common teaching and learning strategies for the specific concept varying the strategies based on learning trajectory using multiple resources (text, Learning progression documents and other research). Provides specific examples.</p>
<p><b>1c. Research on Description of Student conceptions and misconceptions.</b> Specific references are made common conceptions and misconceptions one might attend to based on the research on the learner development using the text and progression document</p> <p>InTASC Standard #6 Assessment.</p>	<p>The candidate does not describe the common student conceptions and misconceptions for the specific concept based on learning trajectory.</p>	<p>The candidate briefly describes the common student conceptions and misconceptions for the specific concept .</p>	<p>The candidate describes the common student conceptions and misconceptions for the specific concept based on learning trajectory using only one resource.</p>	<p>The candidate describes in depth common student conceptions and misconceptions for the specific concept based on learning trajectory using multiple resources (text, Learning progression documents and other research). Provides specific examples.</p>
<p><b>Part 2. Assessment Data from Tasks and Questions with Learning Progression Considered</b></p>				
<p><b>2a. Assessment tasks with multiple representations.</b> Uses multiple and appropriate types of <u>assessment tasks that uses multiple representations</u> including pictorial, numeric, verbal and hands on manipulatives to assess student thinking and identify each learner’s needs (InTASC Standard #6 Assessment)</p>	<p>The candidate does not address learner educational needs or inappropriately uses assessment data to create a statement of educational need.</p>	<p>The candidate locates assessments that are not well aligned to the math concept.</p>	<p>The candidate reports on assessment data through designed tasks aligned to the math concept but does not consider multiple representations.</p>	<p>The candidate effectively integrates results from the assessment tasks from multiple sources to create a thorough and appropriate report aligned to the learning progression. The assessment tasks uses multiple representations including pictorial, numeric, verbal and hands on manipulatives to assess student thinking and identify the learner’s needs</p>
<p><b>2b. Purposeful questions.</b> Designs assessment with tasks aligned with <u>prepared questions</u> that gathers information about student’s interest, background and cultural information as well as specific questions linked to the tasks that probes thinking, and makes math visible.</p>	<p>The candidate does not describe an assessment plan that evaluates all learning objectives or describes a plan with any questions.</p>	<p>The candidate describes an assessment plan that evaluates all learning objectives but does not include questions that delve into the child or concept.</p>	<p>The candidate describes an assessment plan that evaluates all learning objectives and includes questions linked to the tasks that probes thinking, and makes math visible but does not gather info about the whole child.</p>	<p>The candidate describes an assessment plan that evaluates all learning objectives and prepares a variety of questions to gather information about student’s interest, background and cultural information as well as specific questions linked to the tasks that probes thinking, and makes math visible.</p>
<p><b>2c. Geared up and geared down with rationale on conceptual development.</b> Considers learner differences and has <u>at least three (3) differentiated tasks geared up and down with one technology</u> app- and to develop differentiated learning experiences. (INTASC Standard #2: Learning Differences)</p>	<p>The candidate does not identify either adaptations or accommodations to support learner achievement of learning objectives.</p>	<p>The candidate identifies either adaptations or accommodations s that do not fully align with identified needs.</p>	<p>The candidate identifies and describes appropriate adaptations or accommodations that support learner achievement of learning objectives/goals, including technology.</p>	<p>The candidate thoroughly describes multiple, appropriate adaptations or accommodations that clearly support learner achievement of learning objectives/goals, including technology.</p>

