

George Mason University
FAST TRAIN Program

EDUC 513: TEACHING ELEMENTARY MATHEMATICS IN INTERNATIONAL SCHOOLS

(3 credits)

Summer 2011

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I. Course Description

This course is an introduction to methods for teaching developmentally appropriate topics in numbers and operations, algebra, geometry, measurement, and data analysis and probability to students in international schools. Students focus on mathematical thinking in an activity-based, workshop-oriented experience. Students work with manipulatives and technology to explore mathematics, solve problems, and learn ways to teach mathematics content to elementary children. This course is approved for the sequence of courses in the George Mason University IB certificate program. Field experience is required.

II. Student Outcomes

This course will enable students to:

- A. Know what constitutes the essential topics in K – 6 mathematics in international schools.
- B. Identify and use selected manipulatives and technology such as Linking Cubes, Attribute Blocks, Geoboards, Base-10 Blocks, Fraction Circles, Tangrams, calculators, and computers to teach appropriate mathematics content topics in K - 6.
- C. Implement standards-based lessons using a variety of instructional strategies and techniques (cooperative and peer group learning, activity centers, laboratories and workshops, teacher-directed presentations, etc.) to teach diverse learners.
- D. Identify and use alternative methods for assessing students' work in mathematics in K - 6.
- E. Solve problems in the mathematical content areas of number and number theory, geometry, algebra, probability, and statistics appropriate for adaptation to K - 6.
- F. Know and explain what is a standards-based mathematics curriculum, what are the key elements of the National Council of Teachers of Mathematics Principles and Standards for School Mathematics, and what are the key elements of the Virginia Standards of Learning for Mathematics.

III. Relationship to Program Goals and Professional Organizations

Student Outcomes Referenced to Selected National Standards

Course Student Outcomes (above)	NCTM Principles and Standards	ISTE NETS	INTASC
A	S1, S2, S3, S4, S5	SI	P1, P7
B	S10	SII	P1, P2, P6
C	P1, P2, P3, P4, P6	SII	P1, P2, P3, P4
D	P5	SIV	P3, P8
E	S1, S2, S3, S5, S6	SI	P4, P6
F	S1-10, P1-6	SI	P1, P7, P9

Key:

NCTM Principles and Standards = National Council of Teachers of Mathematics Principles and Standards for School Mathematics (2000), where P = principles and S = standards.

ISTE NETS = International Society for Technology in Education National Education Technology Standards 2000, where S = standard number

INTASC = Standards for Licensing Beginning Teachers, where P = principles

Primary Years Programme Areas and Domains Relevant to Teaching K-6 Mathematics in International Schools

Course	Curriculum	Teach/Learn	Assessment	Professional
Teaching Elementary Mathematics in International Schools	A	E, F, G, H	I, J, M	N, O

Area of inquiry 1: Curriculum processes

A: International education and the role and philosophy of the IBO programmes

What is international education and how does the IBO's mission and PYP philosophy promote it?

A consideration of aims and development of international education, the values and mission of the IBO and the beliefs and values of the PYP programme including the:

- PYP perspective on internationalism
- the centrality of the learner profile
- criteria for assessing international mindedness in the school environment.

Area of inquiry 2: Teaching and learning

E. Learning theories, strategies and styles

What is constructivist learning and how is this exemplified in PYP practice?

- the centrality of structured, purposeful inquiry and the engagement of students actively in their own learning.
- the role of the planner in supporting the planning and development of authentic PYP transdisciplinary learning.
- the value and role of collaboration and reflection in the development of authentic PYP transdisciplinary learning.
- criteria for the planning and evaluation of the effectiveness of authentic PYP transdisciplinary learning.

F. Teaching methodologies and the support of learning

What learning activities and teaching strategies support PYP learning outcomes?

- The centrality of using a range and balance of teaching strategies that incorporate student inquiry as an integral part of the learning process and demonstrate appropriate teaching strategies to develop meaningful and relevant inquiry.

G. Differentiated teaching strategies

How does the PYP enable the learning needs of all students to be supported?

An appreciation of how differing teaching strategies impact and address the needs of students:

- with different levels of competency, types of ability, learning styles and learning difficulties
- for whom the language of instruction is not the mother tongue.

H. Selection and evaluation of teaching and learning materials

What learning resources support PYP practice and how are they selected?

Criteria for the selection and evaluation of appropriate teaching and learning resources to:

- support the achievement of PYP learning outcomes
- represent multiple perspectives and diverse cultures that exist in school and global communities
- meet the needs of students operating in languages other than their own
- meet the needs of students with special learning needs.

Area of inquiry 3: Assessment and learning

I. The principles of assessment

What is the role of assessment in PYP practice?

J. Developing assessment strategies

How are assessment strategies designed and implemented to support PYP practice?

- strategies enable effective assessment of broad and specific PYP learning outcomes.
- strategies enable evidence from a variety of contexts to be gathered using a range of techniques according to the nature of what is being assessed.

M. Effective feedback

How is student-learning progress effectively communicated to students and parents?

The design and implementation of alternative procedures for:

- recording authentic student achievement
- providing feedback to students and parents about learning progress and outcomes.

Area of Inquiry 4: Professional Learning

N. The principles and processes of reflective practice

What is reflective practice and how it supports programme implementation and enhance PYP practice?

- the process of reflective practice and its role in improving teaching and learning in the PYP context.
- current standards and practices pertaining to the implementation of PYP programme.
- current innovations and ideas in the area of international education and other educational contexts and how these can apply to enhancing the implementation of the PYP.
- PYP authorization and evaluation processes.
- PYP curriculum review process.

