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

ELED 552-C01 – Mathematics Methods for the Elementary Classroom (ONLINE)
3 Credits Summer 2020
MWF 8:30am - 11:30am

Faculty

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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. 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 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 online (76% or more) using a synchronous format via Blackboard Learning Management system (LMS) housed in the MyMason portal. You will log in to the Blackboard (Bb) course site using your Mason email name (everything before @masonlive.gmu.edu) and email password. The course site will be available on May 30, 2020. 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 are 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.

Technical Requirements

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

· High-speed Internet access with standard up-to-date browsers. To get a list of Blackboard's supported browsers see: https://help.blackboard.com/Learn/Student/Getting_Started/Browser_Support#supported-browsers

To get a list of supported operation systems on different devices see: https://help.blackboard.com/Learn/Student/Getting_Started/Browser_Support#tested-devices-and-operating-systems

· 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 will need a headset microphone for use with the Blackboard Collaborate web conferencing tool.
· 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.
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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. Those unable to come to a Mason campus can meet with the instructor via telephone or web conference. 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 as others do not consider them as personal offenses. *Be positive in your approach with 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 the relationship of math to science, the design process, and technology.
K. 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:

Course Student Outcomes (above)	**INTASC Standard (2013)**
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	#2/#1

Course & PBA	INTASC
552 Math Student Assessment Interview	#4 Content Knowledge #1 & #2 Learner Development & Differences #6 Assessment

Required Texts

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)

Course Performance Evaluation

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

- **Assignments and Examinations**

Daily Participation, Reflections and Professional Dispositions (15%)

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

Reading and activity reflections will be done via Math Reflection entries. First session, we will start with the Math Autobiography & Surveys and the last class we will have a final vision statement and post survey on Teaching practices. In class, students are expected to analyze and reflect on solution strategies, provide differentiated approaches to center activities, and actively participate in class discussions by applying field experiences and class readings. Professional dispositions are to be displayed at all times while interacting with the instructor and other students. Cell phones are not to be used during class. Laptops are to be used for instructional purposes only.

Video Vignettes Analysis using NCTM 8 Teaching Practices: (15%)

Addresses Learner Outcomes: A, C, D, E, F

Being able to decompose a planned and enacted lesson for high quality of 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 video vignettes to evaluate using the NCTM 8 Teaching Practices Observation Tool (3 vignettes)

Student Assessment Interview and Learning Progression Report:
Course Performance Based Assessment (30%)

Addresses Learner Outcomes: A, B, C, D, F

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. Based on the research, TC will prescribe an instructional plan and present this in class. Reflecting on their deeper understanding within the conceptual learning progression/trajectory

Lesson #1: Math Routine and Video Reflection with student work analysis (20%)
Addresses Learner Outcomes: A, B, C, D, E, F

You are required to plan, teach, and complete a video reflection for a Math Routine taught to your classmates during the summer course, and to your students in your field assignment in the fall. Each 10-15 minute Math Routine will include the six essential elements of Math Routine and address a 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.

- Group rehearsal for Math Routine (10%): The first Math Routine will be taught by a small group and presented to your classmates. Each group is expected to: 1) prepare any materials needed for the Math Routine; 2) anticipate possible student responses to the problems presented and plan your expected sequence of follow-up questions; and 3) video record your group-led Math Routine and respond to your video in GoReact, according to the prompts in the detailed assignment description. The group will complete one video reflection on this teaching experience and submit one completed lesson plan. See rubric/Blackboard for more detail.

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Lesson #2: Group Problem Lesson with Student Learning Progression work analysis (20%)

http://www.doe.virginia.gov/testing/sol/standards_docs/mathematics/2016/rich/index.shtml

The lesson will be taught by a small group and presented to your classmates as a simulated lesson. Each group is expected to: 1) design a Power Point slide and e-mail it to your instructor before class; 2) anticipate possible student responses by solving the problem using all three representations (concrete, pictorial, abstract); The group will complete a written reflection on the analysis of student thinking.

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

As a professional learning community group, you are required to plan, teach, and complete a formal summary for a mathematics lesson. Each lesson will place an emphasis on five practices that promote productive discussions: Anticipating, Monitoring, Selecting, Sequencing, and Connecting. Each lesson should be written in the Modified GMU Elementary Lesson Plan Format (MATH) and follow the guidelines set forth by the grading rubric posted on Blackboard. Documents that should be

included are: the lesson plan, reflection, anticipated student responses along the learning progression/trajectory and student work samples. The enacted lesson will be uploaded to Go react as a tool for reflection

- **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 advanced notice of any modifications.

