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Reference Materials - Bibliographies (131)

Annotated Bibliographies; Doctoral Dissertations; *Educational Research; Elementary Secondary Education; Higher Education; *Mathematics Education

This annual listing of research in mathematics education contains annotated citations of all the research papers and monographs dated 1996 through March 1997 that were abstracted for the ERIC database as well as journal articles focusing on the interpretation and implications of mathematics education research. Chapter 1, "Dissertation Research Reported in 1996" (James D. Atkinson and John H. Wetzel), lists 270 dissertations abstracted in "Dissertation Abstracts International" during 1996. Chapter 2, "Research Articles Published in 1996" (Teresa H. Rehner and Parisa Vafai), lists 158 journal articles published in 1996 and includes a list of journals searched. Journal articles focusing on the interpretation and implications of research are also included in this chapter. Chapter 3, "Research Papers and Monographs in Mathematics Education Produced in 1996" (S. Aslı Ozgün-Koca and Hea-Jin Lee), lists 101 papers and monographs abstracted for the ERIC database as of July 1997. Entries in each chapter contain annotations, major and minor category codes, and grade level codes. An index by major category codes is provided at the end. (ASK)
Research in Mathematics Education

96

An Annotated Listing of Research in Mathematics Education Published During 1996

Edited by Douglas T. Owens
ERIC and ERIC/CSMEE

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ACKNOWLEDGMENT

We express thanks to the ERIC/CSMEE production staff for their assistance. In addition to the authors of the various lists, we would like to acknowledge the contribution of Kelly M. Costner who prepared entries for dissertation abstracts written in French.
PREFACE

The annual listing of research in mathematics education for many years was published as an issue of the *Journal for Research in Mathematics Education*, a publication of the National Council of Teachers of Mathematics. Two annual research listings for 1994 and 1995 were prepared by the ERIC Clearinghouse for Science, Mathematics, and Environmental Education (ERIC/CSMEE) with the financial support of NCTM. This is the first annual research listing prepared solely by ERIC/CSMEE.

This version is very similar to the last two versions listing the research reported in 1994 and in 1995. Each entry has been classified with Major and Minor codes and all entries are indexed by Major codes. Research papers and monographs dated 1996 and abstracted for the ERIC database by the end of March 1997, as well as journal articles focusing on the interpretation and implications of research, have been included. Dissertation abstracts which appeared in *Dissertation Abstracts International* during 1996 have been listed. An index of dissertations by institution is provided. A list of journals searched is included.

As much as mathematics educators have valued the research listing in the past, with electronic databases becoming increasingly accessible, it is not clear in what format(s) future listings would be most useful. Though ERIC/CSMEE has the capacity to produce this listing, it is not clear the extent to which a single annotated listing of mathematics education research is still valued by the mathematics education community. We earnestly request feedback from you our reader, either in writing or by e-mail at the addresses listed below. This listing will be available through the ERIC/CSMEE World Wide Web site.

We sincerely hope you find this listing useful. *Again, we solicit your comments and recommendations.* You may contact ERIC/CSMEE by mail, ERIC Clearinghouse for Science, Mathematics and Environmental Education, 1929 Kenny Road, Columbus, OH 43210-1080; or by e-mail at ericse@osu.edu.

D.T.O.
Key to Codes

The following topic codes have been used to indicate the major and minor emphases of each dissertation, journal article, and paper in this listing. Each entry has been assigned a minimum of one and a maximum of three major codes, and any number of minor codes. The combined topic index at the end of the volume reflects only major codes, with entries listed in 18 clusters of related topics.

The grade level or educational level of each study is indicated in parentheses after the topic codes. Please note that studies related to preservice or inservice teacher education are so indicated by the appropriate topic codes (Prsv, Insv). The level designated on teacher education studies refers to the grade level(s) at which the intern or teacher participants teach. Teachers as subjects were preceded with a level code. For example elementary school teachers were coded EL,TE. Teacher education students preparing to teach at the elementary level were coded TE,EL, for example.

