

George Mason University
College of Education and Human Development
Mathematics Education Leadership

EDCI 644 6M1 – Mathematics Learning and Assessment (K-8)
3 Credits, Spring 2017
Mondays, 7:20PM-10:00PM Online

Faculty

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Prerequisites/Corequisites

Admission to the Mathematics Education Leadership Master's degree program or instructor permission.

University Catalog Course Description

Introduces students to learning theories and associated assessment practices specific to mathematics education. Intended for mathematics specialists and teachers interested in problems of learning and assessment across K-8 settings in mathematics education. This course is designed for master's level students in the mathematics education leadership program.

Course Overview

Not Applicable.

Course Delivery Method

This course will be delivered online (76% or more) using synchronous and asynchronous formats 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 Monday January, 23.

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 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 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.
- The following software plug-ins for PCs and Macs, respectively, are available for free download: [Add or delete options, as desire.]
 - Adobe Acrobat Reader: <https://get.adobe.com/reader/>
 - Windows Media Player: <https://windows.microsoft.com/en-us/windows/downloads/windows-media-player/>
 - Apple Quick Time Player: 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 3 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. Understand the learning theories fundamental to mathematics education.
- B. Understand the developmental progressions underpinning mathematics learning.
- C. Develop an understanding of various forms of mathematics learning assessment related to theories of mathematics learning.
- D. Understand the assessment of students' thinking at multiple levels.

Professional Standards (National Council of Teachers of Mathematics (NCTM))

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

A. Standard 4: Mathematical Learning Environment

- b. Plan, create, and coach/mentor teachers in creating developmentally appropriate, sequential, and challenging learning opportunities grounded in mathematics education research in which students are actively engaged in building new knowledge from prior knowledge and experiences.
- d. Demonstrate and encourage equitable and ethical treatment of and high expectations for all students
- e. Apply mathematical content and pedagogical knowledge in the selection, use, and promotion of instructional tools such as manipulatives and physical models, drawings, virtual environments, presentation tools, and mathematics-specific technologies (e.g., graphing tools and interactive geometry software); and make and nurture sound decisions about when such tools enhance teaching and learning, recognizing both the insights to be gained and possible limitations of such tools.

Required Texts

Donovan, M. S. & Bransford, J. (2004). *How students learn: Mathematics in the classroom*. Washington D.C., National Research Council.

Isles, D. (2011). *How to assess while you teach math K-2: Formative assessment practices and lessons*. Sausalito, CA: Math Solutions.

Joyner, J.M. and Muri, M. (2011). *INFORMative assessment: Formative assessment to improve math achievement, grades K-6*. Sausalito, CA: Math Solutions.

Course Performance Evaluation

This course will introduce students to the diverse learning theories and associated assessment practices specific to mathematics education. Topics will also include the historical development of learning theories as well as emerging theories. Assessment topics will include test design, problem-based assessment as well as other forms of assessment of mathematics learning across K-8. The course is intended for mathematics specialists, mathematics teachers, and pre-service mathematics teachers interested in problems of learning and assessment in mathematics education.

- **Assignments and/or Examinations**

All assignments are to be completed on time so that class members might benefit from the expertise and contributions of their colleagues. Assignments are due by 4:30 p.m. the date assigned. **Late work will not be accepted for full credit.** Assignments turned in late will receive a 10% deduction from the grade per late day (including weekends and holidays). **Additional details and rubrics for all assignments will be posted on Blackboard. Please review these materials.**

Students are expected to submit all assignments on time in the manner outlined by the instructor (e.g., Blackboard, Tk20, hard copy).

- **Participation (10%)**

- The quality of this course depends heavily and primarily on the regular attendance and participation of all involved. Participation will include taking part in discussions informed by critical reading and thinking and sharing with the class the products of various reading/writing assignments and teacher leader experiences.
- Attendance. It is your responsibility to attend all class sessions. Please report your reasons for any absences to the instructor in writing.
- Tardiness. It is your responsibility to be on time for each class session. Please report your reasons for any tardiness to the instructor in writing. Class materials will be posted for each class session on Blackboard. Students are responsible for reviewing these materials and submitting required artifacts (where appropriate) to online class discussion boards.