- **Course Performance Evaluation Weighting**
  The assignments across the semester are intended to further your understandings of what it means to teach, learn, and assess mathematics in light of current reforms in mathematics education. All assignments are to be turned in to your instructor on time.

  All assignments are to be completed by the date listed in the syllabus. Written work will not be accepted after the due date unless prior arrangements have been made with the instructor

  Late work will not be accepted for full credit. If the student makes prior arrangements with the instructor, assignments turned in late will receive a 10% deduction from the grade per late day or any fraction thereof (including weekends and holidays).

  Problem Solving Reflection, Daily Participation and Professional Dispositions (15%)

  Video Vignettes Analysis: (15%)

  Student Assessment Interview and Learning Trajectory Report:(30%)

  Lesson #1: Math Routine Lesson with student work analysis (3 act math modeling task) (20%)

  Lesson #2 : Problem Solving Lesson with student work analysis along the learning progression(20%)

- **Grading Policies**
  The mathematics education courses in GSE'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.

At George Mason University course work is measured in terms of quantity and quality. A credit normally represents one hour per week of lecture or recitation or not fewer than two hours per week of laboratory work throughout a semester. The number of credits is a measure of quantity. The grade is a measure of quality. The university-wide system for grading graduate courses is as follows:

Grade	GRADING	Grade Points	Interpretation
A	94-100	4.00	Represents mastery of the subject through effort beyond basic requirements.
A-	90-93	3.67	
B+	85-89	3.33	Reflects an understanding of and the ability to apply theories and principles at a basic level
B	80-84	3.00	
C*	70-79	2.00	Denotes an unacceptable level of understanding and application of the basic elements of the course
F*	<69	0.00	

Note: "C" is not satisfactory for a licensure course.

"F" does not meet requirements of the Graduate School of Education

Professional Dispositions

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

HELPFUL WEBSITES

University of Washington Number Talks website: tedd.org
National Council of Teachers of Mathematics – Illuminations: illuminations.nctm.org
Jo Boaler's blog and resources: joboaler.com
Another Jo Boaler/Stanford University folks website w/K-12 math resources: youcubed.org
Number Talks and other Instructional Activities with videos and lesson plans: tedd.org
Estimation 180 (Andrew Stadel's site – elementary and MS focused): estimation180.com
Fawn Nguyen's website (MS Math focused): fawnnguyen.com
Dan Meyer's website (more HS focused): blog.mrmeyer.com
And his "3-Act" math lessons (MS and HS focused, linked to CCSS): www.livebinders.com/play/play_or_edit?id=330579
Michael Pershan's blog, elementary school teacher: rationalexpressions.blogspot.com
Synchronous Online Learning: http://theresawills.com/

CCSS Helpful Websites:

CCSS Progressions Documents: http://ime.math.arizona.edu/progressions/
Lots of lesson plans and videos organized by Standard: insidemathematics.org
CCSS aligned tasks: illustrativemathematics.org
CCSS aligned tasks and assessments: map.mathshell.org/

EDCI 552-001 – Mathematics Methods for the Elementary Classroom

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.

Assignment	Due Date
Student Assessment Interview and Learning Progression Report: **Course Performance Based Assessment (30points)** (1) Research a Learning Trajectory around a specific focus. 2) Design a plan for the assessment within a conceptual learning trajectory, assessing a specific mathematics topic using concrete, pictorial and abstract representations, (3) TC will describe the assessment task in reference to the Learning trajectory and describe the instructional plan for students who would perform the assessment with high competence as well as ones that would show areas for improvement. Week 2. Start the Learning trajectory research Week 3. Brief assessment with a child Week 4. Write up report Week 5. presentation during last in-class.	Due Last week August 3-7

Lesson #1: Math Routine lesson (20points) **Addresses Learner Outcomes: A, B, C, D, E, F** Each teacher candidate will lead a 10 minute Math Routine will include the essential elements of Math Routine and address a concept. A Math Routine lesson plan template will be provided, to which you will add your anticipated student responses and plan for purposeful questions. .	**Rehearsal in class week 2**
Lesson #2: Group Problem Lesson with student work analysis (20points) Part A: Group Problem-Based Lesson Plan with rehearsal lesson as scheduled in class Part B: Final Plan with Student work analysis : After teaching the rehearsed Group Problem-Based lesson to their peers (in class), each individual will write up how they would select, sequence and connect student work.. Each individual will complete a written reflection on this experience.	**Rehearsal in class week 4**
Math Daily Participation and Activities (15 points) Reflection of weekly readings and activities on BB as designed by instructor.	3 Weekly entries
Video Vignettes Analysis (15%) individual "field work" Teacher candidates will analyze teaching vignettes using a structured observation tool aligned to NCTM 8 Teaching practices as "virtual field work".	Weekly

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 http://oai.gmu.edu/the-mason-honor-code/).
- Students must follow the university policy for Responsible Use of Computing (see http://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 http://ods.gmu.edu/).

