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

EDCI 644.DL3 – Mathematics Learning and Assessment (K-8)
3 Credits, Spring 2019
Mondays 4:30 p.m.-7:10 p.m. 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 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 January 28, 2019.

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.
- The following software plug-ins for PCs and Macs, respectively, are available for free download:
    - Adobe Acrobat Reader: https://get.adobe.com/reader/
    - Windows Media Player:

https://support.microsoft.com/en-us/help/14209/get-windows-media-player

    - Apple 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:

1. Understand the learning theories fundamental to mathematics education.
2. Understand the developmental progressions underpinning mathematics learning.
3. Develop an understanding of various forms of mathematics learning assessment related to theories of mathematics learning.
4. 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

Effective elementary mathematics specialists exhibit knowledge of child, pre-adolescent, and adult learning, development, and behavior. They use this knowledge to plan, create, and assist teachers in planning and creating sequential learning opportunities grounded in mathematics education research where students are actively engaged in the mathematics they are learning and building from prior knowledge and skills. They demonstrate, promote, and assist teachers in demonstrating and promoting a positive disposition toward mathematical practices and learning and exhibit and support the equitable and ethical treatment of and high expectations for all students. They include and assist teachers in embracing culturally relevant perspectives in teaching, in recognizing individual student differences, and in using instructional tools such as manipulatives, digital tools, and virtual resources to enhance student learning, while recognizing the possible limitations of such tools.

- **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.

FREE PDF: https://www.nap.edu/catalog/11101/how-students-learn-mathematics-in-the-classroom

Fennell, F., Kobett, B. M., & Wray, J. A. (2017). *The formative 5: Everyday assessment techniques for every math classroom.* Thousand Oaks, CA: Corwin.

Silver, E. A., & Mills, V. L. (Eds.). (2018). *A fresh look at formative assessment in mathematics teaching.* Reston, VA: NCTM

Course Performance Evaluation

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

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.

Additional details and rubrics for all assignments will be posted on Blackboard. Please review these materials.

- **Assignments and/or Examinations**

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. Additional information on participation is provided on Blackboard.

Mathematics Assessment Autobiography (10%)

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 (20%)

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%)

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 how learning progressions for rational numbers for students are addressed. Additional information is provided on Blackboard.

Clinical Interview (25%)

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 and to develop your skills in citing evidence for the inferences that you make about their thinking 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 (10%)

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. 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.

- **Other Requirements**

APA Formatting

All assignments require APA formatting:

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

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. 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.

Course Performance Evaluation Weighting

10% Participation
10% Mathematical Assessment Autobiography
20% Online Assessment Tool Analysis Video
25% Group Mathematics Topics and Learning Progressions Project
25% Clinical Interview
10% Final Reflection

Grading

All assignments are to be turned in to your instructor on time. **Late work will not be accepted for full credit.** Assignments turned in late will receive a 10% deduction from the grade per late day or any fraction thereof (including weekends and holidays).

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%

- **For Master's Degrees**:

Candidates must have a minimum GPA of 3.00 in coursework presented on the degree application, which may include no more than 6 credits of C. (Grades of C+, C-, or D do not apply to graduate courses. The GPA calculation excludes all transfer courses and Mason non-degree studies credits not formally approved for the degree).

- **For Endorsement Requirements**

Candidates must have a grade of B or higher for all licensure coursework (endorsement coursework).

Professional Dispositions

Students are expected to exhibit professional behaviors and dispositions at all times. Education professionals are held to high standards, both inside and outside of the classroom. Educators are

evaluated on their behaviors and interactions with students, parents, other professionals, and the community at large. At the College of Education and Human Development, dispositions may play a part in the discussions and assignments of any/all courses in a student's program (and thus, as part or all of the grade for those assignments). For additional information visit https://cehd.gmu.edu/students/polices-procedures/

Class Schedule

HSL = How Students Learn F5 = Formative 5 AFLFA = A Fresh Look on Formative Assessment