	LEVEL OF PERFORMANCE			
ELEMENT	<i>Distinguished</i> (9 – 10 points)	<i>Proficient</i> (8 points)	<i>Basic</i> (6 - 7 points)	<i>Unsatisfactory</i> (1 - 5 points)
Attendance &	The student attends all classes, is on time, is	The student attends all classes, is on time, is	The student misses 1 or 2 classes and follows	The student is frequently late for

Participation	prepared and follows outlined procedures in case of absence.	prepared and follows outlined procedures in case of absence.	outlined procedures in case of absence. At times the student is not prepared for class.	class or absences are not documented by following the outlined procedures.
	The student actively participates and continually supports the members of the learning group and the members of the class.	The student makes active contributions to the learning group and class.	The student is on time, prepared for class, and participates in group and class discussions.	The student is frequently not prepared for class and does not actively participate in discussions.
	Presentations demonstrate a deep knowledge of content as well as implications for teaching.	Presentations demonstrate sufficient knowledge of content as well as implications for teaching.	Presentations demonstrate minimal knowledge of content and/or implications for teaching.	Presentations are lacking knowledge of content and connections to teaching.

○ **Mathematics Assessment Autobiography (5%)**

- *Turned in via Blackboard Assignments*
- How you teach is inseparable from what you believe about mathematics, learning, and teaching. This assignment is intended to bring to light your educational and other personal experiences that influence your expectations and understanding of mathematics, teaching and learning. You will reflect upon your own beliefs and actions in regards to teaching and learning mathematics, as well as think about how you might encourage others on the topic of mathematical data and assessments. You will also self-assess your learning directed by this assignment. The specific guiding questions for reflection and self-assessment can be found in your Blackboard Course site.

○ **Online Assessment Tool Analysis Video (25%)**

- *Turned in via Blackboard Assignments & Blackboard File Exchange*
- Students will prepare a short video that explains and summarizes a particular type of online mathematics assessment (e.g., formative, summative, portfolios, multiple-choice, warm-ups) that could be used with teachers. Learning how to effectively and efficiently prepare materials for teachers is an ability mathematics specialists need to develop and to refine. The goal is for you to learn about the type of assessment and to learn how to disseminate information to adult learners.

○ **Group Mathematics Topics and Learning Progression Project (25%)**

- *Turned in via Blackboard Assignments & Blackboard File Exchange*
- In groups, the students will explore research literature on their topic, create an annotated bibliography of the literature, select an article that could be shared with teachers, prepare an appropriate assessment within the topic, and prepare a handout on the topic for their peers. Students will explore and

present information on one of the following topics and how they address learning progressions for students:

- **Presentations in Class 6**
 - K-5 Progression on Number and Operations - Base Ten
 - K-5 Progression on Counting and Cardinality and Operations and Algebraic Thinking
- **Presentations in Class 7**
 - 3-5 Progression on Number and Operations – Fractions
 - 6-8 Progression on the Number System
- **Presentations in Class 8**
 - 6-8 Progression on Expressions and Equations
- **Clinical Interview (30%)**
 - *Turned in via Tk20 (Blackboard Assessments)*
 - Effective teaching requires a keen awareness of how and what your students are thinking and understanding. The experience of conducting a clinical interview is intended to increase your awareness of students' thinking and learning in a detailed manner about a particular mathematics topic. The other focus of this assignment is on concrete manipulatives and their relationship to learning. So, you should select a manipulative (or manipulatives) to accompany the task and then assess how well the manipulative helped the learner to solve the problem. This is your Performance Based Assessment for this course. See the project description and rubric which follow the course schedule.
- **Final Reflection (5%)**
 - *Turned in via Blackboard Assignments*
 - This assignment is intended for you to reflect upon the knowledge you have gained this semester and how it is informing your beliefs and practices. The following reflection questions should be addressed:
 - What do you currently believe regarding the assessment of mathematics? How are these beliefs reflected in your actions? Which of these beliefs and actions support student learning?
 - As a mathematics leader, how might you encourage a teacher who is reluctant about district and/or state assessments and data (both the actual assessments and also the data meetings related to the assessments)? As a mathematics leader, what else might you want to communicate to teachers about other types of assessments (other than district and state mandated assessments)?
 - Read your reflection from the beginning of the semester. How has your mindset changed? What has stayed the same? Did something impact your growth this semester?