O. Collaborative working: planning, implementation and evaluation

What is the role of collaborative working practice in supporting the PYP learning outcomes?

The PYP programme requirements regarding the desirability of effective collaborative planning, instructional design and evaluation in that they:

- address assessment issues throughout the planning process
- address all of the essential elements (concepts, skills, knowledge, attitudes and action)
- emphasize the connections between transdisciplinary and subject disciplinary teaching and learning
- recognize a variety of levels of language competency
- accommodate a range of individual learning needs and styles

IV. Texts

Required:

Reys, Lindquist, Lambdin, & Smith. (2012). *Helping Children Learn Mathematics*, 10th edition, New York: John Wiley & Sons, Inc.

Recommended:

Ashlock. (2010). *Error Patterns in Computation: Using Error Patterns to Improve Instruction*, 10th edition, Upper Saddle River, NJ: Pearson.

V. Course Requirements and Assignments

Assignments are intended to further your understanding of mathematics and what it means to teach and learn mathematics in light of current reforms in mathematics education. Assignments are due by midnight on the day which they are due. Electronic submissions are acceptable and must meet the midnight deadline as well. All assignments are to be turned in to your instructor on time. **LATE**

ASSIGNMENTS: Late work will not be accepted for full credit. If the student makes prior arrangements with the instructor, assignments turned in late will receive a 10% deduction from the grade per late day or any fraction thereof (including weekends and holidays).

Exams (40%)

The errors pattern exam will focus on your ability to identify children's errors in computation for the purpose of improving mathematics instruction. The content exam will consist primarily of computation and problem-solving questions that focus on mathematics content and pedagogy throughout elementary grades.

July 26, July 29

Field Experience (10%)

Field experience documents (signed logs of hours and signed teacher recommendation) will be part of your final grade. Grades are held until all documents are sent to your instructor; failure to complete your field work will make you ineligible to register for your next class. See field experience information sheets for more information.

Due: March 15, 2012

Lesson Plans (20%)

- You are required to design and write three lesson plans. One of the lesson plans must be presented in class to fellow students. The format for designing your lesson plan will be provided.
- Plan lessons with a problem solving approach. Focus on the integration of mathematical tools (manipulatives, calculators, computers) and representations (concrete, visual, symbolic) to provide children with an interactive, conceptually based mathematics experience.

Due: July 29, 2011

Participation and Attendance (10%)

- **Participation:** You will share ideas on student error patterns, required course readings, and technology during class sessions. You will participate in class activities such as problem solving and concept mapping during class time. These assignments require your active engagement in class sessions; therefore, there is no opportunity to "make-up" these assignments.
- **Attendance Policy:** FAST TRAIN students are expected to attend *all* class periods of courses for which they register. In-class participation is important not only to the individual student, but to the class as whole. Class participation is a factor in grading; instructors may use absence, tardiness, or early departure as de facto evidence of nonparticipation and as a result

lower the grade as stated in the course syllabus (Mason Catalog). Each unexcused absence will result in a 12.5 point (out of 100) deduction from the student's participation grade. Two points will be deducted from the student's participation grade for each hour he/she is late, up to a total of 12.5 points.

Student Assessment Interview (20%)

Teacher Anthology and PBA's:

The Teacher Candidate Anthology (TCA) is designed to be a collection of performance-based tasks that are valid samples of candidate work throughout the program. It documents the individual's knowledge, skills, dispositions and ability to teach. Further it documents the candidate's ability to positively influence PK-6 student learning. Its purpose is to assess the attainment of the Interstate New Teacher Assessment and Support Consortium (INTASC) standards and to provide an avenue for growth and reflection.

All FAST TRAIN licensure courses have a required Performance Based Assessment (PBA). The required PBA for this course is a student assessment interview. In order to plan effective instruction, you will need to know how to assess children's knowledge of mathematical concepts. One way to assess children's thinking is a diagnostic interview. This assignment has two parts: (1) Design a plan for the interview, assessing a specific mathematics topic using concrete, pictorial and abstract representations, (2) Conduct the interview with a child and write a report describing the outcome of the interview. Your PBA must be submitted to TASK STREAM, where it will be reviewed and graded, in order to receive credit. **Due March 15, 2010**

Additionally, students are required to submit both a mid-point anthology reflective paper after completing three licensure courses and a final reflective after completing the final licensure courses. Both the mid-point and final anthology will be posted to Task Stream for scoring. Future registrations will be effected if this requirement is not met by the due dates indicated in the guidelines. Please see the FAST TRAIN website:

http://gse.gmu.edu/fasttrain/programs_of_study/elementary/ for more guidelines about the anthology requirement.

VI. Evaluation Schema

Determination of the Final Grade:

Graduate Grading Scale

A+	100%
A	94-99%
A-	90-93%
B+	85-89%
B	80-84% (no B- grades)
C	70-79% (does not meet licensure requirements or Level I award recommendation)
F	Below 70% (does not meet requirements of Graduate School of Education)

The mathematics education courses in FAST TRAIN's Elementary Education Program integrate pedagogy and mathematics content appropriate for the elementary school grades. To earn a grade of A in the course, you must demonstrate excellence in *both* the pedagogical knowledge and the content knowledge of the mathematics appropriate at your level of teaching. Thus, the grading in the course is structured to help fairly evaluate student excellence in both areas. Exam work focuses primarily on ascertaining student excellence in handling mathematics content appropriate for the elementary grades. Pedagogical knowledge is ascertained primarily through readings, assignments and participation in the course. Therefore, if you demonstrate excellence in both pedagogical knowledge and content knowledge, you will receive an acceptable grade for performance in graduate education.