College of Education and Human Development

Early Childhood Education Program
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https://gse.gmu.edu/programs/earlychildhood/

ECED 514.001: Mathematics and Science for Diverse Young Learners (3:3:0)
Fall 2014
Tuesdays, 4:30 – 7:10 pm
Thompson Hall L028

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Course Description

Examines ways to foster development of mathematics and science in preschool to third-grade children. Covers construction of math and science lessons and hands-on experiences that address the needs of culturally, linguistically, and ability diverse children.

Prerequisite: Admission to the Early Childhood Education program or approval of course instructor.

Note: Field experience required.

Nature of Course Delivery

This course utilizes a distributed learning format requiring timely and active participation of all students throughout the semester. Activities to support student achievement of the learner outcomes include instructor presentations, videos, student team presentations, collaborative student work in small groups in class and in on-line discussion groups, assigned readings, and projects leading to written products. Students engage in timely critical reflection and accountable talk related to the learning activities.

Learner Outcomes

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

1. Develop an understanding of the changing focus in both curricula and pedagogy at the early childhood level and implications for math and science instruction.
2. Develop strategies to help young children become mathematically and scientifically literate, think critically and creatively, and to see the relationships between mathematics, science, social studies, and language/literacy.
3. Develop the skills necessary to utilize a variety of methods in teaching mathematics and science to young children.
4. Develop insight in selecting, modifying, and presenting instructional activities in

mathematics and science.
5. Develop science activities for young children using the scientific process with an emphasis on describing, analyzing, and quantitatively presenting findings.
6. Construct math and science experiences in an environment that promotes equity and responds to cultural, linguistic, and ability diversity.
7. Use state and local curriculum standards for mathematics and science, the standards identified by the National Council of Teachers of Mathematics, and national-level science standards to plan instruction.
8. Describe the role of family and community knowledge, experience, and resources in planning and implementing mathematics and science content in the curriculum.
9. Use a variety of sources for ideas and materials useful in teaching mathematics and science when planning instruction.
10. Integrate mathematics and science objectives into planning and implementing an integrated project.
11. Use authentic assessment strategies to describe young children's understanding of mathematics and science concepts.
12. Reflect on one's own use of inquiry strategies in facilitating children's learning of mathematics and science concepts.

Professional Standards

This concentration complies with the standards for teacher licensure established by the National Association for the Education of Young Children.

Required Texts

Achieve Inc. (2013). *Next generation science standards*. Washington, DC: Author. http://www.nextgenscience.org

Copley, J. V. (2009). *The young child and mathematics* (2nd ed.). Washington, DC: National Association for the Education of Young Children. [PLEASE PURCHASE]

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: Author. http://www.nctm.org/standards/content.aspx?id=16909

National Council of Teachers of Mathematics. (2006). *Curriculum focal points for prekindergarten through grade 8 mathematics*. Reston, VA: Author. http://www.nctm.org/standards/content.aspx?id=270

Shillady, A. (ed.) (2013). *Spotlight on young children: Exploring science*. Washington, DC: National Association for the Education of Young Children. [PLEASE PURCHASE]

Additional Resources

*Cross, C., Woods, T., & Schweingruber, H. (2009). *Mathematics learning in early childhood: Paths toward excellence and equity.* Washington, D. C.: National Research Council.

*Kilpatrick, J., Swafford, J., & Findell, B (ed). (2001). *Adding it up: Helping children learn mathematics*. Washington, D. C.: National Research Council.