- What are your future goals?

- **Other Requirements**

All assignments require APA formatting:

American Psychological Association (2010). *Publication Manual of the American Psychological Association*. American Psychological Association: Washington, DC.

- **Course Performance Evaluation Weighting**

10%	Participation
5%	Mathematical Assessment Autobiography
25%	Online Assessment Tool Analysis Video
25%	Group Mathematics Topics and Learning Progressions Project
30%	Clinical Interview
5%	Final Reflection

- **Grading**

The final evaluation criteria utilizes the graduate grading scale and is as follows:

A	93%-100%	B+	87%-89%	C	70%-79%
A-	90%-92%	B	80%-86%	F	Below 70%

Professional Dispositions

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

Class Schedule

Textbook Abbreviation Key:

HSL = How Students Learn

K-2 = How to Assess While You Teach Math

INFORM = INFORMative Assessment

Date	Readings Due	Topics	Assignments Due
Week 1 Jan 23 Format Synchronous		Technology Briefing Class Overview Introduction Assessment Reflection Interviews	Create Collaborate Profile (Including Picture)
Week 2 Jan 30 Format Synchronous	HSL: Ch. 1 HSL: Ch. 5	Principles of Learning Theories Mathematical Understanding Library Tools for Research	Mathematics Autobiography
Week 3 Feb 6 Format Synchronous	INFORM: Ch. 2 INFORM: Ch. 3	Formative Assessment: Decision Making Learning Targets	
Week 4 Feb 13 Format Synchronous	INFORM: Ch. 4 K-2: p. 1-15 Fernandez (2009)	Formative Assessment: Oral Assessments Designing A Clinical Interview ELLs	
Week 5 Feb 20 Format Asynchronous	INFORM: Ch. 6 INFORM: Ch. 8	Formative Assessment: Rich Tasks Good Questions	Clinical Interview Part I
Week 6 Feb 27 Format Synchronous	HSL: Ch. 6	Whole Number Sense Learning Progressions	Group 1 & 2 Presentations
Week 7 March 6 Format Synchronous	HSL: Ch. 7	Rational Numbers Learning Progressions	Group 3 & 4 Presentations Group 1 & 2 Mathematics Topics and Learning Progressions Project Due

Week 8 March 13 GMU Spring Break Format Synchronous	HSL: Ch. 8	Functions Probability & Statistics Learning Progressions	Group 5 Presentations Group 3 & 4 Mathematics Topics and Learning Progressions Project Due
Week 9 March 20 Format Asynchronous	K-2: p. 15-34	Student-Led Formative Assessment Practices	Group 5 Mathematics Topics and Learning Progressions Project Due
Week 10 March 27 Format Synchronous	INFORM: Ch. 5 INFORM: Ch. 7	Formative Assessment: Written Assessments Student Self-Assessment & Responsibility	Online Assessment Tool Analysis Video
Week 11 April 3 Format Asynchronous		Video Assessment Tool Reflection VDOE Scavenger Hunt Clinical Interview Work Session	Clinical Interview Part II
Week 12 April 10 Format Synchronous	INFORM: Ch. 9 Mathematics Education Dialogues (NCTM, 1998)	Assessment to Inform Inferences & Actionable Feedback State Testing In Practice: Virginia Mathematics SOL	
No Class April 17 No Class Meeting			
Week 13 April 24 Format Synchronous	INFORM: Ch.10 Wilson (2007)	Informative Assessment for Long- Term Success State Testing In Practice: Non-Common Core State Mathematics Assessments	Clinical Interview Part III
Week 14	Gewertz (2014a)	State Testing In Practice:	

<p>May 1</p> <p>Format Synchronous</p>	<p>Gewertz (2014b) Larson & Leinwand (2013)</p>	<p>Common Core Mathematics Assessments</p>	
<p>Week 15 May 8</p> <p>Format Asynchronous</p>		<p>Clinical Interview Work Session</p>	
<p>Week 16 May 15</p> <p>Format Synchronous</p>		<p>Sharing of Clinical Interview Projects</p> <p>Final Reflection (Written In Class)</p>	<p>Clinical Interview (Parts I- IV) Due to Tk20</p>

