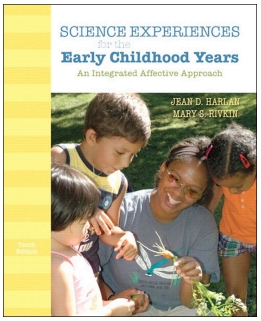
Supporting Cognitive Development Through
Math and Science



Course Information

A. Number: ECED 370
B. Credits: 5
C. Prereq: ECED 130 and ECED 113
D. Coreq: None

Personal Information

A. Instructor: Linda Bone
B. Office: Education Bldg. 125
C. Office Hours: T 8:00-10:00, W 1:00-3:00, R 8:00-10:00
D. Telephone: Office: 275-4770; Home: 883-0123
E. Email: linda_bone @skc.edu

Required Materials

A. Text: Harlan, J., & Rivkin, M., (2012). *Science Experiences for the Early Childhood Years* (10th edition). Boston: Pearson
B. *Montana's Early Learning Standards,* Early Childhood Project, http://www.montana.edu/ecp/pubs.html.
C. Handouts from the instructor
D. 1½ inch binder with dividers

Description

Supporting Cognitive Development through Math and Science explores theories and strategies that support the early learning and cognitive development of children from age zero to eight. Students will design, implement and evaluate developmentally and individually appropriate lessons based on mathematical concepts such as estimation, geometry, numeration and whole-number operations; as well, students will design, implement and evaluate lessons that support each child's innate curiosity and each child's procedural and thinking skills for investigating the world, solving problems, and making decisions. Curriculum will be connected to national standards and state guidelines.

Course Objectives

Upon completion of this course students will:

1. Gain knowledge of mathematical concepts such as estimation, geometry, number sense and numeration along with whole-number operations in relationship to the development of young children.
2. Gain knowledge of general principles of science inquiry such as cause and effect, systems, scale, models, change, variations, structure and function in relationship to the development of young children.

3. Demonstrate the ability to foster creative thinking and problem solving.
4. Explore the cultural perspective of science and mathematics and appropriately use this perspective with young children.
5. Determine techniques to include all children in math and science education.
6. Develop, implement and evaluate developmentally appropriate activities that teach the concepts of mathematics.
7. Develop, implement and evaluate developmentally appropriate activities that teach principles of science inquiry.
8. Design, implement and develop math and science activities through an integrated unit based on national standards and state guideline
9. Adapt math and science activities to accommodate diverse learners.
10. Explore standards and guidelines for early childhood math and science education.

Cultural Relevancy

Math and science will be studied with respect to diversity. Candidates will plan instruction with respect to diverse cultures, learning styles and developmental needs. In particular, students will develop science activities for young children that reflect Salish, Kootenai and Pond d'Oreille cultures.

Candidate Objectives:

1. Determine techniques to include all children in math and science education.
2. Develop learning activities that reflect Salish, Kootenai and Pond d'Oreille cultures.

Critical Thinking

This course will engage candidates in critical thinking by having them apply and critique information. As well, candidates will foster critical thinking in children.

Candidate Objectives:

1. Create modifications of learning activities to individualize for children's needs and learning styles.
2. Participate in group activities and discussions that utilize critical thinking skills such as problem solving skills and self-evaluation techniques.
3. Demonstrate the ability to foster creative thinking and problem solving.

Communication

Candidates are expected to demonstrate effective oral communication skills when participating in classroom discussion as well as when engaging children in math and science activities. Candidates will demonstrate satisfactory writing skills through completion of course projects.

Candidate Objectives:

1. Demonstrate effective oral communication skills when participating in class assignments.
2. Design and implement math and science activities through an integrated unit based on national standards and state guidelines. Plans will demonstrate satisfactory writing skills.

Course Requirements

A. Attendance and participation in class discussions
B. One written reflection for each chapter
C. Weekly journal entries (.5 hour/week) for instruction and observation of young children using math manipulatives (4 hours out of class for 1 credit)
D. Create one *Hands on Science* activity for integrated unit
E. Create one *at-Home Activity* to involve families with math
F. Thematic Unit integrating literature, math, science, and art.
G. Field Trip participation and reflection (6 hours out of class for 1 credit)
H. Science Fair presentations
I. Two written quizzes: mid-term and final
J. Organized Science/Math binder

Credit Hours

Following the SKC Credit Hour policy, to meet the identified objectives of this course, this 5 credit course, delivered over a 10 week term will approximate:

4 hours/week classroom of direct faculty and group activities
9 hours (3 hours extended day for 3 field trips)
4 hours (.5 hour/week) for instruction and observation of young children using math manipulatives

Grading

A. An incomplete grade ("I") is NOT an option with the exemption of an extreme emergency or the death of a family member. In either case, the instructor must be notified within 48 hours.
B. The following is a breakdown of how grades are earned:

Grading will be based on the percentage of total points earned for course assignments. All assignments will be turned in at the beginning og class on the day it is due according to the weekly assignment sheet. Late assignments will be deducted by 20% if not turned in on time and will not be accepted after one week. Please communicate with me if you are having difficulties with your class assignments so I can work with you.

Class attendance and participation (10 pts/class x 10 wks)	_____/100
Written reflection for each assigned chapter (5 pts/16 chapter)	_____/80
Weekly journal entries (5 pts/8 wks)	_____/40
Hands on Science Activity	_____/20
Hands on Math Activities	_____/20
Complete Thematic Unit	_____/200
Field trip participation and reflection	_____/40
Science Fair presentation	_____/50
Quizzes: mid-term and final (25 pts. x 2 quizzes)	_____/50

600 – 540 = A
539 – 480 = B
479 – 420 = C
419 – 360 = D
Below 360 = F

*Tutors are available for students! Please contact the instructor if you have any questions or a need for a tutor.