## Topic Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Ach</td>
<td>Achievement</td>
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<tr>
<td>A/S</td>
<td>Addition, subtraction</td>
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<td>AdvM</td>
<td>Post-calculus mathematics</td>
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<td>Aff</td>
<td>Affect</td>
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<td>Alg</td>
<td>Algebra, pre-algebra</td>
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<td>Anx</td>
<td>Anxiety (student’s)</td>
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<td>Arth</td>
<td>Arithmetic</td>
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<td>Assm</td>
<td>Assessment, evaluation</td>
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<td>Bif</td>
<td>Beliefs (student’s)</td>
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<tr>
<td>Calc</td>
<td>Calculus, precalculus</td>
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<td>Cltr</td>
<td>Calculators (general)</td>
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<td>ClIn</td>
<td>Classroom interaction</td>
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<td>Comm</td>
<td>Communication</td>
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<td>CAI</td>
<td>Computer-assisted instruction</td>
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<td>Comp</td>
<td>Computers (general)</td>
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<td>CC</td>
<td>Cross-cultural studies</td>
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<td>Curr</td>
<td>Curriculum, programs</td>
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<td>Decm</td>
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<td>D/R</td>
<td>Diagnosis, remedial mathematics</td>
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<td>DscM</td>
<td>Discrete mathematics</td>
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<td>Eqv</td>
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<td>Eqqy</td>
<td>Equity</td>
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<td>Ethn</td>
<td>Ethnic, racial, cultural</td>
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<td>Frac</td>
<td>Fractions, rational numbers</td>
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<td>Gend</td>
<td>Gender differences</td>
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<td>Geometry</td>
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<td>Gifted (students)</td>
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<td>GCal</td>
<td>Grading calculators</td>
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<td>Grpg</td>
<td>Grouping for instruction, cooperative learning</td>
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<tr>
<td>Impl</td>
<td>Implications of research, interpretations of research</td>
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<td>Insv</td>
<td>Inservice teacher education, professional development</td>
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<td>Int</td>
<td>Integers</td>
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<td>IC</td>
<td>Integrated curriculum</td>
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<td>Knw</td>
<td>Knowledge (student’s)</td>
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<td>Lang</td>
<td>Language, psycholinguistics</td>
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<tr>
<td>Lmrk</td>
<td>Learners (characteristics of)</td>
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<tr>
<td>Lng</td>
<td>Learning, learning theories, cognitive development, constructivism</td>
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<td>Styl</td>
<td>Learning style, cognitive style</td>
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<td>Manp</td>
<td>Manipulatives</td>
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<td>Matl</td>
<td>Materials (texts, other resources)</td>
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<td>Meas</td>
<td>Measurement</td>
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<tr>
<td>Mscn</td>
<td>Misconceptions</td>
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<tr>
<td>M/D</td>
<td>Multiplication, division</td>
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<tr>
<td>M/CBL</td>
<td>Microcomputer/calculator based laboratory</td>
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<td>MMed</td>
<td>Multimedia</td>
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<td>Mtcg</td>
<td>Metacognition, reflection</td>
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<tr>
<td>NSNs</td>
<td>Number sense</td>
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<tr>
<td>PlcV</td>
<td>Place value, numeration</td>
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<tr>
<td>Oral</td>
<td>Oral communication, classroom discourse</td>
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<tr>
<td>Patt</td>
<td>Patterns, relationships, math connections</td>
</tr>
<tr>
<td>RaPc</td>
<td>Ratio, proportion, percent</td>
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<tr>
<td>Pers</td>
<td>Personality</td>
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<tr>
<td>Phil</td>
<td>Philosophy, epistemology</td>
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<tr>
<td>Plan</td>
<td>Planning, decision making</td>
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<tr>
<td>Prob</td>
<td>Probability</td>
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<td>PS</td>
<td>Problem solving, reasoning</td>
</tr>
<tr>
<td>Prsv</td>
<td>Preservice teacher education</td>
</tr>
<tr>
<td>Prf</td>
<td>Proof, justification</td>
</tr>
<tr>
<td>RaPc</td>
<td>Ratio, proportion, percent</td>
</tr>
<tr>
<td>Rep</td>
<td>Representations, modelling</td>
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<tr>
<td>Rsch</td>
<td>Research issues, methods</td>
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<tr>
<td>Revw</td>
<td>Reviews of research</td>
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<tr>
<td>Soc</td>
<td>Social factors, context, parents</td>
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<tr>
<td>Vis</td>
<td>Spatial visualization</td>
</tr>
<tr>
<td>Stat</td>
<td>Statistics</td>
</tr>
<tr>
<td>TAnx</td>
<td>Anxiety (teacher’s)</td>
</tr>
<tr>
<td>TAtt</td>
<td>Attitudes (teacher’s)</td>
</tr>
<tr>
<td>TBlf</td>
<td>Beliefs (teacher’s)</td>
</tr>
<tr>
<td>TKnw</td>
<td>Content knowledge (teacher’s), pedagogical knowledge</td>
</tr>
<tr>
<td>Tchr</td>
<td>Teachers (characteristics of)</td>
</tr>
<tr>
<td>Tchg</td>
<td>Teaching (role, style, methods)</td>
</tr>
<tr>
<td>Tech</td>
<td>Technology (general)</td>
</tr>
<tr>
<td>Whol</td>
<td>Whole numbers</td>
</tr>
<tr>
<td>Writ</td>
<td>Writing, journals</td>
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</tbody>
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### Level Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC</td>
<td>Early childhood, K-4</td>
</tr>
<tr>
<td>MS</td>
<td>Middle grades, 5-8</td>
</tr>
<tr>
<td>HS</td>
<td>High school, 9-12</td>
</tr>
<tr>
<td>PS</td>
<td>Post secondary, 13+</td>
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<tr>
<td>TE</td>
<td>Teacher education, teachers</td>
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<tr>
<td>EL</td>
<td>Elementary, K-8</td>
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<tr>
<td>SE</td>
<td>Secondary, 5-12</td>
</tr>
<tr>
<td>K-12</td>
<td>All school levels</td>
</tr>
<tr>
<td>ALL</td>
<td>All student levels</td>
</tr>
</tbody>
</table>
This section lists 270 dissertations in mathematics education research that were abstracted in *Dissertation Abstracts International* during 1996. Each entry is coded (see Key to Codes) with one to three *major* topic codes (in bold type) and any number of *minor* topic codes, as well as the grade level code (in parentheses). Studies related to preservice or inservice teacher education are indicated by the appropriate topic codes (Prsv, Insv). The level designated for teacher education or teacher studies first indicates the grade level(s) at which the interns or teacher participants teach, followed by the level code "TE" for "teacher education" or "teacher." All entries are indexed by major codes at the end of the volume (see page 83). An index of dissertations by institutions is included at the end of this section (see page 33).