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

Tk20

Every student registered for any Math Education Leadership course with a required TK20 performance-based assessment (designated as such in the syllabus) must submit this/these assessment(s) (**EDCI 644: Clinical Interview Project**) to Tk20 through ‘**Assessments**’ in Blackboard. Failure to submit the assessment(s) to Tk20 (through Blackboard) will result in the course instructor reporting the course grade as Incomplete (IN). Unless this grade is changed upon completion of the required Tk20 submission, the IN will convert to an F nine weeks into the following semester.

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://coursesupport.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/>.

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

CLINICAL INTERVIEW ASSESSMENT

Course Performance Based Assessment

PART I: The Plan

Student Description:

Describe the students you plan to assess. Include information you gathered about the child (grade level, age, gender, race, and academic ability level). What do you know about the child's level of understanding about the topic *before* the assessment?

The Mathematics Concept Development & Learning Progression:

Select one specific mathematics concept to assess during the assessment. Examples of concepts might include patterns, sorting, addition of whole numbers, division of fractions, finding averages, percent, geometric shapes, or length measurement. Tell why this concept is appropriate for this child at this particular grade level.

Different Forms of Representation:

During the assessment, assess the child using three different forms of representation. Identify the three different forms of representation you will use during the assessment with at least one example in each form. *Concrete* representations include manipulatives, measuring tools, or other objects the child can manipulate during the assessment. *Pictorial* representations include drawings, diagrams, charts, or graphs that are drawn by the child or are provided for the child to read and interpret. *Symbolic* representations include numbers or letters the child writes or interprets to demonstrate understanding of a task.

Tasks & Questions:

Design tasks and questions that use three different forms of representation (concrete, pictorial, symbolic) to diagnose the child's understanding of ONE basic concept. Go beyond the basic level of determining the child's factual knowledge of the concept by asking questions that determine how much the child understands about the concept. For example, suppose you are assessing the concept of ADDITION. (1) Create several tasks where the child uses concrete manipulatives to demonstrate his or her understanding of addition; ask questions about the child's understanding of the addition tasks with manipulatives. (2) Create several tasks where the child is asked to create or interpret drawings to demonstrate her understanding of addition; ask questions about the child's understanding of these tasks with pictorial models; (3) Create several tasks where the child uses abstract symbols (and letters) to demonstrate her understanding of addition; ask questions about the child's understanding of these addition tasks using the symbols.

The Goal is to assess students' conceptual understanding, procedural fluency, strategic competence, adaptive reasoning and productive dispositions towards mathematics.

PART II: Analysis of Evidence

Student Work Samples:

Collect and document three different forms of representation (concrete, pictorial, symbolic) during the assessment to elicit the child's level of understanding. The report must include samples of the

child's computations, writings and drawings, as well as a description of how the child used concrete objects during the assessment or photographs of the child's work.

Question & Response Assessment Segments

Audiotape the assessment. For the report, choose segments of your questions and the child's responses. Indicate what you said and what the child said.

Questioning Competence:

The questions and follow-up questions that you use during the assessment will be evaluated. You will be evaluated on the *quality* and the *types of follow-up questions* you use during your interaction with the child. Your textbooks and readings provide direction on the types of questions that are appropriate in an assessment and that go beyond factual information to deeper understanding.

PART III: Evaluation and Instructional Implications

Evaluation of Child's Mathematical Knowledge:

Write an evaluation of the child's mathematical knowledge in the content area. Use evidence from the assessment to support your conclusions. Use your textbook to help you describe the specific types of behaviors and verbalizations you observed using specific mathematical terms. For example, if you conclude that the student has an understanding of addition of fractions with like denominators, you should base this on evidence that you present that shows the child was able to represent $\frac{3}{5}$ and $\frac{4}{5}$ with fraction pieces (concrete), and/or the child used a drawing to find the sum (pictorial), and/or the child computed the answer with symbols (abstract). Give specific examples of the child's responses to support your statements.