Virginia Department of Education. (2009). Mathematics standards of learning. http://www.doe.virginia.gov/testing/sol/standards_docs/index.shtml

Virginia Department of Education. (2009). Mathematics curriculum framework. http://www.doe.virginia.gov/testing/sol/standards_docs/index.shtml

Virginia Department of Education. (2010). Science standards of learning http://www.doe.virginia.gov/testing/sol/standards_docs/index.shtml

Virginia Department of Education. (2010). Science curriculum framework. http://www.doe.virginia.gov/testing/sol/standards_docs/index.shtml

*Available as free downloads under early childhood education at the National Academies Press website: http://www.nap.edu/topicpage

George Mason University Policies and Resources for Students

- Academic integrity (honor code, plagiarism) – Students must adhere to guidelines of the George Mason University Honor Code [See http://oai.gmu.edu/the-mason-honor-code/].
- Mason Email – Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, division, and program will be sent to students solely through their Mason email account.
- Students must follow the university policy for Responsible Use of Computing [See http://universitypolicy.gmu.edu/policies/responsible-use-of-computing/].
- Counseling and Psychological Services – The George Mason University 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/].
- Office of Disability Services – Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor in writing at the beginning of the semester http://ods.gmu.edu/].
- Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.
- The Writing Center (Optional Resource) – The George Mason University Writing Center staff 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/].
- University Libraries (Optional Resource) – The George Mason University Libraries provide numerous services, research tools, and help with using the library resources [See http://library.gmu.edu/].

Professional Dispositions

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

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.

Collaboration
Collaboration is an important human activity that involves shared responsibility in promoting healthy, productive lives, and educational success. We commit ourselves to work toward these goals in genuine partnerships with individuals, families, community agencies, schools, businesses, foundations, and other groups at the local, regional, national, and international levels.

Ethical Leadership
In all professions represented by the college, leadership is an essential component denoting ability and willingness to help lead professional practice to higher levels. We commit ourselves to practice ethical leadership through deliberate and systematic attention to the ethical principles that guide all leaders in a moral society.

Innovation
We have a history of creating dynamic, innovative programs, and we are dedicated to continue creating innovative approaches in all areas of our work. We commit ourselves to seeking new ways to advance knowledge, solve problems, improve our professional practice, and expand on our successes.

Research-Based Practice
The best practice in any discipline is based upon sound research and professional judgment. We commit ourselves to basing our instruction, scholarship, and policy recommendations on well-established principles that, wherever possible, emerge from research and reflection on its implications for professional practice.

Social Justice
Social justice embodies essential principles of equity and access to all opportunities in society, in accordance with democratic principles and respect for all persons and points of view. We commit ourselves to promoting equity, opportunity, and social justice through the college's operations and its missions related to teaching, research, and service.

For additional information on the College of Education and Human Development, Graduate School of Education, please visit our website [See http://gse.gmu.edu/].

Course Requirements

General Requirements

1. The completion of all readings assigned for the course is assumed. Because the class will be structured around discussion and small group activities, it is imperative that students keep up with the readings and participate in class.
2. Attendance in class and/or online is important to students' learning; therefore, students are expected to make every effort to attend class sessions and/or complete online modules within the designated timeframe. Absences, tardiness, leaving early, and not completing online modules in the designated timeframe may negatively affect course grades. If, due to an emergency, students will not be in class, they must call the instructor and leave a message or send an email before class. The following policy is from the university course catalog:

Students are expected to attend the class periods of the courses for which they register. In-class participation is important not only to the individual student, but also to the class as a whole. Because class participation may be a factor in grading, instructors may use absence, tardiness, or early departure as de facto evidence of nonparticipation. Students who miss an exam with an acceptable excuse may be penalized according to the individual instructor's grading policy, as stated in the course syllabus.

