Description: Mathematics Education 2: Reflection, Decision & Management

Subject       Cat-Nbr  Class  Term    Mode  Units  Campus
EDU           2421     20855  1, 2003  ONC   1.00   TWMBA

Academic Group:   FOEDU
Academic Org:     FOE002
HECS Band:        1
ASCED Code:       070301

STAFFING
Examiner: John Green
Moderator: Leo Crameri

RATIONALE
Teachers of mathematics need a sound understanding and appreciation of those key mathematics concepts and relationships which are embodied in the primary school mathematics curriculum. At the same time, teachers need to be confident and competent in planning for, and responding to, the mathematical needs of individual children. Effective professional practice can be developed by assisting prospective teachers to link their own understandings of mathematical concepts with their emerging personal and practical theories of teaching mathematics. Prospective teachers of mathematics will need to have access to situations which include the observation, discussion, and refinement, of elements of observable mathematics teacher behaviours, as well as the opportunity to explore and extend their understanding of relevant mathematical concepts. In this way, a framework can be established for the development of skills that will enable them, as practising teachers, to reflect upon, adapt, and refine elements of their practice to meet the needs of the children in their mathematics classrooms.

SYNOPSIS
The course assists pre-service teachers to develop their own personal, practical theories about teaching mathematics in the primary years of schooling. As part of this approach, the course presents small slices on video of teacher-learner interaction related to numeracy tasks, episodes that expose some of the common mis-understandings and mis-conceptions of primary students. Each video episode also illustrates the approach adopted by the novice teacher to overcoming the learning difficulty of the child and that adopted by the teacher educator in keeping with current research and thinking in the area. These then become the focus of attention of pre-service teachers. They are invited to consider ways of dealing with various aspects of the problems presented by the children. The visual presentation of these problems and solutions adds considerable impact to their pedagogic merit. An important
aspect of this course is to develop students' understandings and appreciations of mathematical concepts, while at the same time assisting pre-service teachers to grow in their personal, practical theories about teaching mathematics. Emphasis throughout the course will be in establishing links between key mathematical concepts which are important in the primary mathematics curriculum. Content will include: the history and development of natural numbers and of ways of representing them; one-to-one correspondence; cardinal and ordinal aspects of natural numbers and associated linguistic forms; the set of natural numbers and subsets; operations on natural numbers; solving arithmetic word problems by counting up, counting down, and other common strategies; the change, combine, compare and equalisation models of addition and subtraction of natural numbers; simple equations; different models of multiplication and division; commutative, associative, identity, distributive properties for addition and multiplication of natural numbers; written and mental algorithms for the four operations on natural numbers; rational numbers; historical development of the concept of "zero," of fraction concepts, and of representations of these concepts; vulgar and decimal representations of fractions; percentages; introduction to, and application of, the principles of induction and deduction. Segments of video of teacher-learner interaction related to numeracy tasks will be presented. The various episodes have been selected to expose some common misunderstanding and misconceptions shown by primary school students. Each episode also illustrates the approach adopted by a novice teacher to overcome the learning difficulty. Discussion and reflection on these episodes is supported through a framework of current research. Visual presentation of classroom situations and possible ways of approaching them adds impact to the underlying mathematical concepts and pedagogy.

OBJECTIVES

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

- describe currently researched and recommended strategies for teaching "Number" in the first seven years of schooling
- demonstrate an understanding of the mathematical concepts that make up the "Number" strand of mathematics
- identify challenges faced by the typical teacher of mathematics
- construct appropriate strategies and responses for addressing these situations
- modify such strategies to suit particular needs and situations
- demonstrate an ability to test such responses that have been, in the context of group meetings, exposed to adaptation and refinement
- demonstrate frameworks for thinking about and articulating their own approaches to teaching mathematics.

TOPICS

<table>
<thead>
<tr>
<th>Description</th>
<th>Weighting (%)</th>
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<tbody>
<tr>
<td>1. Number systems, historical perspectives</td>
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<tr>
<td>2. Natural numbers, counting, ordinality, cardinality</td>
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<tr>
<td>3. Rational numbers, derivation of zero, vulgar fractions, percentages</td>
<td>20.00</td>
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<tr>
<td>4. Addition, subtraction, multiplication, division concepts</td>
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TEXT and MATERIALS required to be PURCHASED or ACCESSED:

Books can be ordered by fax or telephone. For costs and further details use the 'Book Search' facility at http://bookshop.usq.edu.au by entering the author or title of the text.

Children Learning Number (Video Cassette), packaged with accompanying workbook (EDU 2421) and available through USQ Bookshop.

REFERENCE MATERIALS

Reference materials are materials that, if accessed by students, may improve their knowledge and understanding of the material in the course and enrich their learning experience.


Barrett, G. & Goebel, J. 1990, The impact of teaching and learning through technology, Teaching and learning mathematics in the 1990s, NCTM, Reston, VA.


Green, J. 1993, Constructivist strategies for the mathematics teacher, Constructivist interpretations of teaching and learning mathematics, Curtin University of Technology, Perth, WA.

Kamii, C 1994, Young Children Continue to Reinvent Arithmetic, Teachers College Press, NY.

Salmon, B. & Grace, N. 1984, Problem solving - Some issues concerning the teaching and learning of skills and strategies during Years 1-10, Department of Education, Queensland, Brisbane.

STUDENT WORKLOAD REQUIREMENTS

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>HOURS</th>
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<tbody>
<tr>
<td>Assessment</td>
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<tr>
<td>Directed Study</td>
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<tr>
<td>Group Work</td>
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<tr>
<td>Private Study</td>
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<td>Workshops</td>
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### ASSESSMENT DETAILS

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<tr>
<th>Description</th>
<th>Marks Out of</th>
<th>Wtg(%)</th>
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<th>Due Date</th>
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<td>CONTINUOUS</td>
<td>999.00</td>
<td>50.00</td>
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<td>04 Mar 2003</td>
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<tr>
<td>2.5 HOUR EXAMINATION</td>
<td>999.00</td>
<td>50.00</td>
<td>Y</td>
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**NOTES:**
- Examiner to advise.
- Examination timetable will be available during semester.

### OTHER REQUIREMENTS

1. When there is more than one marker for a single item of assessment, the distribution patterns and means for the different markers will be compared and marks adjusted if necessary.
2. Marking criteria are provided in course material as mark sheets/guides or as part of assignment specifications.
3. Summative assessment items will receive one of the following letter grades: HD, A, B, C, F or I.
4. Course Grades will be calculated by aggregating the weighted result or numerical score for each summative assessment item. Any ungraded assessment requirement will receive a Pass, Fail or Incomplete.
5. Assignments submitted after the due date may be penalised in accordance with the University policy on assignments.