Instructional Plan:

Develop a suggested instructional plan for the child. Your assessment of the child's thinking should give you some information for planning instruction. Your suggestions should be based on what you learned about the child during the assessment. Many general suggestions can be valuable for children. However, your recommendations should relate to specifics. For example, if you assessed basic division concepts and you suggest that the instructional plan for the child should include more manipulatives, that would be an important teaching strategy, but it would be too general. You should be more specific about why and how manipulatives might be used. Example: "The student had difficulty making 3 equal groups from a set of 21 chips; therefore, the student should be given more experiences with grouping and partitioning manipulatives in sets of 15 to 30 to develop both the measurement and partitive concepts of division."

Part IV: Reflection

Reflection of the Assessment Process:

Comment on the assessment process. How long did the assessment last? What did you learn about assessment techniques? What did you learn about your ability to create mathematics questions and tasks for this concept? If you were to conduct the assessment with another child, would there be any changes in your questions, either the order or the level of difficulty, or the materials you had available for the child to use? Why or why not? What have you learned about how children learn mathematics from this assessment? How might a classroom teacher use the diagnostic mathematics assessment to assess children?

CLINICAL INTERVIEW ASSESSMENT RUBRIC
Course Performance Based Assessment

Level/Criteria	4	3	2	1
	Exceeds Expectations	Meets Expectations	Developing	Does Not Meet Expectations
CLINICAL INTERVIEW PART I: THE PLAN				
<p>THE CHILD</p> <p>NCTM Element 4d</p> <p>Demonstrate and encourage equitable and ethical treatment of and high expectations for all students.</p>	<p>A positive description of the child includes all of the following elements:</p> <ul style="list-style-type: none"> • Grade level • Age • Gender • Race • Academic ability level • Child’s mathematical understanding on the mathematics topic assessed • Child’s performance in other academic areas • Child’s performance in social or behavioral areas 	<p>A positive description of the child includes all of the following elements:</p> <ul style="list-style-type: none"> • Grade level • Age • Gender • Race • Academic ability level • Child’s mathematical understanding on the mathematics topic assessed 	<p>A positive description of the child includes five of the following elements:</p> <ul style="list-style-type: none"> • Grade level • Age • Gender • Race • Academic ability level • Child’s mathematical understanding on the mathematics topic assessed 	<p>A positive description of the child includes less than five of the following elements:</p> <ul style="list-style-type: none"> • Grade level • Age • Gender • Race • Academic ability level • Child’s mathematical understanding on the mathematics topic assessed
<p>THE MATHEMATICS CONCEPT & FORMS OF REPRESENTATION</p> <p>NCTM Element 4e.1</p> <p>Apply mathematical content and pedagogical knowledge in the selection, use, and promotion of instructional tools</p>	<p>A description of the mathematics concept and forms of representation is provided that includes all of the following:</p> <ul style="list-style-type: none"> • Information on age-appropriate variations of the mathematics concept. • One specific math concept that is 	<p>A description of the mathematics concept and forms of representation is provided that includes all of the following:</p> <ul style="list-style-type: none"> • Information on age-appropriate variations of the mathematics concept. • One specific math concept that is 	<p>A description of the mathematics concept and forms of representation is provided that includes all of the following:</p> <ul style="list-style-type: none"> • Information on age-appropriate variations of the mathematics concept. • One specific math concept that is 	<p>A description of the mathematics concept and forms of representation is provided that is missing one of the following:</p> <ul style="list-style-type: none"> • Information on age-appropriate variations of the mathematics concept. • One specific math concept that is

