Description: Mathematics Education 2: Reflection, Decision Making and Pedagogy

<table>
<thead>
<tr>
<th>Subject</th>
<th>Cat-nbr</th>
<th>Class</th>
<th>Term</th>
<th>Mode</th>
<th>Units</th>
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<td>40672</td>
<td>1, 2005</td>
<td>ONC</td>
<td>1.00</td>
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**Academic group:** FOEDU  
**Academic org:** FOE002  
**Student contribution band:** National Priority Teaching  
**ASCED code:** 070301

**STAFFING**  
Examiner: John Green  
Moderator: Noel Geoghegan

**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.

IMPORTANT NOTE: Working with Children: State law in Queensland requires that all adults (including university students, pre-service educators, trainers, vocational teachers, industry educators) working with children under the age of 18, in the State of Queensland*, obtain approval before commencing such work. Many education courses include a practical component (professional experience, project work, research, assessment etc.) that may require engagement with children under the age of 18. It is your responsibility to ensure that you possess a current suitability card (Blue Card) before commencing any practical components of this course. DO NOT PARTICIPATE IN ANY PRACTICAL EXPERIENCE WITH CHILDREN UNDER 18 UNLESS YOU POSSESS A CURRENT 'BLUE CARD'. For further information: http://www.childcomm.qld.gov.au/employment/bluecard/informationSheets.html *If you are undertaking practical experience outside the State of Queensland, Australia you should check local requirements.

OBJECTIVES

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

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

TOPICS

<table>
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<tr>
<th>Description</th>
<th>Weighting (%)</th>
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<tbody>
<tr>
<td>1. Number systems, historical perspectives</td>
<td>20.00</td>
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<tr>
<td>2. Natural numbers, counting, ordinality, cardinality</td>
<td>20.00</td>
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3. Rational numbers, derivation of zero, vulgar fractions, percentages 20.00
4. Addition, subtraction, multiplication, division concepts 20.00
5. Operations involving rational numbers 20.00

**TEXT and MATERIALS required to be PURCHASED or ACCESSED**

ALL textbooks and materials are available for purchase from USQ BOOKSHOP (unless otherwise stated). Orders may be placed via secure internet, free fax 1300642453, phone 07 46312742 (within Australia), or mail. Overseas students should fax +61 7 46311743, or phone +61 7 46312742. For costs, further details, and internet ordering, use the 'Textbook Search' facility at http://bookshop.usq.edu.au click 'Semester', then enter your 'Course Code' (no spaces).

Children learning number (video cassette), packaged with accompanying workbook (EDU2421) and available from 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.


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

<table>
<thead>
<tr>
<th>ACTIVITY</th>
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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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<tr>
<td>Workshops</td>
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ASSESSMENT DETAILS

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<tr>
<th>Description</th>
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<tr>
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NOTES
1. The examiner will advise the due date for this assessment item. Letter grades will be used in this course and displayed in the notes section.
2. Students will be advised of the examination date for this course when the official timetable for semester 1 2005 has been finalised.

IMPORTANT ASSESSMENT INFORMATION

1. Attendance requirements:
   It is the students' responsibility to attend and participate appropriately in all activities (such as lectures, tutorials, laboratories and practical work) scheduled for them, and to study all material provided to them or required to be accessed by them to maximise their chance of meeting the objectives of the course and to be informed of course-related activities and administration.

2. Requirements for students to complete each assessment item satisfactorily:
   To complete each of the assessment items satisfactorily, students must obtain at least a grade of C- for each assessment item.

3. Penalties for late submission of required work:
   If students submit assignments after the due date without prior approval then a penalty in accordance with the University policy on assignments will apply for each working day late.

4. Requirements for student to be awarded a passing grade in the course:
   To be assured of receiving a passing grade a student must achieve at least 50% of the available weighted marks for each summative assessment item.

5. Method used to combine assessment results to attain final grade:
   The final grades for students will be assigned on the basis of the weighted aggregate of the marks or grades obtained for each of the summative assessment items in the course.

6. Examination information:
In an Open Examination, candidates may have access to any material during the examination except the following: electronic communication devices, bulky materials, devices requiring mains power and material likely to disturb other students.

7 Examination period when Deferred/Supplementary examinations will be held: There will be no Deferred examinations in this course.

8 University Regulations: Students should read USQ Regulations 5.1 Definitions, 5.6. Assessment, and 5.10 Academic Misconduct for further information and to avoid actions which might contravene University Regulations. These regulations can be found at the URL http://www.usq.edu.au/corporateservices/calendar/part5.htm or in the current USQ Handbook.

ASSESSMENT NOTES

1 The due date for an assignment is the date by which a student must despatch the assignment to the USQ. The onus is on the student to provide proof of the despatch date, if requested by the examiner.

2 Students must retain a copy of each item submitted for assessment. This must be produced within twenty-four (24) hours of receipt of request being made by the examiner. The student must retain this copy until the grade for this course has been finalised.

3 In accordance with the University's assignment extension policy (Regulation 5.6.1), the examiner may grant an extension of the due date of an assignment in extenuating circumstances.

4 The Faculty will normally only accept assessments that have been written, typed or printed on paper-based media.

5 The Faculty will NOT accept submission of assignments by facsimile.

6 Students who have undertaken all of the required assessments in a course but who have failed to meet some of the specified objectives of a course within the normally prescribed time may be awarded the temporary grade: IM (Incomplete - Make up). An IM grade will only be awarded when, in the opinion of the examiner, a student will be able to achieve the remaining objectives of the course after a period of non-directed personal study.

7 Students who, for medical, family/personal, or employment-related reasons, are unable to complete an assignment or to sit for an examination at the scheduled time may apply to defer an assessment in a course. Such a request must be accompanied by appropriate supporting documentation. One of the following temporary grades may be awarded IDS (Incomplete - Deferred Examination); IDM (Incomplete - Deferred Make-up); IDB (Incomplete - Both Deferred Examination and Deferred Make-up).

8 When there is more than one marker for a single item of assessment, the distributed patterns and means for the different markers will be compared and marks adjusted if necessary.

9 Marking criteria are provided in course material as mark sheets/guides or as part of assignment specifications.

10 All continuous assessment items must be submitted with a pass overall gained.

11 Each assessment item must be submitted and passed.

OTHER REQUIREMENTS

1 Students will require access to e-mail and Internet access to USQConnect for this course.
Students are to use a recognised referencing system as specified by the examiner.

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