Part 3 Learning goals and Instructional Activities				
<p><b>3a. Set Learning Goal</b> (aka: target, benchmark, expectation) based on Developmental path along which children develop to reach that goal</p> <p>The candidate individually and collaboratively selects and creates learning objectives that are appropriate for curriculum goals and content standards, and are relevant to learners. The candidate identifies objectives for instruction based on formative and summative assessment data, prior learner knowledge, and learner interest.</p> <p><b>InTASC 7; VDOE 2</b></p> 	<p>The candidate identifies learning objectives that are either incomplete because related outcomes are not identified or the objectives are not directly related to learner educational need.</p>	<p>The candidate identifies learning objectives without relevance to learner educational need.</p>	<p>The candidate identifies learning objectives with related outcomes that are relevant to individual learner needs.</p>	<p>The candidate identifies distinct learning objectives with related outcomes that are relevant to individual learner needs. These learning outcomes allow for different and individualized learning pathways that can be accessed fluidly during instruction. Includes rationales for the selection of those objectives and how they support the achievement in advancing student along the learning progression</p>
<p><b>3b. INSTRUCTIONAL STRATEGIES AND ADAPTATIONS</b>—Set of activities matched to each of the levels of thinking in that path that help children develop the next higher level of thinking. The candidate plans how to achieve each learner’s learning goals, choosing appropriate strategies and accommodations, resources, and materials to differentiate instruction for individuals and groups of learners.</p> <p><b>InTASC 4</b></p>  <p>Standard #4: Content Knowledge.</p>	<p>The candidate does not identify instructional strategies or identifies instructional strategies that are not related to the learning objectives or learning needs.</p>	<p>The candidate identifies instructional strategies that are inappropriate for meeting the learning objectives or learning needs.</p>	<p>The candidate identifies evidence-based instructional strategies that are aligned to the learning objectives and learning needs.</p>	<p>The candidate identifies evidence-based instructional strategies that are aligned to specific learning objectives and learning needs. Uses <b>technology</b> as one of the modalities.</p> <p>The candidate provides evidence of the effectiveness of these selected learning strategies through data analysis of the assessment.</p>
<p><b>3c. Developmental path along which children develop to reach that goal</b>The candidate connects concepts and uses different perspectives and digital resources to engage learners in critical thinking, creativity, and collaborative problem solving.</p> <p><b>InTASC 5; VDOE 2;</b></p> 	<p>Candidate does not connect concepts, address different perspectives or use digital resources to engage learners in higher-level learning.</p>	<p>Candidate connect concepts, addresses different perspectives or uses digital resources to engage learners but at a basic level of learning and recall.</p>	<p>Candidate connects concepts, addresses different perspectives and uses digital resources to engage learners in higher-level learning in using at least one of these higher-order skills: critical thinking, creativity, and collaborative problem solving.</p>	<p>Candidate creates multi-disciplinary opportunities and a range of multiple perspectives to engage learners in critical thinking, creativity, and collaborative problem solving.</p>
Part 4. REFLECTION and Presentation				
<p>The candidate uses ongoing analysis and reflection to improve planning and practice</p>	<p>There was no evidence that the candidate used ongoing analysis and/or reflection to improve planning and practice.</p>	<p>The candidate uses marginal analysis and reflection strategies to improve planning and practice.</p>	<p>The candidate uses ongoing analysis and reflection to improve planning and practice</p>	<p>The candidate effectively uses ongoing analysis and deep reflection to improve planning and practice. Candidates reflect and share on learning about the student’s learning trajectory.</p>

## **NCTM Process standards & SOL Mathematical Process Goals for Students**

The content of the mathematics standards is intended to support the following five process goals for students: becoming mathematical problem solvers, communicating mathematically, reasoning mathematically, making mathematical connections, and using mathematical representations to model and interpret practical situations. Practical situations include real-world problems and problems that model real-world situations.

### **Mathematical Problem Solving**

Students will apply mathematical concepts and skills and the relationships among them to solve problem situations of varying complexities. Students also will recognize and create problems from real-world data and situations within and outside mathematics and then apply appropriate strategies to determine acceptable solutions. To accomplish this goal, students will need to develop a repertoire of skills and strategies for solving a variety of problem types. A major goal of the mathematics program is to help students apply mathematics concepts and skills to become mathematical problem solvers.

### **Mathematical Communication**

Students will communicate thinking and reasoning using the language of mathematics, including specialized vocabulary and symbolic notation, to express mathematical ideas with precision. Representing, discussing, justifying, conjecturing, reading, writing, presenting, and listening to mathematics will help students to clarify their thinking and deepen their understanding of the mathematics being studied. Mathematical communication becomes visible where learning involves participation in mathematical discussions.

### **Mathematical Reasoning**

Students will recognize reasoning and proof as fundamental aspects of mathematics. Students will learn and apply inductive and deductive reasoning skills to make, test, and evaluate mathematical statements and to justify steps in mathematical procedures. Students will use logical reasoning to analyze an argument and to determine whether conclusions are valid. In addition, students will use number sense to apply proportional and spatial reasoning and to reason from a variety of representations.

