

ECED-1321: MATH AND SCIENCE INQUIRY IN AN INTEGRATED CURRICULUM

Cuyahoga Community College

Viewing: ECED-1321 : Math and Science Inquiry in an Integrated Curriculum

Board of Trustees:

June 2023

Academic Term:

Fall 2023

Subject Code

ECED - Early Childhood Education

Course Number:

1321

Title:

Math and Science Inquiry in an Integrated Curriculum

Catalog Description:

Introduction to extensive variety of curricular experiences which enhance young children's intellectual curiosity and critical thinking skills. Role of teacher in facilitating science, math, problem solving experiences, scientific methods/learning process and constructivist theory explored. Students participate in lecture/lab setting with variety of hands on problem solving activities. Observations in an early childhood setting are required.

Credit Hour(s):

3

Lecture Hour(s):

2

Lab Hour(s):

2

Requisites

Prerequisite and Corequisite

ENG-1010 College Composition I and ECED-1010 Introduction to Early Childhood Education: Children's Development and Programs.

Outcomes

Course Outcome(s):

Plan and organize a developmentally appropriate curriculum that fosters the math, science, and inquiry development of young children.

Essential Learning Outcome Mapping:

Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):

- a. Articulate the stages of cognitive development and their inherent implications for teachers of young children.
- b. Explain how math, science and inquiry experiences help young children develop physically, emotionally, socially, and cognitively.
- c. Identify and discuss theories of constructivism and sociocultural development in explaining how children acquire knowledge.
- d. Articulate the application of Piaget's and Vygotsky's theories of child development.
- e. Identify the key concepts in brain development that are furthered by cognition and problem-solving curriculum.
- f. Describe inquiry and problem-solving experiences that promote young children's intellectual curiosity and critical thinking.
- g. Demonstrate an ability to incorporate state standards into planning appropriate math and science inquiry experiences for young children.

Course Outcome(s):

Implement and evaluate developmentally appropriate math, science, and inquiry experiences.

Essential Learning Outcome Mapping:

Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):

1. Describe the role of the teacher in supporting young children's cognitive development.
 2. Demonstrate effective strategies for implementing math, science and problem-solving experiences with young children.
 3. Demonstrate the use of documentation to communicate children's learning.
 4. Describe and apply methods of assessing the cognitive growth of children.
 5. Demonstrate the ability to implement developmentally appropriate curriculum experiences for young children that include play, small-group projects, open-ended questioning and group discussion.
 6. Describe developmentally appropriate science and math curriculum for young children.
 7. Describe opportunities to integrate math, science and inquiry experiences throughout the curriculum.
-

Course Outcome(s):

Create and maintain indoor and outdoor learning environments that include experience in math, science and inquiry to meet the individual needs of all children.

Essential Learning Outcome Mapping:

Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):

1. Explain how to arrange a developmentally appropriate math and science area in the classroom.
 2. Identify and describe a foundation of developmentally appropriate nature and discovery experiences for young children.
 3. Create, evaluate, and select developmentally appropriate materials and equipment for science and number experiences in indoor and outdoor learning centers.
 4. Describe materials needed to create problem solving experiences and environments for children and adults.
-

Course Outcome(s):

Create opportunities to increase family involvement and knowledge of appropriate math, science and inquiry experiences and processes.

Essential Learning Outcome Mapping:

Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):

- a. Demonstrate knowledge of and respect for children's diverse cultural backgrounds as they apply to children's knowledge of math, science and inquiry.
 - b. Recognize and describe the value of inquiry-based learning and process-focused math and science experiences.
 - c. Describe the difference between child-centered and adult-centered math, science, and inquiry concepts and learning.
-

Methods of Evaluation:

- a. Science and number projects
- b. Report and analysis of practical experience in an early childhood learning center environment
- c. Written reports and experience plans
- d. Quizzes/midterm/final examination
- e. Participation in lab experiences

Course Content Outline:

- a. Introduction to science and math
 - i. Philosophy and concepts in science discovery
 - ii. Philosophy and concepts of early math skills
 - iii. Characteristics of an appropriate program
 - 1. Inquiry-based
 - 2. Play-based discovery
 - 3. Guided experiences
 - 4. Anti-bias
 - 5. Integrated curriculum
 - 6. Emergent curriculum
 - 7. Teacher as facilitator
 - 8. Block play
 - iv. Child's self-concept and identity
 - 1. Anti-bias
 - 2. Diversity issues and experiences
 - 3. Community resources
- b. Approaches to teaching science and math
 - i. Inquiry-based
 - ii. Five senses
 - iii. Roles of teacher
 - 1. Facilitator/co-partner
 - 2. Direct experiences
 - 3. Play-based
 - iv. Correlation of science with other curriculum areas
 - v. Correlation to math with other curriculum areas
 - vi. Guidance and safety guidelines in science
- c. Life science-inquiry based
 - i. Plants in the community
 - ii. Animals/insects in the community
- d. Natural experiences/non-living-inquiry based
 - i. Air/wind
 - ii. Sun/Light
 - iii. Water
 - iv. Sand/soil
 - v. Rocks
- e. Physical science (Engineering)
 - i. Problem-solving
 - 1. Simple machines
 - 2. Tinkering, creating
 - 3. Blocks
 - ii. Cooking
- f. Logical mathematical knowledge
 - i. Quantity
 - ii. Logico-mathematical intelligence
 - iii. Seriation
 - iv. Estimation
 - v. Shapes and symbols
 - vi. Patterns
 - vii. Measurement
 - viii. Sorting and classifying
 - ix. Block play
- g. Number concepts
 - i. One-to-one correspondence
 - ii. Counting
 - iii. Social knowledge
 - iv. Data analysis and graphs
- h. Brain development related to math and science skill development

- i. Outdoor environments
 - i. Experiences in nature
 - ii. Field trip planning and safety
- j. Assessing and documenting children's learning
 - i. Use of technology
 - ii. Ohio Early Learning and Development Standards (OELDS)
 - iii. Family communication and involvement

Resources

Bredenkamp, S., Masterson, M., Wiler, B., and Wright, B. (2022) *Developmentally Appropriate Practice in Early Childhood Programs*, NAEYC.

Bresson, L.M. & Kng, M. (2022) *Preschoolers at Play-Choosing the Right Stuff for Learning and Development*, NAEYC.

Charlesworth, R., & Lind, K. (2016) *Math and Science for Young Children*, Belmont, CA: Wadsworth Cengage Learning.

Harms, T., Clifford, R.M., Cryer, D. (2014) *Early Childhood Environment Rating Scale*, New York, NY: Teacher's College Press.

Heroman, C. (2017) *Making and Tinkering with STEM: Solving Design Challenges with Young Children*, Washington D.C.: NAEYC.

Nemeth, K. . (2017) (October/November) *Make Math Meaningful for Diverse Learners*, Vol. 11, No.1. <https://www.naeyc.org/resources/pubs/tyc/oct2017/make-math-meaningful-diverse-learners>

Ohio Department of Education. (2022) *Early Learning and Development Standards*, <https://education.ohio.gov/Topics/Early-Learning/Early-Learning-Content-Standards>

Parks, A. N. (2015) *Exploring Mathematics Through Play in the Early Childhood Classroom*, New York, NY: Teachers College Press.

Prairie, A.P. (2009) (This is the course textbook). *Math, Science and Technology for Teaching Young Children*, Cengage.

Selly, P.B.,. (2017) *Teaching STEM Outdoors: Activities for Young Children*, St. Paul, MN: Redleaf Press,.

Strasse, J., and Bresson, L. (2017) *Big Questions for Young Minds: Extending Children's Thinking*, Washington, D.C.: NAEYC.

Saracho, O.N. (2021) *An integrated Play-Based Curriculum for Young Children*, NAEYC.

Turrou, A. C., Johnson, N. C., Franke, M. L. . (2021) *The Young Child and Mathematics*, NAEYC.

Wanerman, T.,. (2013) *From Handprints to Hypotheses: Using the Project Approach with Toddlers and Twos*, St. Paul, MN: Redleaf Press,.

Top of page
Key: 1516