- Students must follow the university policy stating that all sound emitting devices shall be silenced during class unless otherwise authorized by the instructor.

Campus Resources

- Support for submission of assignments to Tk20 should be directed to tk20help@gmu.edu or https://cehd.gmu.edu/aero/tk20. Questions or concerns regarding use of Blackboard should be directed to http://coursessupport.gmu.edu/.

- The Writing Center provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing (see http://writingcenter.gmu.edu/).

- The Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance (see http://caps.gmu.edu/).

- The Student Support & Advocacy Center staff helps students develop and maintain healthy lifestyles through confidential one-on-one support as well as through interactive programs and resources. Some of the topics they address are healthy relationships, stress management, nutrition, sexual assault, drug and alcohol use, and sexual health (see http://ssac.gmu.edu/). Students in need of these services may contact the office by phone at 703-993-3686. Concerned students, faculty and staff may also make a referral to express concern for the safety or well-being of a Mason student or the community by going to http://ssac.gmu.edu/make-a-referral/.

- **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.
- 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/.

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Assessment Rubric(s)

INDIVIDUALIZED INSTRUCTION AND ASSESSMENT PLAN TASK

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

In the Elementary Education program, the Individualized Instruction and Assessment 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

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)

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.

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

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.

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 instruction and assessment plan should include the following sections:

Part 1. Description of the Learning Progression (4-6 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 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

2a. **Enact Assessment tasks with multiple representations.** Uses multiple and appropriate types of assessment tasks that uses multiple representations including pictorial, numeric, verbal and hands on manipulatives to assess student thinking and identify each learner's needs

2b. **Purposeful questions.** Designs assessment with tasks aligned with prepared questions 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.

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 (4-6 pages) . As TC describe data from part 2, the teacher candidate 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 INSTRUCTION AND ASSESSMENT PLAN RUBRIC

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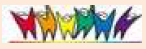
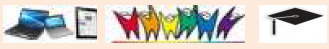
SCORING GUIDELINES

- **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)**	**Approaches Standard (1)**	**Meets Standard (2)**	**Exemplary Standard (3)**
Part 1. Description of the Learning Progression (5-7 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. Research on Description of the learning progression. Summarize the research around the learning progression around the topic chosen. **InTASC 1 &2; VDOE 1;** 	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).

1b. Research on 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? **InTASC 2; VDOE 4**	The candidate does not describe the common teaching and learning strategies for the specific concept varying the strategies based on learning trajectory..	The candidate describes briefly the common teaching and learning strategies for the specific concept varying the strategies based on learning trajectory.	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.	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.
1c. Research on Description of Student conceptions and misconceptions. 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 InTASC Standard #6 Assessment.	The candidate does not describe the common student conceptions and misconceptions for the specific concept based on learning trajectory.	The candidate briefly describes the common student conceptions and misconceptions for the specific concept .	The candidate describes the common student conceptions and misconceptions for the specific concept based on learning trajectory using only one resource.	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.
Part 2. Assessment Data from Tasks and Questions with Learning Progression Considered				
2a. Assessment tasks with multiple representations. Uses multiple and appropriate types of assessment tasks that uses multiple representations including pictorial, numeric, verbal and hands on manipulatives to assess student thinking and identify each learner's needs (InTASC Standard #6 Assessment)	The candidate does not address learner educational needs or inappropriately uses assessment data to create a statement of educational need.	The candidate locates assessments that are not well aligned to the math concept.	The candidate reports on assessment data through designed tasks aligned to the math concept but does not consider multiple representations.	The candidate effectively integrates results from the assessment tasks from multiple sources to create a thorough and appropriate aligned to the learning progression. Assessment tasks that uses multiple representations including pictorial, numeric, verbal and hands on manipulatives to assess student thinking and identify the learner's needs
2b. Purposeful questions. Designs assessment with tasks aligned with prepared questions 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.	The candidate does not describe an assessment plan that evaluates all learning objectives or describes a plan with any questions.	The candidate describes an assessment plan that evaluates all learning objectives but does not include questions that delve into the child or concept.	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.	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.