Attendance Policy

This class is highly interactive and learning occurs through participation in class discussions and activities that are impossible to duplicate outside of class. Therefore, it is required that students participate in all class sessions. Participation is graded at 10 pts day. An opportunity for make-up work is provided on an individual basis for **emergency situations**. Communication with the instructor is very important in this class.

Students missing **8 hours of class without make-up work** may be asked to drop the class. Students are expected to be on time for class and to stay until the designated time set for dismissal. If a student must leave early he/she must inform the instructor at the beginning of class. I will make every attempt to be fair. If you contact me, I will work with you. If you fail to do so, points will be adjusted accordingly.

Students must keep cell phones in the **off** position during class. If students must leave a phone on in case of emergency situations, they must notify the instructor and take the cell outside of the classroom.

*As stated in the Student Handbook, page 24, Section VI – Good Things to Know, Item 5, "Child must be supervised at all times when on campus. Children are not allowed in classrooms, while class is in session. Please do not leave them unattended in the lounge or hallways."

Reasonable Accommodations

Accommodations are provided for eligible students with identified disabilities. The College complies with the Rehabilitation Act of 1973 and the Americans with Disabilities Act. Students may contact Stan Flaming (Stanley_fleming@skc.edu), (406) 275-4889, or consult the SKC web page for Students with Disabilities for more information.

Cognitive Development in Math and Science
ECED 370

Week 1

Class Introductions: syllabus and routines
Chapter 1, *An Integrated Affective Approach to Science Learning*
Math Manipulatives (junk boxes)
Science experiences with plants (chap. 4)

Assignments

Prepare ECED 370 binder with dividers
Read Chapter 4, *Plants* and complete a reflection sheet
Plan for Field trip to Tribal Nursery on April 12th (sack lunch provided) 1-3

Week 2

Presentation by Dr. Amy Burland on the importance of early math experience
Chapter 2, *Science Participants: Children, Teachers, Families, and Communities*
Math Manipulatives (assessment activities)
Discussion and science experiences with plants (chap. 4, cont.)
Present Thematic Unit outline
Field trip to Nursery, 1-3

Assignments

Read chapter 5, *Animals* and complete a reflection sheet
Complete 30 minutes of math manipulative with journaling
Plan for field trip to Montana Water Fowl (sack lunch provided) 1-3
Peruse textbook for ideas on Thematic Unit. Complete web outline.

Week 3

Presentation by Lisa Killerman on how to use end of chapter Resource list and ordering from inner library loan (April 19th) 11:30-12:20
Chapter 3, *Guiding Science Learning and Assessments in the Early Years*
Math Manipulative (Piaget's stages of development)
Discussion and science experiences with *Animals* (Chap. 5)
Field trip to Montana Water Fowl, 1-3

Assignment

Read chapter 6, *The Human Body* and complete a reflection sheet
Complete 30 minutes of math manipulative with journaling
Complete Goal, Key Concepts, and Skills for thematic unit

Week 4

Presentation by Mary Driscoll on Project Wet tub and books available in library
Math manipulative (number sense and one-to-one correspondence)
Discussion and science experiences with the human body (chap. 6)
Field trip to Missoula Science centers.

Assignments

Read Chapter 7, *Air* and Chapter 8, *Water* and complete 2 reflections
Complete 30 minutes of math manipulative with journaling

Complete Book list and Vocabulary list for thematic unit

Week 5

Mid-term quiz
Presentation by Drew Hanson on EC technology for science
Math manipulative (Attribute Blocks)
Discussion and science experiences with air (Chap. 7) and water (Chap. 8)

Assignments

Read Chapter 9, *Weather* and Chapter 10, *Rocks and Minerals*
Complete 30 minutes of math manipulative with journaling
Complete Songs and Finger Plays (include copy of words) and Resources
Thematic Unit Base, final print

Week 6

Appendix B, Exploring *at-Home Activities* used as extensions and in newsletters
Math manipulative (Unifix Cubes)
Discussion and science experiences with weather (Chap. 9) and Rocks and Minerals (Chapter 10)

Assignments

Read chapter 11, *Magnetism* and Chapter 12, *The Effects of Gravity,* and Chapter 13, *Simple Machines*
Complete 30 minutes of math manipulative with journaling
Complete Hook, KWL questions, Outline and Celebration, final print

Week 7

Lesson Plan template and rubric
Math Manipulative (Measurement and Comparison)
Discussion and science experiences with *Magnetism* (Chap. 11), *Gravity* (Chapter 12), and *Simple Machines* (Chapter 13)

Assignments

Read Chapter 14, *Sound* and Chapter 15, *Light*
Complete 30 minutes of math manipulative with journaling
Lesson plans for Literature and Math

Week 8

STEM vs. STEAM handout discussed
Math Manipulative (Pattern Blocks)
Discussion and science experiences with Sound (Chap. 14) and Light (Chapter 15)
Video: Music and Learning

Assignments

Short description Science Fair presentation and one at-Home Math activity
Lesson plans for Science and Art
Read Chap 16, *Our Environment* and complete reflection
Complete 30 minutes of math manipulative with journaling

Three additional math lesson plans for portfolio

Week 9

Final quiz
Plan for Science Fair
Discussion and science experiences with environments (chap 16)
Visit SKC Childcare's natural playground
Organized science/math binder due

Week 10

Science Fair; each candidate will display and explain 1 Hands on Science project and 1 self-made Math manipulative
Field Trip to Bison Range/Missoula 10-3