<p>such as manipulatives and physical models, drawings, virtual environments, presentation tools, and mathematics-specific technologies (e.g., graphing tools and interactive geometry software)</p>	<p>clearly described and mathematically accurate.</p> <ul style="list-style-type: none"> • Three different forms of representation, with different examples in each form, are designed for use in interesting and creative ways. • Connections are made among representational forms. • References are cited. 	<p>clearly described and mathematically accurate.</p> <ul style="list-style-type: none"> • Three different forms of representation, with different examples in each form, are designed for use in interesting and creative ways. • Connections are made among representational forms. 	<p>clearly described and mathematically accurate.</p> <ul style="list-style-type: none"> • Three different forms of representation, with different examples in each form, are designed for use in interesting and creative ways. 	<p>clearly described and mathematically accurate.</p> <ul style="list-style-type: none"> • Three different forms of representation, with different examples in each form, are designed for use in interesting and creative ways.
<p>TASKS & QUESTIONS</p> <p>NCTM Element 4e.1</p> <p>Apply mathematical content and pedagogical knowledge in the selection, use, and promotion of instructional tools such as manipulatives and physical models, drawings, virtual environments, presentation tools, and mathematics-specific technologies (e.g., graphing tools and interactive geometry software)</p>	<p>A description of the tasks and questions is provided that includes all of the following:</p> <ul style="list-style-type: none"> • The tasks and questions are aligned with the math concept • Questions are provided that allow for differentiation and extensions for different levels of student performance. • A variety of tasks and questions is provided for each of the three forms of representation • The tasks show creativity and will be motivating for a child. • References are cited. 	<p>A description of the tasks and questions is provided that includes all of the following:</p> <ul style="list-style-type: none"> • The tasks and questions are aligned with the math concept • Questions are provided that allow for differentiation and extensions for different levels of student performance. • A variety of tasks and questions is provided for each of the three forms of representation • The tasks show creativity and will be motivating for a child. 	<p>A description of the tasks and questions is provided that includes 3 of the following:</p> <ul style="list-style-type: none"> • The tasks and questions are aligned with the math concept • Questions are provided that allow for differentiation and extensions for different levels of student performance. • A variety of tasks and questions is provided for each of the three forms of representation • The tasks show creativity and will be motivating for a child. 	<p>A description of the tasks and questions is provided that is missing 2 or more of the following:</p> <ul style="list-style-type: none"> • The tasks and questions are aligned with the math concept • Questions are provided that allow for differentiation and extensions for different levels of student performance. • A variety of tasks and questions is provided for each of the three forms of representation • The tasks show creativity and will be motivating for a child.

CLINICAL INTERVIEW PART II: ANALYSIS OF EVIDENCE				
<p>STUDENT WORK SAMPLES</p> <p>NCTM Element 4e.1</p> <p>Apply mathematical content and pedagogical knowledge in the selection, use, and promotion of instructional tools such as manipulatives and physical models, drawings, virtual environments, presentation tools, and mathematics-specific technologies (e.g., graphing tools and interactive geometry software)</p>	<p>A clearly detailed description of the student's performance is provided that includes all of the following:</p> <ul style="list-style-type: none"> • A variety of work samples from the child showing examples in each of the three forms of representation (concrete, pictorial, and abstract). • An explanatory analysis and overview of each of the child's work samples. • Clearly explained connections between student work samples. 	<p>A clearly detailed description of the student's performance is provided that includes 2 of the following:</p> <ul style="list-style-type: none"> • A variety of work samples from the child showing examples in each of the three forms of representation (concrete, pictorial, and abstract). • An explanatory analysis and overview of each of the child's work samples. • Clearly explained connections between student work samples. 	<p>A description of the student's performance is provided that includes 1 of the following:</p> <ul style="list-style-type: none"> • A variety of work samples from the child showing examples in each of the three forms of representation (concrete, pictorial, and abstract). • An explanatory analysis and overview of each of the child's work samples. • Clearly explained connections between student work samples. 	<p>A description of the student's performance is provided that is missing all of the following:</p> <ul style="list-style-type: none"> • A variety of work samples from the child showing examples in each of the three forms of representation (concrete, pictorial, and abstract). • An explanatory analysis and overview of each of the child's work samples. • Clearly explained connections between student work samples.
<p>TRANSCRIPT EVIDENCE</p> <p>NCTM Element 4e.1</p> <p>Apply mathematical content and pedagogical knowledge in the selection, use, and promotion of instructional tools such as manipulatives and physical models, drawings, virtual environments, presentation tools, and mathematics-specific technologies (e.g., graphing tools and interactive</p>	<p>Transcript evidence is provided that includes all of the following:</p> <ul style="list-style-type: none"> • Several excerpts from the mathematics assessment using the teacher and the child's actual verbalizations from the assessment (T for teacher; C for child). • Descriptive information on the behaviors and verbalizations that 	<p>Transcript evidence is provided that includes the following:</p> <ul style="list-style-type: none"> • Several excerpts from the mathematics assessment using the teacher and the child's actual verbalizations from the assessment (T for teacher; C for child). 	<p>Transcript evidence is provided that includes the following:</p> <ul style="list-style-type: none"> • Few excerpts from the mathematics assessment using the teacher and the child's actual verbalizations from the assessment (T for teacher; C for child). 	<p>Transcript evidence is not provided.</p>