3. In line with Mason's policy that students should not be penalized because of observances of their religious holidays, students shall be given an opportunity to make up, within a reasonable time, any academic assignment that is missed due to individual participation in religious observances. It is the student's responsibility to inform the instructor of any intended absences for religious observations in advance of the class that will be missed. Notice should be provided in writing as soon as possible.
4. During face-to-face and live online meetings, cell phones, pagers, and other communicative devices are not allowed in this class. Students must keep them stowed away and out of sight. Laptops or tablets (e.g., iPads) may be permitted for the purpose of taking notes only. Engaging in activities not related to the course (e.g. gaming, email, chat, etc.) will result in a significant deduction in their participation grade.
5. It is expected that assignments will be turned in on time. However, it is recognized that students occasionally have serious problems that prevent work completion. If such a dilemma arises, students should speak to the instructor prior to the assignment due date (when possible). If the student does not communicate with the instructor, a late penalty will be applied.
6. Mason is an Honor Code university; please see the Office for Academic Integrity for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when responsible for a task, students will perform that task. When students rely on someone else's work in an aspect of the performance of that task, they will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind), students will ask for guidance and clarification.

Written Assignments

All formal written assignments will be evaluated for content and presentation. The American Psychological Association, Sixth Edition (APA) style will be followed for all written work. All written work unless otherwise noted must be completed on a word processor and should be proofread carefully. (Use spell check!) If students are not confident of their own ability to catch errors, they should have another person proofread their work. When in doubt, they should check the APA manual. Portions of the APA manual appear at the Style Manuals link on the Mason library web guide at http://infoguides.gmu.edu/content.php?pid=39979. Students may consult the Writing Center for additional writing support.

Students will do the following:

1. Present ideas in a clear, concise, and organized manner. (Avoid wordiness and redundancy.)

2. Develop points coherently, definitively, and thoroughly.
3. Refer to appropriate authorities, studies, and examples to document where appropriate. (Avoid meaningless generalizations, unwarranted assumptions, and unsupported opinions.)
4. Use correct capitalization, punctuation, spelling, and grammar.

Grading Criteria
Grading Criteria

A = 95-100 A- = 90-94 B+ = 87-89 B = 83-86 B- = 80-82 C = 70-79 F = < 70

Grading Policy

All CEHD undergraduate and graduate students are held to the university grading policies as described in the Academic Policies section of the current catalog, which can be accessed at http://catalog.gmu.edu. Those students enrolled in a CEHD Licensure Graduate Certificate program, however, must earn a B- or better in all licensure coursework. A degree-seeking graduate student will be dismissed after accumulating grades of F in two courses or 9 credits of unsatisfactory grades (C or F) in graduate courses. A 3.0 grade point average is required for completion of the graduate degree.

Specific Course Assignments

Assignments	Due Dates	Points
Participation (Individual/group/preparation)	*Ongoing*	15
Group Topic Presentations	*Various*	35
Informal Assessment Video Analysis	*October 7* *Submit via Blackboard by 11:59 PM*	25
Teaching Observation Analysis	*November 25* *Submit via Blackboard by 11:59 PM*	25
TOTAL		**100**

Attendance and Participation (15 points)

Because active participation and engagement are imperative for optimal learning, preparation for and participation in in-class activities will be evaluated based on the following criteria:

- Students attend class, arrive on time, and stay for the entire class period.
- Students complete readings and prepare for class activities prior to class as is evidenced by their ability to discuss and write about the concepts presented and examined in the texts as well as participate fully in related activities.
- Students are actively involved in in-class and online learning experiences as is evidenced by (1) participating in all activities, (2) engaging in small and large group discussions, (3) not using laptops and other electronic devices during class time except as approved to support learning within the current class activity, (4) completing written work related to the activities, and (5) supporting the participation and learning of classmates on-line and face-to face.
- Students show evidence of critical reflective thinking through in-class and online discussions, activities, and written reflections.

Note: To determine whether the campus is closed due to inclement weather, call 703-993-1000 or go to www.gmu.edu.