Date	Topics	Readings Due	Assignments Due
Week 1 1/28 **Format** Synchronous	Technology Briefing Class Overview Introduction Assessment Reflection Interviews		**Create Collaborate Profile (Including Picture)**
Week 2 2/4 **Format** Synchronous	Principles of Learning Theories & Mathematical Understanding	HSL: Ch. 1 F5: Part 1 AFLAFA: Foreword & Preface	**Mathematics Assessment Autobiography**
Week 3 2/11 **Format** Synchronous	Observations Formative Assessment: What, Why & How? Library Tools for Research: Anne Driscoll Presentation	HSL: Ch. 5 F5: Chapter 1 AFLAFA: Chapter 1 & 2	
Week 4 2/18 **Format** Synchronous	Interviews Designing A Clinical Interview Classroom Discourse Cognitively Guided Instruction ELLs	F5: Chapter 2 AFLAFA: Chapter 3 & 4 Fernandez (2009)	
Week 5 2/25 **Format** Synchronous	Show Me Culturally Responsive Pedagogy	F5: Chapter 3 AFLAFA: Chapter 5 & 6	

	Learning Trajectories		
Week 6 3/4 **Format** Synchronous	Hinge Questions Mathematical Tasks Response to Intervention	F5: Chapter 4 AFLAFA: Chapters 7 & 8	
Week 7 3/11 GMU Spring Break **Format** Synchronous	Whole Number Sense Learning Progressions	HSL: Chapter 6 Morrow-Leong (2016)	**Group 1 & 2 Presentations** **Clinical Interview: Protocol Draft Due**
Week 8 3/18 **Format** Synchronous	Rational Number System Learning Progressions	HSL: Chapter 7 Crespo (2000)	**Group 3 & 4 Presentations** Group 1 & 2 Mathematics Topics and Learning Progressions Project Due
Week 9 3/25 **Format** Synchronous	Functions Learning Progressions	HSL: Chapter 8 Section Harbour, Karp, & Lingo (2016)	**Group 5 & 6 Presentations** Group 3 & 4 Mathematics Topics and Learning Progressions Project Due
Week 10 4/1 **Format** Asynchronous	Video Assessment Tool Work Session Clinical Interview Work Session: Clinical Interview Part II		**Online Assessment Tool Analysis Video Due** Group 5 & 6 Mathematics Topics and Learning Progressions Project Due
Week 11 4/8 **Format** Asynchronous	Video Assessment Tool Reflection Clinical Interview Work Session: Clinical Interview Part II		

4/15	**No Class Meeting**		
Week 12 4/22 **Format** Synchronous	Improving Mathematics Instruction Equitable Mathematics Classrooms	AFLAFA: Chapters 9 & 10	
Week 13 4/29 **Format** Synchronous	A Vision Moving Forward	AFLAFA: Chapters 11 & 12 NCTM Position Statement (2016): Large-Scale Assessments NCSM & AMTE Position Statement (2013): Improving Student Achievement in Mathematics Through Formative Assessment in Instruction	
Week 14 5/6 **Format** Asynchronous	Clinical Interview Work Session: Part III Final Reflection (Optional)		
Week 15 5/13 **Format** Synchronous		Sharing of Clinical Interview Projects **Final Reflection (Time in Class)**	**Clinical Interview Due**

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

Core Values Commitment

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

GMU Policies and Resources for Students

Policies

- Students must adhere to the guidelines of the Mason Honor Code (see https://catalog.gmu.edu/policies/honor-code-system/).

- Students must follow the university policy for Responsible Use of Computing (see 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 https://ds.gmu.edu/).

- Students must silence all sound emitting devices during class unless otherwise authorized by the instructor.

Campus Resources

- Support for submission of assignments to 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/.

- 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 https://cehd.gmu.edu/students/ .

EDCI 644 - Expectations Clinical Interview Assessment (30% of Grade)
Performance- Based Assessment

NCTM Standards 4b, 4d, 4e

PART I: The Plan

Student Description:

- Describe the student 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. The goal is to assess students' conceptual understanding, procedural fluency, strategic competence, adaptive reasoning and productive dispositions towards mathematics.
- 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.
    - 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.
    - 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
    - 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.