geometry software)	occurred during the assessment.			
<p>EVIDENCE OF QUESTIONING</p> <p>NCTM Element 4e.1</p> <p>Apply mathematical content and pedagogical knowledge in the selection, use, and promotion of instructional tools such as manipulatives and physical models, drawings, virtual environments, presentation tools, and mathematics-specific technologies (e.g., graphing tools and interactive geometry software)</p>	<p>Questioning evidence is provided that includes all of the following:</p> <ul style="list-style-type: none"> • Evidence that during the assessment the candidate used a variety of questions to encourage the child to express his/her thinking. • Evidence that during the assessment the candidate used many higher-level questions to encourage deeper thinking and responses from the child. • Evidence that during the assessment the candidate used specific follow-up questions to probe for understanding. 	<p>Questioning evidence is provided that includes all of the following:</p> <ul style="list-style-type: none"> • Evidence that during the assessment the candidate used a variety of questions to encourage the child to express his/her thinking. • Evidence that during the assessment the candidate used many higher-level questions to encourage deeper thinking and responses from the child. • Evidence that during the assessment the candidate used specific follow-up questions to probe for understanding. 	<p>Questioning evidence is provided that includes 2 of the following:</p> <ul style="list-style-type: none"> • Evidence that during the assessment the candidate used a variety of questions to encourage the child to express his/her thinking. • Evidence that during the assessment the candidate used many higher-level questions to encourage deeper thinking and responses from the child. • Evidence that during the assessment the candidate used specific follow-up questions to probe for understanding. 	<p>Questioning evidence is provided that is missing 1 or more of the following:</p> <ul style="list-style-type: none"> • Evidence that during the assessment the candidate used a variety of questions to encourage the child to express his/her thinking. • Evidence that during the assessment the candidate used many higher-level questions to encourage deeper thinking and responses from the child. • Evidence that during the assessment the candidate used specific follow-up questions to probe for understanding.
CLINICAL INTERVIEW PART III: EVALUATION & INSTRUCTIONAL IMPLICATIONS				
<p>THE EVALUATION</p> <p>NCTM Element 4b</p> <p>Plan, create, and coach/mentor teachers in creating developmentally appropriate, sequential, and challenging learning opportunities grounded in mathematics</p>	<p>An evaluation of the child's understanding on the mathematical concept is provided that includes all of the following:</p> <ul style="list-style-type: none"> • An accurate and detailed description of the child's current level of 	<p>An evaluation of the child's understanding on the mathematical concept is provided that includes 2 of the following:</p> <ul style="list-style-type: none"> • An accurate and detailed description of the child's current level of 	<p>An evaluation of the child's understanding on the mathematical concept is provided that includes 1 of the following:</p> <ul style="list-style-type: none"> • An accurate and detailed description of the child's current level of 	<p>An evaluation of the child's understanding on the mathematical concept is provided that is missing all of the following:</p> <ul style="list-style-type: none"> • An accurate and detailed description of the child's current level of

