

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

MATHEMATICS 128 – CHILDREN'S MATHEMATICAL THINKING

2 hours lecture, 2 units

Catalog Description

Children's mathematical thinking and in-depth analyses of children's understanding of operations (addition, subtraction, multiplication, division) and place value. Students will observe individual children solving mathematics problems.

Prerequisite

Math 125 or equivalent OR Concurrent enrollment in Math 125

Entrance Skills

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:

- 1) Understand and Apply:
 - a. Problem-solving strategies based on Polya's Four Steps
 - b. Various numeration systems and their properties
 - c. Number sense
- 2) Identifying and Analyzing:
 - a. Sequences using patterns
 - b. Properties of the major subgroups of the real number system
- 3) Number Theory Concepts:
 - a. Prime and composite numbers
 - b. Prime factorization
- 4) Using Various Computational Algorithms:
 - a. Estimation
 - b. Mental arithmetic

Course Content

- 1) Role of multiple representations and connections among them in children's understanding of mathematics
- 2) Learn and understand significance of models of multiplication and division
- 3) Children's problem-solving strategies for multiplication and division problems before instruction
- 4) Learn elements of counting
- 5) Importance and complexities of place value
- 6) Understand what teachers need to do to effectively teach children if they address the complex place-value ideas presented

Course Objectives

Students will be able to:

- 1) Identify different strategies that children use to solve mathematics problems.
- 2) Analyze children's thinking in mathematics (meaning of operations, place value, and multiple meanings of fractions).
- 3) Develop, conduct and reflect on an interview experience with children solving mathematics problems.

Method of Evaluation

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system.

- 1) Written assignments that measure students' ability to analyze and reflect on their experiences observing children solving mathematics problems.
- 2) Quizzes and exams which measure students' ability to recognize different strategies children use to solve mathematics problems.

Special Materials Required of Student

- 1) Audio recorder

Minimum Instructional Facilities

- 1) Smart classroom with whiteboards covering three walls, graphing utility and viewscreen, overhead projector
- 2) Manipulative math materials

Method of Instruction

- 1) Lecture
- 2) Small group discussion
- 3) Field observation

Out-of-Class Assignments

- 1) Interviews of K-6 grade children regarding mathematical thinking
- 2) Reflection papers related to journal articles

Texts and References

- 1) Required (representative examples):
 - a. Integrating Mathematics and Pedagogy (IMAP) Searchable Video Library (25 Clips), 1st edition, Pearson, 2020.
 - b. Hiebert, James et al. *Making Sense: Teaching and Learning Mathematics with Understanding*. Heinemann, 1997.
- 2) Supplemental: None

Exit Skills

Students having successfully completed this course exit with the following skills, competencies and/or knowledge:

- 1) Recognize different strategies that children use to solve mathematics problems.
- 2) Interview children and discern their understanding of particular math concepts.

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

- 1) Develop and conduct interviews, and evaluate and reflect upon interview experiences focusing on children's mathematical thinking.
- 2) Evaluate different strategies children use to solve mathematical problems.