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. (INTASC Standard #2: Learning Differences)	The candidate does not identify either adaptations or accommodations to support learner achievement of learning objectives.	The candidate identifies either adaptations or accommodations that do not fully align with identified needs.	The candidate identifies and describes appropriate adaptations or accommodations that support learner achievement of learning objectives/goals, including technology.	The candidate thoroughly describes multiple, appropriate adaptations or accommodations that clearly support learner achievement of learning objectives/goals, including technology.
Part 3 Learning goals and Instructional Activities				
3a. Set Learning Goal (aka: target, benchmark, expectation) based on Developmental path along which children develop to reach that goal 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. **InTASC 7; VDOE 2** 	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.	The candidate identifies learning objectives without relevance to learner educational need.	The candidate identifies learning objectives with related outcomes that are relevant to individual learner needs.	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
3b. INSTRUCTIONAL STRATEGIES AND ADAPTATIONS-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. **InTASC 4**  Standard #4: Content Knowledge.	The candidate does not identify instructional strategies or identifies instructional strategies that are not related to the learning objectives or learning needs.	The candidate identifies instructional strategies that are inappropriate for meeting the learning objectives or learning needs.	The candidate identifies evidence-based instructional strategies that are aligned to the learning objectives and learning needs.	The candidate identifies evidence-based instructional strategies that are aligned to specific learning objectives and learning needs. Uses **technology** as one of the modalities. The candidate provides evidence of the effectiveness of these selected learning strategies through data analysis of the assessment.
3c. Developmental path along which children develop to reach that goal The candidate connects concepts and uses different perspectives and digital resources to engage learners in critical thinking, creativity, and collaborative problem solving. **InTASC 5; VDOE 2;** 	Candidate does not connect concepts, address different perspectives or use digital resources to engage learners in higher-level learning.	Candidate connect concepts, addresses different perspectives or uses digital resources to engage learners but at a basic level of learning and recall.	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.	Candidate creates multi-disciplinary opportunities and a range of multiple perspectives to engage learners in critical thinking, creativity, and collaborative problem solving.
Part 4. REFLECTION and Presentation				

The candidate uses ongoing analysis and reflection to improve planning and practice	There was no evidence that the candidate used ongoing analysis and/or reflection to improve planning and practice.	The candidate uses marginal analysis and reflection strategies to improve planning and practice.	The candidate uses ongoing analysis and reflection to improve planning and practice	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.

Number Routine Lesson (20points)

• Part A: Plan & Teach: Design a slide of the number routine with brief launch, explore and summarize aligned to SOL. and CCSS.	5 points
• Part A: Q & A: Plan Includes **Questions** for Making Math Visible and encouraging justification and **Anticipated** student responses.	5 points
• Part B: Complete a written reflection on how number routines promotes equitable teaching practices	5 points
• Part B: This lesson should be videotaped and annotated using the NCTM 8 Teaching Practices Observation Tool on GO REACT	5 points
Total points	20/20

Problem Solving along the Learning Progression Lesson (20points)

• Part A: Plan & Teach: Design slides to teach through problem solving with brief launch, explore and summarize aligned to SOL. and CCSS..	5 points
• Part A: Q & A: Plan Includes **Questions** for Making Math Visible and encouraging justification and **Anticipated** student responses.	5 points
• Part B: Complete a written reflection on how problem solving tasks and understanding the learning progression promotes equitable teaching practices	5 points
• Part B: This lesson should be videotaped and annotated using the NCTM 8 Teaching Practices Observation Tool on GO REACT	5 points
Total points	20/20

1) Number routine lesson **Rehearsals-** Tedd.org-Number Talk- **20 points**
2) Problem-based Lesson (rich task) 5 Practices -**20 points**
3) PBA - student assessment project (Learning Trajectories in K-6, text) **-30 points**

Candidates will assess a student

4) Video Vignette Analysis using Teaching practices 15 points
5) Daily participation and exercises 15 points

week 1	week 2	week 3	week 4	week 5
Autobiography and vision statement Video Vignette Module #1: NCTM Teaching Practice (5pts)	Math Routines (Rehearsals) for Primary and Upper Grades Math (20points)	Video Vignette Module #2: NCTM Teaching Practice (5pts)	Group Problem Solving- 5 practices with Student Analysis (20pts) Video Vignette #3: NCTM Teaching Practice(5pts)	PBA Report Share Symposium
	Conduct LT Student Assessment Interview: Course PBA (30points) due June30			