<p>education research in which students are actively engaged in building new knowledge from prior knowledge and experiences.</p>	<p>understanding on the concept.</p> <ul style="list-style-type: none"> • Many different and specific examples from the assessment are given to provide supporting evidence for the evaluation of the child (including the child's quotations and student work) • Information from other sources on math development. 	<p>understanding on the concept.</p> <ul style="list-style-type: none"> • Many different and specific examples from the assessment are given to provide supporting evidence for the evaluation of the child (including the child's quotations and student work) • Information from other sources on math development. 	<p>understanding on the concept.</p> <ul style="list-style-type: none"> • Many different and specific examples from the assessment are given to provide supporting evidence for the evaluation of the child (including the child's quotations and student work) • Information from other sources on math development. 	<p>understanding on the concept.</p> <ul style="list-style-type: none"> • Many different and specific examples from the assessment are given to provide supporting evidence for the evaluation of the child (including the child's quotations and student work) • Information from other sources on math development.
<p>THE INSTRUCTIONAL PLAN</p> <p>NCTM Element 4b</p> <p>Plan, create, and coach/mentor teachers in creating developmentally appropriate, sequential, and challenging learning opportunities grounded in mathematics education research in which students are actively engaged in building new knowledge from prior knowledge and experiences.</p>	<p>An instructional plan is provided that includes all of the following:</p> <ul style="list-style-type: none"> • A creative, detailed description of developmentally appropriate next steps for instruction taking into account the child's current level of understanding. • The plan identifies many specific examples of activities and tasks that would further enhance this child's knowledge of this math concept. • Information from other sources on math development and child development 	<p>An instructional plan is provided that includes all of the following:</p> <ul style="list-style-type: none"> • A creative, detailed description of developmentally appropriate next steps for instruction taking into account the child's current level of understanding. • The plan identifies many specific examples of activities and tasks that would further enhance this child's knowledge of this math concept. • Information from other sources on math development and child development 	<p>An instructional plan is provided that includes 2 of the following:</p> <ul style="list-style-type: none"> • A creative, detailed description of developmentally appropriate next steps for instruction taking into account the child's current level of understanding. • The plan identifies many specific examples of activities and tasks that would further enhance this child's knowledge of this math concept. • Information from other sources on math development and child development 	<p>An instructional plan is provided that is missing more than 2 of the following:</p> <ul style="list-style-type: none"> • A creative, detailed description of developmentally appropriate next steps for instruction taking into account the child's current level of understanding. • The plan identifies many specific examples of activities and tasks that would further enhance this child's knowledge of this math concept. • Information from other sources on math development and child development

	are used in making the plan. • References are cited.	are used in making the plan.	are used in making the plan.	are used in making the plan.
CLINICAL INTERVIEW PART IV: REFLECTION				
	<p>A reflection is provided that includes all of the following:</p> <ul style="list-style-type: none"> • An overview on implementing the assessment • Description of the length of the clinical interview. • Information on what was learned about assessment techniques. • Information on what was learned about the candidate's ability to create mathematics questions and tasks on the concept. • Explanations of adaptations or changes that would be made if conducting the interview with another child. • Description on what the candidate has learned about how children learn mathematics. • Description of how a classroom teacher might use a diagnostic math assessment to assess children. 	<p>A reflection is provided that includes at least 6 of the following:</p> <ul style="list-style-type: none"> • An overview on implementing the assessment • Description of the length of the clinical interview. • Information on what was learned about assessment techniques. • Information on what was learned about the candidate's ability to create mathematics questions and tasks on the concept. • Explanations of adaptations or changes that would be made if conducting the interview with another child. • Description on what the candidate has learned about how children learn mathematics. • Description of how a classroom teacher might use a diagnostic math assessment to assess children. 	<p>A reflection is provided that includes 5 of the following:</p> <ul style="list-style-type: none"> • An overview on implementing the assessment • Description of the length of the clinical interview. • Information on what was learned about assessment techniques. • Information on what was learned about the candidate's ability to create mathematics questions and tasks on the concept. • Explanations of adaptations or changes that would be made if conducting the interview with another child. • Description on what the candidate has learned about how children learn mathematics. • Description of how a classroom teacher might use a diagnostic math assessment to assess children. 	<p>A reflection is provided that includes 4 or fewer of the following:</p> <ul style="list-style-type: none"> • An overview on implementing the assessment • Description of the length of the clinical interview. • Information on what was learned about assessment techniques. • Information on what was learned about the candidate's ability to create mathematics questions and tasks on the concept. • Explanations of adaptations or changes that would be made if conducting the interview with another child. • Description on what the candidate has learned about how children learn mathematics. • Description of how a classroom teacher might use a diagnostic math assessment to assess children.