Group Topic Presentations (35 points)

- Students will choose presentation groups based on a topic of interest listed on the class schedule on the syllabus. All members will participate in gathering information, preparing materials, and presenting. Some class time will be provided to work in groups.
- Students will select an appropriate article or chapter to provide to the class at least a week before the presentation that provides foundational information related to the topic (email a pdf of the reading selection to your instructor at least one week prior to your presentation).
- Groups will prepare and present an informative and interactive 25–30 minute presentation on their math or science topic with all group members participating equally.
- The presentation will include:
  - An overview of the topic to include the key ideas or content and the importance of the topic to students' mathematical or scientific learning supported by class readings and additional resources
  - A research-based developmental sequence or learning trajectory for pre-kindergarten-3rd grade students specific to the topic
  - A list of state and national content standards related to the topic
  - Lesson ideas or learning activities for teaching the topic including the modeling of (and audience participation in) at least 1 learning activity with all appropriate materials during the presentation
  - Strategies for instruction in the topic for a range of learners
  - A list of at least 10 resources related to teaching the topic that could include children's literature, websites, manipulatives or materials, or other teacher resources
  - A handout that includes all of the above and references used to develop the presentation (distribute one paper copy to each of your audience members; email a pdf of handout to instructor by 11:59 PM of presentation night for posting on Blackboard)

Informal Assessment Video Analysis (25 points)

Students will choose one video clip on Blackboard to analyze.
In a bulleted list or in paragraphs, students will answer in detail the following questions:

- List and provide evidence for four skills/ knowledge the child has mastered.
- List and provide evidence for three skills/ knowledge the child is developing.
- List and provide evidence for two skills/ knowledge that are emergent for the child or which might reasonably be expected to develop next.
- Develop and list five learning objectives for what the student could next be expected to become familiar with, learn, or master.
- Provide short descriptions for three whole or small group learning experiences or lessons based on the learning objectives to further the child's learning in the topic or content area.
- Describe and provide evidence for how the teachers' lessons could be adapted to better meet the individual needs of the learner based on his or her current skills, knowledge, and interests.

Students will note which video clip was used.
Include citations of at least two course readings to support the analysis.
Due by due date via Blackboard.

Teaching Observation Analysis (25 points)

Students will observe **one** math lesson *or* science lesson (can be interdisciplinary), at his or her internship site or field experience site. Based on the observation, students will prepare a paper using the attached template (**Attachment 1**). The focus is on describing, analyzing, and reflecting upon the instructional content and strategies the teacher uses to teach math or science. The paper should provide specific linkages to course readings (include citations as noted in the rubric).
Due by due date via Blackboard.

Tentative Class Schedule

Date	Topics Addressed	Readings Prior to Class	Assignment Due
August 26	Cognitive aspects of math and science Meaningful math and science learning	Welcome to ECED 514!	
September 2	Constructivist environments to support math/science learning Mathematics and science content knowledge for teaching and learning	Copley, Chapter 1 Spotlight: Science, p. 2-10	
September 9	Introduction to mathematics and science content standards, including the Virginia Standards of Learning Sequential nature of mathematics	Copley, Chapter 2 Spotlight: Science, p. 72-73 National and State Math and Science Learning Standards	
September 16	Focus on math instruction to develop the five processes of mathematical understanding—reasoning mathematically, solving problems, communicating mathematics effectively, making mathematics connections, and using mathematical representations of different levels of complexity	Copley, Chapters 3 & 4	
September 23	Authentic math and science assessment—addressing the needs of diverse learners	Spotlight: Science, p. 17-22	
September 30	Inquiry-based approach to teaching science Questioning techniques	Operations & Computation reading Spotlight: Science, p. 41-47	Operations and Computation Presentation
October 7	The language of math and science	Copley, Chapter 6	**Informal Assessment Video Analysis (due via Blackboard)**
October 14	Tuesday classes do not meet this week at Mason.	No class	No class
October 21	Focus on math and science instruction for diverse young children	Physical science reading Place value reading Spotlight: Science, p. 29-35	Physical Science Presentation Place Value Presentation
October 28	Multiple mechanisms for representing mathematical concepts and procedures Contributions of different cultures to the history and development of mathematics and science	Life science reading Copley, Chapter 7 Spotlight: Science, p. 11-16, 23-28	Life Science Presentation
November 4	The role of science in explaining and	Fractions reading	Fractions Presentation