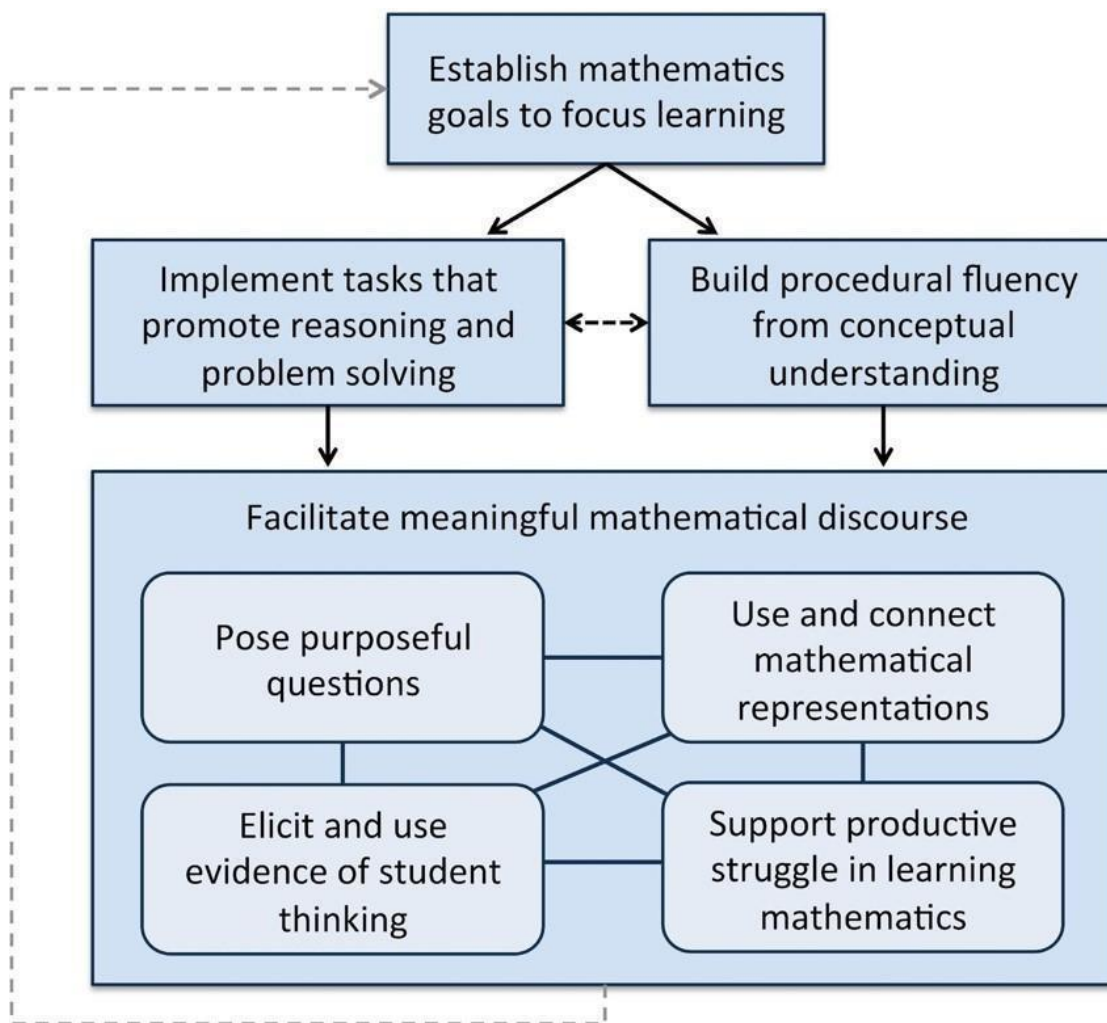
### **Mathematical Connections**

Students will build upon prior knowledge to relate concepts and procedures from different topics within mathematics and see mathematics as an integrated field of study. Through the practical application of content and process skills, students will make connections among different areas of mathematics and between mathematics and other disciplines, and to real-world contexts. Science and mathematics teachers and curriculum writers are encouraged to develop mathematics and science curricula that support, apply, and reinforce each other.

### **Mathematical Representations**

Students will represent and describe mathematical ideas, generalizations, and relationships using a variety of methods. Students will understand that representations of mathematical ideas are an essential part of learning, doing, and communicating mathematics. Students should make connections among different representations – physical, visual, symbolic, verbal, and contextual – and recognize that representation is both a process and a product.

