

Children's Conceptual Understanding of Decimal Fractions

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This paper reports three case studies of Year 5 students drawn from a longitudinal study of students' multiplicative reasoning. The analysis shows wide differences in students' conceptual understanding and strategy use across tasks involving decimal fractions. The high ability student demonstrated a strong link between decimal understanding and the base 10 numeration system. By comparison the lower ability student showed conceptual difficulties with decimals based on inappropriate utilization of base 10 material. The average ability student displayed conceptual confusion based on her treatment of decimals as whole numbers.

The Impact of the Intermediate Number Project on Teacher Classroom Practice - A Case Study

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This session discusses work in progress that aims to monitor the impact of the Intermediate Number Project on the classroom practice of year 7 and 8 teachers in a New Zealand Intermediate School. The levels of the teachers' mathematical content knowledge, pedagogical content knowledge, strategic thinking, the availability and effective use of equipment and grouping versus whole class teaching are some of the issues to be considered. Preliminary research results related to the impact of the Early Number Project on teachers' classroom practice are encouraging, but will this be as effective at the upper ends of the primary school system? The ability of a school and individual teachers to implement the approaches inherent in the numeracy projects independently is to be explored in this research.

The Role of Mathematical Processes: Issues for Pacific Island NESB Students in New Zealand.

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This paper reports on a study that investigated the experiences and perceptions of a group of Pacific Island students whose first experience of studying mathematics in New Zealand came in a university bridging programme. The importance given to problem-solving, logical reasoning, and communication was quite different from their experiences in their home countries. The study indicated some difficulties that the mathematical processes approach posed for newcomers adapting to the New Zealand system, and especially for newcomers from non-English-speaking backgrounds (NESB).

Does the Use of Spreadsheets in Year 4 Number Programmes Enhance Children's Numeracy Development?

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Little is known about how integrating ICT actually enhances the learning process. This study investigated the link between integrating spreadsheets into mathematics programmes and the development of numeracy. While a correlation between the two is difficult to establish, significant development occurred and insights into the way spreadsheets facilitate that development were gained.

A Review of Textbooks in Integrating The Use of Technology in Teaching Mathematics: The Case of Hong Kong

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A new secondary mathematics curriculum emphasizing the use of technology was introduced in Hong Kong in September 2001. This study summarizes how technology is used in textbook materials for the new curriculum. The study found that when use of technology is mandated in the curriculum technology can be used simply as a marketing initiative, without much relevance to pedagogy. It is noted that support of teachers in a technologically rich work environment becomes the greatest concern of teachers.

Rethinking Curriculum: A Values Perspective

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The most important issue for practising teachers is what content will they be teaching. Curriculum developers also concentrate most efforts on this issue. But policy makers speak more often about long term goals including values, but then revert to very specific cognitive skills that they think students should be able to perform. Interesting questions are why teachers don't seem to concern themselves with values, and why policy makers seem to think there is a direct and immediate linkage between values and immediate skill type cognitive behaviour. These questions will be considered in the light of the ongoing work of the Values and Mathematics Project (VAMP), which has been discussed at earlier MERGA conferences.

A Learning Support Program for First Year Tertiary Mathematics Students

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This short communication describes the work in progress at QUT's Mathematics Access Centre (MAC). The rationale of the project is to provide first year students of mathematics with face-to-face programmes that support their learning needs. This is done with weekly enabling tutorials, examination preparation workshops, and a drop-in centre. Approximately 1000 students are eligible for MAC assistance. Initial data which will be presented suggest that MAC programmes are having a positive impact on qualitative and quantitative learning measures.

Development of Effective Web Materials for the Mathematics Learning Centre

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This paper seeks to explore issues inherent in the development of effective web materials and the manner in which these have been addressed at the Mathematics Learning Centre (MLC) at Central Queensland University (CQU). The MLC is a support unit which provides assistance to students who are experiencing difficulty with the mathematics or the quantitative component of their course at CQU. The paper also presents a number of guiding principles for the design and development of web-based study materials and their implementation by the MLC for its students.

Learning Multiplication in Year 5 and 6 Classrooms

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Multiplicative thinking represents a qualitative change in children's understanding of number and operations. We know how a child's thinking changes in terms of their approach to problems. We also know that children's increasing sophistication in strategy use does not follow a linear pathway. This research aims to trace the emergence of multiplicative thinking through an examination of the classroom experience of children. Initial studies have been undertaken with teachers and children. The next phase of the research brings these two together to examine the dynamics of teaching and learning.

Working Mathematically: A Transatlantic Comparison

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Part of the presenter's PhD research involved examining curriculum documents from England and America. Two, which were chosen because of their international prominence, were the Mathematics: the National Curriculum for England and the American Principles and Standards for School Mathematics,(NCTM). The focus of this paper is the way in which the processes of mathematics learning and thinking are described and incorporated into the two curricula. Comparisons of the two documents revealed a very different rationale behind the writing of each document and the need for further research into what is meant by "working mathematically".

Enactivism, Post-Modernism and Curriculum

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Traditionally, curriculum dialogue revolves around consideration of aims/intentions, content, teaching methods and assessment. These concepts are interpreted within a modernist paradigm that objectifies knowledge, privileges product over process and separates self from other and environment. Enactivism, a learning theory embracing post-modernist thought, sees knowing as (*emergent*) process and as embodied and embedded within broader contexts. Self, other and environment are co-defining and co-emerging and can be considered as 'open' (*transforming and creating*) systems. From this perspective, the curriculum dialogue necessarily changes. This paper explores the implications, for curriculum dialogue, of an enactivist view.