	predicting events and phenomena Developing the skills of data analysis, measurement, observation, prediction, and experimentation	Spotlight: Science, p. 36-40	
November 11	Technology in early childhood math and science Resources and references for young children and math and science	Earth and space science reading Copley, Chapter 5 Spotlight: Science, p. 61-67, 74-76	Earth and Space Science Presentation
November 18	Creating safe environments for children's research and experimentation Using community resources to enhance math and science instruction	Money reading Spotlight: Science, p. 55-60	Money Presentation
November 25	Math and science across the disciplines	Copley, Chapter 8 Spotlight: Science. P. 48-54, 68-71	**Teaching Observation Analysis (due via Blackboard)**
December 2	Self-reflections on filling the role of math and science teacher for diverse young learners Course wrap-up	Copley, Chapter 9 Spotlight: Science, p. 77-80	

Group Topic Presentation Evaluation Rubric

	Exceeds Expectation	**Meets Expectations**	**Does Not Meet Expectations**	**___/35 Points and Comments**
Related Article *2 points*	An appropriate and relevant article is provided for students with several links to the article during the presentation	An appropriate and relevant article is provided for students with links to the article during the presentation	The article is either not appropriate or relevant to the topic and/or there aren't any links to the article during the presentation	
Topic Overview *3 points*	A detailed description of the math or science topic that is supported by references to class or other readings	Description of the math or science topic that is supported by references to class or other readings	Limited or no description of the math or science topic and/ or that is not supported by references to readings	
Developmental sequence *5 points*	A thorough, research supported description of the stages of knowledge acquisition related to the topic	A research supported description of the stages of knowledge acquisition related to the topic	A lack of description of the stages of knowledge acquisition or inaccurate or not research supported description	
Learning Standards *2 points*	Complete listing of all state and national standards related to the topic	List of state and national standards related to the topic	Incomplete list of state and national standards related to the topic	
Learning Activities *5 points*	Detailed listing and explanation (at least 5) of learning activities to master the essential concepts related to the topic	Listing and explanation of learning activities (at least 5) to master the essential concepts related to the topic	Incomplete listing and explanation of learning activities that will not help students to master the essential concepts related to the topic	
Strategies for instruction *5 points*	Comprehensive instructions for how to teach about the topic for a range of learners	Instructions for how to teach about the topic for a range of learners	Limited or no instructions for how to teach the topic without focusing on a range of learners	
Resources *5 points*	A variety of carefully selected materials (at least 10) and resources to facilitate instruction related to the topic	Resources (at least 10) to facilitate instruction related to the topic	Limited or no materials and resources and/or materials that do not facilitate instruction related to the topic.	
Visual aids and Modeling *3 points*	The use of visual aids and effective modeling during the presentation facilitates the clarity and value of the presentation	There is use of visual aids and modeling that somewhat facilitate the clarity and value of the presentation	Limited or ineffective use of visual aids and modeling during the presentation	
Class Handout *2 points*	The class handout provides a useful and concise overview of the presentation for colleagues with appropriate references	The class handout provides an overview of the presentation for colleagues with appropriate references	There is no handout to accompany the presentation and / or the handout has no references	
Presentation *3 points*	The presentation is very engaging and informative. All group members participate equally	The presentation is engaging and informative. All group members participate equally	The presentation is not engaging and or informative and/or all group members do not participate equally	
Total Points				**/ 35**