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

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	Active learning & Discussion emphasis	Readings due	Assignment -PST
Week 1 July 6-10	Building classroom norms (online and in class) • Number and Data Sense **Math Routines:** Splat, WODB, Choral Counting **Rich Tasks:** Farmer Bob **Summarization Strategies:** Compass Points	Chapter 1, 2 3 Content Ch. 7,8,9	Math Autobio with Vision Statement
Day 1	Graphing to know you! How Do Children Learn Mathematics? Overview of NCTM 8 Teaching Practices	Chapter 1 & 2 Preview	
Day 2	Early Number Sense Teaching Through Problem Solving & Math Modeling Routine: Quick Images Task: Caterpillar (Smith & Stein)	Chapter 3 and 7	

Day 3	Problem Situations 5 Practices for Math Discourse NCTM Principles & Standards Routine: Choral Counting Task: Kickball problem	Standard for Preparing Math Teachers (short excerpt)	
Weekly	CLT/Video Vignette Analysis ONLINE CLASS Assignment: Video Vignette Activity #1 -Choose a Math Routine: https://tedd.org/	Chapter 8 and 9	
Week 2 July 13-17	Equity Focused Instruction • Computation & Operations	Chapter 4, 6 Content Ch 10-13 Operations Unit	Start Mini Number Routines (individual)
Day 1	Developing Whole-Number and Place Value Concept Routine: Number Wave Task: Reaction Speeds Number Routines**	Chapter 4, 5	**Slides and Q and A due to instructor** **Q**uestions to make math visible and **A**nticipation of student thinking
Day 2	Developing Student Strategies for Addition & Subtraction & Algebraic Reasoning Routine: Many Ways Arrays Task: Hopscotch Number Routines**	Chapter 6, 10	
Day 3	Developing Student Strategies for Multiplication and Division & Algebraic Reasoning Routine: What comes next Task: Grow worm Number Routines**	Chapter 11, 12	
Weekly	CLT- Rich Task VDOE Vignette Activity #2- NCTM teaching practices	Number Routines Chapter 13	
Week 3 July 13-17	Mini Number Routine Rehearsals STEM PBL week Co-teach Fraction and decimals	18. Developing Measurement Concepts	Continue Mini Number Routines

		19. Geometric Thinking and Geometric Concepts 20. Data analysis	
Day 1	Measurement	Chapter 18.Developing Measurement	
Day 2	Geometry STEM PBL	Chapter 19. Geometric Thinking	
Day 3	Data - Statistics Reasoning STEM PBL	Chapter 20.Data analysis	
Weekly	CLT-Vignette Activity #3 NCTM teaching practices		
Week 4 July 27-31	Collaborative Problem based Lessons Co-teach http://www.doe.virginia.gov/testing/sol/standards_docs/mathematics/2016/rich/index.shtml	Content Chp 14,15, 16 Fraction/Operations	Group-lead Collaborative Problem Based Lessons Co-teach
Day 1	Developing Fraction Concepts Routine: Same & Different Task: Mango problem variations Pouring Paint (4)**	Chapter 14. Fractions	**Slides and Q and A due to instructor** **Q**uestions to make math visible and **A**nticipation of student thinking
Day 2	Developing Fraction Operations Routine: Number Talks - fractions Task: Pi day pies Room for shoes (5)**	Chapter 15. Fraction Operations	
Day 3	DDeveloping Decimal Computation Routine: How many fit (decimal squares) Task: Cookie Topping (6)**	Chapter 16. Decimals	
Weekly	CLT- work on final PBA share out slides Bake Sale (7)**		
Week 5 August 3-7	Learning Trajectory PBA Due and Share out Probability games	Ch 17 proportional reasoning 21. Probability games	Highlight LT research on students

		22. Integers	Post statement with Vision Statement
Day 1	Proportional reasoning Task: Graphs from found images	Chapter 17 proportional reasoning	
Day 2	Probability Game Day!	Chapter 21. Probability games	PBA DUE
Day 3	Integers Integers Mini-Lesson - How to use algebra tiles for integers	Chapter 22. Integers	PBA Report Share Symposium
Weekly	Reflection of the Course		PBA Report Share Symposium

Math Routine Quick Plan

https://docs.google.com/document/d/1gzkLlzJpWd-2DXcxll3DLrJuTvcwqoafARpc7xlFAtY/edit

Math Goal using Routine & SOL connection		
Math Routine Slide Image 1	**Math Routine Slide Image 1**	**Math Routine Slide Image 1**
Anticipated Student Responses		
Posing Purposeful Questions		
Questions to Make Math Visible	**To Encourage Justification and Reflection**	**To orient students to other ideas/extend on other's ideas**