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 3/5 and 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 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				
THE CHILD **NCTM Standard 4d** Demonstrate and encourage equitable and ethical treatment of and high expectations for all students.	The plan includes a positive description of the child with all of the following elements: ● 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	The plan includes a positive description of the child with all of the following elements: ● Grade level ● Age ● Gender ● Race ● Academic ability level ● Child's mathematical understanding on the mathematics topic assessed	The plan includes a positive description of the child with five of the following elements: ● Grade level ● Age ● Gender ● Race ● Academic ability level ● Child's mathematical understanding on the mathematics topic assessed	The plan includes a positive description of the child with fewer than five of the following elements: ● Grade level ● Age ● Gender ● Race ● Academic ability level ● Child's mathematical understanding on the mathematics topic assessed
THE MATHEMATICS CONCEPT & FORMS OF REPRESENTATION **NCTM Standard 4e** 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	The plan describes the mathematics concept and forms of representation with all of the following elements: ● Information on age-appropriate variations of the mathematics concept ● One clearly-described and	The plan describes the mathematics concept and forms of representation with all of the following elements: ● Information on age-appropriate variations of the mathematics concept ● One clearly-described and	The plan describes the mathematics concept and forms of representation with all of the following elements: ● Information on age-appropriate variations of the mathematics concept ● One clearly-described and	The plan does not describe the mathematics concept and forms of representation or is missing one of following elements: ● Information on age-appropriate variations of the mathematics concept ● One clearly-described and

technologies (e.g., graphing tools and interactive geometry software)	mathematically-accurate. concept ● Three different forms of representation, with different examples in each form, are designed for use in interesting and creative ways ● Connections among representational forms ● References are cited.	mathematically-accurate. concept ● Three different forms of representation, with different examples in each form, are designed for use in interesting and creative ways ● Connections among representational forms	mathematically-accurate. concept ● Three different forms of representation, with different examples in each form, are designed for use in interesting and creative ways	mathematically-accurate. concept ● Three different forms of representation, with different examples in each form, are designed for use in interesting and creative ways
TASKS & QUESTIONS **NCTM Standard 4e** 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)	The plan describes tasks and questions with all of the following elements: ● Tasks and questions are aligned with the math concept. ● Questions allow for differentiation and extensions for different levels of student performance. ● A variety of tasks and questions for each of the three forms of representation ● Tasks show creativity and will be motivating for a child. ● References are cited.	The plan describes tasks and questions with all of the following elements: ● Tasks and questions are aligned with the math concept. ● Questions allow for differentiation and extensions for different levels of student performance. ● A variety of tasks and questions for each of the three forms of representation ● Tasks show creativity and will be motivating for a child.	The plan describes tasks and questions with three of the following elements: ● Tasks and questions are aligned with the math concept. ● Questions allow for differentiation and extensions for different levels of student performance. ● A variety of tasks and questions for each of the three forms of representation ● Tasks show creativity and will be motivating for a child.	The plan describes tasks and questions with two or fewer of the following elements: ● Tasks and questions are aligned with the math concept. ● Questions allow for differentiation and extensions for different levels of student performance. ● A variety of tasks and questions for each of the three forms of representation ● Tasks show creativity and will be motivating for a child.
CLINICAL INTERVIEW PART II: ANALYSIS OF EVIDENCE				
STUDENT WORK SAMPLES **NCTM Element 4e**	The description of the student's performance includes all of the following:	The description of the student's performance includes two of the following:	The description of the student's performance includes one of the following:	The description of the student's performance is missing or includes

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)	● 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.	● 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	● 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	none of the following: ● 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
TRANSCRIPT EVIDENCE **NCTM Element 4e** 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)	The transcript evidence includes: ● 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 occurred during the assessment	The transcript evidence includes: ● Several excerpts from the mathematics assessment using the teacher and the child's actual verbalizations from the assessment (T for teacher; C for child)	The transcript evidence includes: ● Few excerpts from the mathematics assessment using the teacher and the child's actual verbalizations from the assessment (T for teacher; C for child)	Transcript evidence is not provided.
EVIDENCE OF QUESTIONING **NCTM Standard 4e** Apply mathematical content and pedagogical knowledge in the selection, use,	Questioning evidence includes all of the following: ● A variety of questions encouraging the	Questioning evidence includes two of the following: ● A variety of questions encouraging the	Questioning evidence includes one of the following: ● A variety of questions encouraging the	Questioning evidence does not include the following: ● A variety of questions encouraging the