Informal Assessment Video Analysis Evaluation Rubric

	Exceeds Expectation	Meets Expectations	Does Not Meet Expectations	Points and Comments
Mastered Skills *3 points*	Four mastered skills listed with detailed evidence	Four mastered skills listed with some evidence	Fewer than four mastered skills listed and/ or absence of evidence	
Developing Skills *3 points*	Three developing skills listed with detailed evidence	Three developing skills listed with some evidence	Fewer than three developing skills listed and/ or absence of evidence	
Emergent Skills *2 points*	Two emergent skills listed with detailed evidence	Two emergent skills listed with some evidence	Fewer than two emergent skills listed and/ or absence of evidence	
Learning Objectives *3 points*	Five measurable and specific learning objectives listed with clear links to the analysis of the student's knowledge and skills	Five measurable and learning objectives listed with some links to the analysis of the student's knowledge and skills	Fewer than five learning objectives and/or a lack of links to the analysis, not specific or not measurable	
Lessons / Learning Activities *5 points*	Detailed and complete descriptions of three lessons or learning experiences with clear links to the analysis	Complete descriptions of three lessons or learning experiences with links to the analysis	Fewer than three lessons and / or lack of detail without links to the analysis	
Adaptations *4 points*	Detailed and complete description of adaptations the teacher can provide to best meet the learning needs of the student based on his or her skills, knowledge, and interests	Complete description of adaptations the teacher can provide to best meet the learning needs of the student based on his or her skills, knowledge, and interests	Incomplete description of adaptations and/or adaptations are not based on the needs of the student and his or her skills, knowledge, and interests	
Links to Course Readings *5 points*	Strong evidence of incorporating at least two course readings to support the analysis (includes citations)	Evidence of incorporating at least two course readings to support the analysis (includes citations)	Limited or ineffective incorporation of course readings	
Total Points				**/ 25**

Teaching Observation Analysis Evaluation Rubric

	Exceeds Expectation	Meets Expectations	Does Not Meet Expectations	Points and Comments
Description of Lesson Content *3 points*	Complete and detailed list of what occurred during the lesson including the subject area and grade level, standards utilized, concept(s) and/or process skills being taught, description of the activity, learning objectives, and relevant vocabulary	Complete list of what occurred during the lesson including the subject area and grade level, standards utilized, concept(s) and/or process skills being taught, description of the activity, learning objectives, and relevant vocabulary	Incomplete description of the lesson content that does not include all of the required information and/or uses inadequate detail	
Description of Instructional Strategies *3 points*	Complete and detailed list of the instructional strategies used, adaptations provided, links to family/community knowledge or children's interests, management procedures, assessments, questions asked by the teacher, and questions asked by the children	List of the instructional strategies used, adaptations provided, links to family/community knowledge or children's interests, management procedures, assessments, questions asked by the teacher, and questions asked by the children	Incomplete description of the instructional strategies used	
Analysis of Teacher's Use of Specific Instructional Strategies *6 points*	Detailed and complete analysis of the effectiveness of the teacher's use of instructional strategies related to vocabulary, adaptations, management, assessment, and questioning supported by evidence and course readings (include citations)	Analysis of the use of the effectiveness of the teacher's use of instructional strategies related to vocabulary, adaptations, management, assessment, and questioning supported by evidence and course readings (include citations)	Limited or incomplete analysis of the teacher's use of specific instructional strategies without or with limited support from evidence and course readings	
Analysis of Overall Effectiveness *4 points*	Comprehensive analysis of the effectiveness of the instructional strategies and those that were most and least effective supported by evidence and course readings (include citations)	Analysis of the effectiveness of the instructional strategies and those that were most and least effective supported by evidence and course readings (include citations)	Limited or incomplete analysis of the effectiveness of the instructional strategies, no discussion of the least and most effective strategies, and/or lack of support from evidence and course readings	
Analysis of Changes to the Lesson *4 points*	Thorough analysis of the needed changes to the lesson with detailed supports for why those changes are needed and would be beneficial for the students	Analysis of the needed changes to the lesson with detailed supports for why those changes are needed and would be beneficial for the students	Limited analysis of the needed changes to the lesson without supports or with limited supports for why those changes would be needed and/or beneficial for the students	
Reflection *5 points*	A thoughtful and complete reflection on the implications of the observation and analysis for future practice that meaningfully incorporates course readings (include citations)	A complete reflection on the implications of the observation and analysis for future practice that meaningfully incorporates course readings (include citations)	A limited or incomplete reflection on the implications of the observation and analysis and/or that does not incorporate course readings	
Total Points				**/ 25**