The purpose for this study was designed to investigate the relationship between six teacher (n=43) traits and achievement of students (1,697) enrolled in Algebra I. Second, the relationship of achievement and graphing calculator use was investigated.

*Alg, TBlf, GCal, Insv, Tchg, Ach (HS)*


Using survey data from 76 high school mathematics departments, indices for each of four dimensions of teachers' professional community and a composite measure were developed. Levels of professional community varied significantly from department to department.

*Tchr, Insv, Tchg (HS, TE)*


Differences in learning outcomes and student attitudes between a CLS and a graphing calculator setting were studied (n=56). Differences in student familiarity with the technology and with the capabilities of the technology for calculus led to differences in problem solving, attitudes, and interaction.

*Cale, Tech, PS, Att, ClIn (PS)*


Interviews and observations of teachers (n=6) were employed. Two major knowledge clusters emerged: conceptual and didactic. Teachers who held conceptual views about mathematics supported their instruction with technology. Teachers who viewed mathematics as a set of rules and procedures tended to avoid using technology.

*Comp, TKnw, TBlf, Tech (HS)*


High school learning disabled students were compared to age-level matched students and to mathematics-level matched students. The learning disabled students had much more difficulty with the estimation tasks than either control group.

*LD, Est (HS)*


Eighth-grade students in three middle schools were studied. Peer tutoring was compared to independent student practice. Significant differences from pretest to posttest were found for all groups. No significant differences were found between treatment groups or at-risk groups.

*Ach, Alg, PS, LD, Insv, D/R (MS)*


Problem-centered learning, designed to be implemented with elementary-age children was adapted for use with university students. The instruction was effective in improving students' conceptual understanding, anxiety, and confidence.