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)	child to express his/her thinking ● Many higher-level questions to encourage deeper thinking and responses from the child ● Specific follow-up questions to probe for understanding	child to express his/her thinking ● Many higher-level questions to encourage deeper thinking and responses from the child ● Specific follow-up questions to probe for understanding	child to express his/her thinking ● Many higher-level questions to encourage deeper thinking and responses from the child ● Specific follow-up questions to probe for understanding	child to express his/her thinking ● Many higher-level questions to encourage deeper thinking and responses from the child ● Specific follow-up questions to probe for understanding
CLINICAL INTERVIEW PART III: EVALUATION & INSTRUCTIONAL IMPLICATIONS				
THE EVALUATION **NCTM Element 4b** 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.	The evaluation of the child's understanding includes all of the following: ● An accurate and detailed description of the child's current level of understanding of the mathematics concept ● 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 mathematics development.	The evaluation of the child's understanding includes two of the following: ● An accurate and detailed description of the child's current level of understanding of the mathematics concept ● 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 mathematics development.	An evaluation of the child's understanding includes one of the following: ● An accurate and detailed description of the child's current level of understanding of the mathematics concept ● 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 mathematics development.	An evaluation of the child's understanding does not include the following: ● An accurate and detailed description of the child's current level of the mathematics concept ● 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 mathematics development.
THE INSTRUCTIONAL PLAN **NCTM Element 4b** Plan, create, and coach/mentor teachers in creating	The instructional plan includes all of the following: ● A creative, detailed description of	The instructional plan includes all of the following: ● A creative, detailed description of	The instructional plan includes two of the following: ● A creative, detailed description of	The instructional plan includes one or none of the following:

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.	developmentally appropriate next steps for instruction taking into account the child's current level of understanding. ● Many specific examples of activities and tasks that would further enhance this child's knowledge of this math concept. ● Information from other sources on mathematics and development and child development are used in making the plan. ● References are cited.	developmentally appropriate next steps for instruction taking into account the child's current level of understanding. ● Many specific examples of activities and tasks that would further enhance this child's knowledge of this math concept. ● Information from other sources on mathematics and development and child development are used in making the plan.	developmentally appropriate next steps for instruction taking into account the child's current level of understanding. ● Many specific examples of activities and tasks that would further enhance this child's knowledge of this math concept. ● Information from other sources on mathematics and development and child development are used in making the plan.	● A creative, detailed description of developmentally appropriate next steps for instruction taking into account the child's current level of understanding. ● Many specific examples of activities and tasks that would further enhance this child's knowledge of this math concept. ● Information from other sources on mathematics and development and child development are used in making the plan.
CLINICAL INTERVIEW PART IV: REFLECTION				
	The reflection includes all of the following: ● Implementing the assessment ● Describing the clinical interview ● Learning about assessment techniques ● Creating questions and tasks for the mathematics concept ● Adapting the interview for another child	The reflection includes at least six of the following: ● Implementing the assessment ● Describing the clinical interview ● Learning about assessment techniques ● Creating questions and tasks for the mathematics concept ● Adapting the interview for another child	The reflection includes five of the following: ● Implementing the assessment ● Describing the clinical interview ● Learning about assessment techniques ● Creating questions and tasks for the mathematics concept ● Adapting the interview for another child	A reflection is provided that includes four or fewer of the following: ● Implementing the assessment ● Describing the clinical interview ● Learning about assessment techniques ● Creating questions and tasks for the mathematics concept

	● Learning about how children learn mathematics ● Describing how a classroom teacher might use a diagnostic mathematics assessment	● Learning about how children learn mathematics ● Describing how a classroom teacher might use a diagnostic mathematics assessment	● Learning about how children learn mathematics ● Describing how a classroom teacher might use a diagnostic mathematics assessment	● Adapting the interview for another child ● Learning about how children learn mathematics ● Describing how a classroom teacher might use a diagnostic mathematics assessment