## NCTM 8 Teaching Practices





## Mathematics Teaching Practices: Supporting Equitable Mathematics Teaching

### EQUITABLE TEACHING PRACTICES

VDOE SOL Institutes, 2018

Mathematics Teaching Practices (NCTM)	Equitable Teaching
<p>1. <b>Establish mathematics goals to focus learning.</b> Effective teaching of mathematics establishes clear goals for the mathematics that students are learning, situates goals within learning progressions, and uses the goals to guide instructional decisions.</p>	<ul style="list-style-type: none"> <li>● Establish learning progressions that build students' mathematical understanding, increase their confidence, and support their mathematical identities as doers of mathematics.</li> <li>● Establish high expectations to ensure that each and every student has the opportunity to meet the mathematical goals.</li> <li>● Establish classroom norms for participation that position each and every student as a competent mathematics thinker.</li> <li>● Establish classroom environments that promote learning mathematics as just, equitable, and inclusive.</li> </ul>
<p>2. <b>Implement tasks that promote reasoning and problem solving.</b> Effective teaching of mathematics engages students in solving and discussing tasks that promote mathematical reasoning and problem solving and allow multiple entry points and varied solution strategies.</p>	<ul style="list-style-type: none"> <li>● Engage students in tasks that provide multiple pathways for success and that require reasoning, problem solving, and modeling, thus enhancing each student's mathematical identity and sense of agency.</li> <li>● Engage students in tasks that are culturally relevant.</li> <li>● Engage students in tasks that allow them to draw on their funds of knowledge (i.e., the resources that students bring to the classroom, including their home, cultural, and language experiences).</li> </ul>
<p>3. <b>Build procedural fluency from conceptual understanding.</b> Effective teaching of mathematics builds fluency with procedures on a foundation of conceptual understanding so that students, over time, become skillful in using procedures flexibly as they solve contextual and mathematical problems.</p>	<ul style="list-style-type: none"> <li>● Connect conceptual understanding with procedural fluency to help students make sense of mathematics and develop a positive disposition toward mathematics.</li> <li>● Connect conceptual understanding with procedural fluency to reduce mathematical anxiety and position students as mathematical knowers and doers.</li> <li>● Connect conceptual understanding with procedural fluency to provide students with a wider range of options for entering a task and building mathematical meaning.</li> </ul>

**EQUITABLE TEACHING PRACTICES**

VDOE SOL Institutes, 2018

Mathematics Teaching Practices (NCTM)	Equitable Teaching
<p>4. <b>Facilitate meaningful mathematical discourse.</b> Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments.</p>	<ul style="list-style-type: none"> <li>● Use discourse to elicit students’ ideas and strategies and create space for students to interact with peers to value multiple contributions and diminish hierarchical status among students (i.e., perceptions of differences in smartness and ability to participate).</li> <li>● Use discourse to attend to ways in which students position one another as capable or not capable of doing mathematics.</li> <li>● Make discourse an expected and natural part of mathematical thinking and reasoning, providing students with the space and confidence to ask questions that enhance their own mathematical learning.</li> <li>● Use discourse as a means to disrupt structures and language that marginalize students.</li> </ul>
<p>5. <b>Pose purposeful questions.</b> Effective teaching of mathematics uses purposeful questions to assess and advance students’ reasoning and sense making about important mathematical ideas and relationships.</p>	<ul style="list-style-type: none"> <li>● Pose purposeful questions, then listen to, and understand students’ thinking to signal to students that their thinking is valued and makes sense.</li> <li>● Pose purposeful questions to assign competence to students. Verbally mark students’ ideas as interesting or identify an important aspect of students’ strategies to position them as competent.</li> <li>● Be mindful of the fact that the questions that a teacher asks a student and how the teacher follows up on the student’s response can support the student’s development of a positive mathematical identity and sense of agency as a thinker and doer of mathematics.</li> </ul>
<p>6. <b>Use and connect mathematical representations.</b> Effective teaching of mathematics engages students in making connections among mathematical representations to deepen understanding of mathematical concepts and procedures and to use as tools for problem solving.</p>	<ul style="list-style-type: none"> <li>● Use multiple representations so that students draw on multiple resources of knowledge to position them as competent.</li> <li>● Use multiple representations to draw on knowledge and experiences related to the resources that students bring to mathematics (culture, contexts, and experiences).</li> <li>● Use multiple representations to promote the creation and discussion of unique mathematical representations to position students as mathematically competent.</li> </ul>

**EQUITABLE TEACHING PRACTICES**

VDOE SOL Institutes, 2018

Mathematics Teaching Practices (NCTM)	Equitable Teaching
<p>7. <b>Elicit and use evidence of student thinking.</b> Effective teaching of mathematics uses evidence of student thinking to assess progress toward mathematical understanding and to adjust instruction continually in ways that support and extend learning.</p>	<ul style="list-style-type: none"> <li>● Elicit student thinking and make use of it during a lesson to send positive messages about students' mathematical identities.</li> <li>● Make student thinking public, and then choose to elevate a student to a more prominent position in the discussion by identifying his or her idea as worth exploring, to cultivate a positive mathematical identity.</li> <li>● Promote a classroom culture in which mistakes and errors are viewed as important reasoning opportunities, to encourage a wider range of students to engage in mathematical discussions with their peers and the teacher.</li> </ul>
<p>8. <b>Support productive struggle in learning mathematics.</b> Effective teaching of mathematics consistently provides students, individually and collectively, with opportunities and supports to engage in productive struggle as they grapple with mathematical ideas and relationships.</p>	<ul style="list-style-type: none"> <li>● Allow time for students to engage with mathematical ideas to support perseverance and identity development.</li> <li>● Hold high expectations, while offering just enough support and scaffolding to facilitate student progress on challenging work, to communicate caring and confidence in students.</li> </ul>