Adult Students Learning Mathematics – Some Case Studies

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As part of a larger study, 11 adult students studying in a Bridging Mathematics course were interviewed on three occasions about their experiences and feelings. The interviews were early in the course, towards the end of the course, and the following semester. Their interviews were analysed looking at their past experiences of learning mathematics in schools, issues of confidence, their experiences learning mathematics again as adult learners, and their ideas as to the usefulness of mathematical tools in real life.

An Investigation into Undergraduate Examinations

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Examinations are the main form of assessment in undergraduate mathematics and statistics courses and examination papers tend to follow a very rigid format, but very little research has been carried out on the structure of examination papers or on their impact on learning. Recent work has focussed on ways of incorporating technology into the standard examination format making as little change as possible to the format itself. This paper demonstrates firstly how little research exists on examinations and their effects on learning and secondly how a small change in the structure of an examination can significantly alter the results. This leads to the question, "Are we testing the right things in the right way or are we just perpetuating a ritual without questioning its effectiveness?"

Teaching Multiplication of Negative Numbers

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Current approaches to teaching mathematics in New Zealand place emphasis on the use of meaningful contexts. One method of teaching multiplication of two negative numbers is described here. In a class of year 9 students a video camera was used to record the motion of a toy car travelling forwards and backwards, then the videotape replayed in both directions. Stimulated recall interviews were conducted with four of the students, whose responses are analysed with reference to the Pirie-Kieren model.

Multiplicative Skills of Year 9 Students

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The New Zealand initiative to improve numeracy skills was extended to students in years 7 – 10 (age 11-14) in 2001. Results of initial assessment and reassessment after one term of intervention showed that such a programme was needed and that it was effective for this age group. This paper focuses on the results of assessments of multiplicative scales for year 9 students, demonstrating initial results that concerned educators and a positive response of the students involved to attention to these skills.

Facilitating the Teaching of Space Mathematics: An Evaluation

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The implementation of a NSW teacher development program to improve teaching the space strand of mathematics has been evaluated in terms of students' learning and whether the teachers did indeed implement the intended program. Results indicate a successful program was established. The study identified the role of school facilitators and the comprehensive support package as effective features of the teachers' professional development. The package included the purpose for teaching space written in terms of students' expected learning with background theoretical notes, assessment tasks, lesson plans, and supporting videotapes which illustrated the theory and classroom implementation.

Gender Bias in Mathematics Textbooks at Secondary Level in Mauritius

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There are several factors that affect acquisition of mathematical knowledge at school level. It is generally held that the method of teaching mathematics through concept formation is probably the most simple technique of teaching. Our research team is proposing that using 'core constructs' as a pedagogical paradigm to teach mathematical knowledge is more useful and coherent. The relevance of core constructs is well embodied in the way we perceive the nature and structure of mathematical knowledge. This is then followed by the next overall purpose of our study which examines "Gender bias in mathematics textbooks" produced locally. Indeed our study has shown that our curriculum materials are significantly gender biased and that there is an urgent need to reconsider, rethink and rewrite mathematics curricular materials by ensuring much more fairness and balance in terms of gender notions and gender concepts.

How Crucial is a Clear Understanding of Algebraic Symbols?

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This paper presents research data, assembled from three countries, to support the view that students with better levels of understanding of the meaning of algebraic symbols are more likely to have higher degrees of success with algebraic tasks. Misunderstanding alphabetic symbols, especially by regarding them as representing objects, can severely handicap those studying the algebra of generalised arithmetic. Awareness of the importance of a numbers view of such symbols alerts educationists to take great care regarding methods used to introduce students to symbolic algebra.

Children's Mathematical Communication During Play

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The importance of language for communicating mathematically has long been recognised. This study of young children determines the purposes for which children communicate as they play and confirms the significance of mathematical language development in the early years. Playing together in early childhood settings, children communicated their understandings and experiences to each other using language that was rich in mathematical ideas, fantasy and social construction.

Calculators and Number Sense: Teachers' Responses

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This project introduced TI-15 calculators into five older primary classrooms. Classes were used where children had already undertaken work with standard algorithms for calculating. The need for children to 'learn the basics' is one reason for teachers not introducing calculators to many lower primary classrooms. This paper which reports part of a larger project noted a change in general teaching style in mathematics, more talk and exploration by children, an acknowledgment of different mathematical abilities, and a renewed enthusiasm for learning mathematics with calculators.

Development of a Number Framework

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Over the past two decades mathematics education researchers have created learning frameworks for various aspects of number. In New Zealand an attempt has been made to develop an integrated number framework that links students' mental strategies across different operational domains. This paper discusses the theoretical underpinnings for the number framework and gives reasons for the directions taken in its development.

The Influence of Language Factors on the Teaching and Learning of Equations and Inequations

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An investigation into the influence of language factors on the learning of equations and inequations in two schools in Chiang Mai, Thailand, is described. 152 Year 9 students, in four classes, were administered a *Language of Equations and Inequations Test* (LEIT) based on nine categories of language. On average, students answered 12 of the 27 LEIT questions correctly. Questions in the "graph to word" category were best answered, and those in the "word to graph" category were the most difficult.