Attachment 1: Teaching Observation Analysis

Description (List or provide brief descriptions)

- Subject Area and Grade Level
- Standards Utilized (POS, SOL, or National Standards)
- Concept(s) and/or Process Skills Being Taught
- Brief Description of Activity
- Objectives (Individual and/or Group)
- Relevant Vocabulary
- Instructional Strategies Used
- Adaptations Provided for Groups of Students or Individual Students
- Links to Family/Community Knowledge or Children's Interests
- Management Procedures
- Assessments
- Questions Asked by the Teacher
- Questions Asked by the Children

Analysis (Address each question with supports from the observation and course readings – provide citations)

- Evaluate the effectiveness of the teachers' use of strategies
    - To help students understand relevant vocabulary
    - To meet the learning needs of groups of students or individual students
    - To link to students' knowledge, interests, and backgrounds
    - To manage the students during the learning activity
    - To assess students' learning during the lesson
    - To use questions and address students' questions to promote student learning
- Overall, how effective and engaging was the lesson? Which instructional strategies were the most and least effective? Why?
- What changes would you make to the lesson and why?

Reflection

- Describe the implications of the observation and analysis for your future math or science instruction (incorporates course readings – provide citations)

Resources

Ameis, J. (2002). *Mathematics on the internet: A resource for K-12 teachers* (2nd ed). Ohio: Merrill Prentice Hall, Inc.

Cowhey, M. (2006). *Black ants and Buddhists: Thinking critically and teaching differently in the primary grades.* Portland, ME: Stenhouse.

De La Cruz, Y. (1999). Reversing the trend: Latino families in real partnerships with schools. *Teaching Children Mathematics, 5(5).*

Ethridge, E. A., & King, J. R. (2005). Calendar math in preschool and primary classrooms: Questioning the curriculum. *Early childhood education journal, 32*(5), 291-296.

Elstgeest, J. (1985). The right question at the right time. In W. Harlen (Ed.), *Primary science: Taking the plunge* (pp. 36-46). Oxford: Heinemann.

Geist, E. *Children are born mathematicians: Supporting mathematical development, birth to age 8.* Ohio: Pearson.

Harris, M. E. (2009). Implementing portfolio assessment. *Young Children, 64*, 82-85.

Kliman, M. (1999). Beyond helping with homework: Parents and children doing mathematics at home. *Teaching Children Mathematics, 6(3).*

Lovin, L., Kyger, M., & Allsopp, D. (2004). Differentiation for special need learners. *Teaching Children Mathematics,* 11(3), 159-167.

Ma, L. (1999). *Knowing and teaching elementary mathematics*. Mahwah, N. J.: Erlbaum, Inc.

Martin, R., Sexton, C., & Franklin, T. (2009). *Teaching science for all children: An inquiry approach* (5th ed.). Boston: Pearson.

McCarty, D. (1998). Books + manipulatives + families = A mathematics lending library. *Teaching Children Mathematics, 4(6).*

Melber, L. M. (2008). Young learners at natural history museums. *Dimensions of Early Childhood, 36*(1), 22-29.

Moyer, R. H., Hackett, J. K., & Everett (2006). *Teaching science as investigations: Modeling inquiry through learning cycle lessons*. Upper Saddle River, NJ: Pearson.

Ogu, U., & Schmidt, S.R. (2009). Investigating rocks and sand: Addressing multiple learning styles through an inquiry-based approach. *Young Children, 64*, 12-18.

Small, M. (2009). *Good questions: Great ways to differentiate mathematics instruction.* New York: Teachers College Press.