*Prsv, Lrng, Anx, Frac, Decm (TE, EL)*

The study models a procedure to extract instructional information from a minimal competency test in mathematics, using Yamamoto’s (1989) hybrid model. This procedure was applied to the data of 1600 ninth-grade students. The Hybrid model provided a better fit than another and provides instructionally relevant information.

**Curr, Impl, Plan, Assm, D/R (HS)**


College students enrolled in a statistics course were identified as believing either that ability in math is stable (entity theorists) or that ability in math is increasable (incremental theorists). This study tested an integrated model of students’ beliefs about the nature of ability and their subjective classroom experiences in different classroom situations.

**Blf, Styl, Lrng, Stat (PS)**


A case study (n=21) of a first grade classroom used activity theory to study students’ use of strategies to solve mathematics problems. The study failed to reveal any systematic pattern to students’ strategy use within or across problem-solving setting.

**PS, Lrng, Tchg (EC)**


The teaching of matrices, linear systems, and applications of linear algebra for pre-calculus students is discussed.

**Calc, Curr (HS, PS)**


This study documents the efforts of a teacher/researcher to learn to use computer algebra software applications as pedagogical tools through systematic self-study, clinical observations of secondary students (n=6) and collaboration with groups of preservice teachers (n=12).

**Comp, Alg, Prsv, Insv (TE, HS)**


Participants (n=50) constructed word problems and were interviewed regarding their understanding of fraction multiplication before and after a unit of instruction. The assumption that students who can multiply fractions have adequate conceptual understanding to teach the topic was not supported.

**Frac, Prsv, M/D, TKnw (TE, EL)**


Individual interviews (n=136) were used to examine performance on five problem types. Children in both grades understood and solved problems of all five types. They used the same procedures whether they were successful or not.

**PS, M/D, Arth, Ach (EC)**


Case studies of teachers were employed (n=5). During the study some of the teachers’ initial skepticism about the calculator’s usefulness was diminished. The new technology and curriculum were assimilated into the teachers’ normal practices. No major shifts in teaching role were detected.

**GCal, Calc, TBIL, Tchg, Cuff (PS)**


Fifth graders’ (n=39) journal entries were analyzed based on indicators in the evaluation goals of the NCTM Standards. Mathematical and nonmathematical dispositions, language forms used, changes in entries over time, and the impact of teacher responses were all examined.

**Writ, Comm, Mcfg, Att (MS)**

This case study focused on (n=9) teachers' professional use of observation as a natural assessment process. Conclusions clarify that (1) the use of observation as a credible assessment practice needs sustained staff development. (2) teachers as trained observers become empowered as professionals, and (3) teachers' beliefs have critical impact on their role as the primary assessor.


The study examined how children (n=26) partitioned sets in various fractional settings, the effect of arrangement on partitioning, and the construction of units formed by partitioning. Results suggest that children's intuitive image of division may not play as large a role as has been theorized.


The construction of “virtual geneses” is proposed based on the three differential vector operators: gradient, divergence, and rotation. These are used in an analogy to philosophies in mathematics education reform, and are thus presented as a framework for viewing mathematics teaching and learning.


The purpose of this study was to devise strategies for the improvement of Computer-Assisted Instruction (CAI). The strategies focused on the areas of students’ time on task, subjective feedback, and achievement scores.


The purpose of the study was to determine whether elementary school teachers (n=60) and their principals recognize that problem solving as presented in the NCTM Standards emphasizes process, in addition to product, and whether they agree on the role of problem solving.


Activities included classroom explorations and group work, projects, cooperative tests, and examination preparation sessions. Although positive results were seen from the use of cooperative projects, students did not develop the mutual interdependence hoped for through cooperative testing.


The independent and combined effects of gender, financial aid status, and teaching methods on learning styles, attitudes, and mathematics scores of first-year college students (n=64) was studied. These factors, separately, had no affect on performance but in combination did influence learning styles scores.


The study provides strong evidence that a unit such as the experimental one can, in the course of building a sound foundation of probability understanding.
effectively combat representativeness misconceptions (n=187).

Prob, Mscn, Rep (PS)


Grounded in developmental change theory, studies of schools in three rural school districts employed a survey of computer anxiety and efficacy and an analysis of a series of six teacher workshops. Defined as the extrinsic and intrinsic factors which affect a teacher’s innovation implementation efforts, the greatest first-order and second-order barriers, respectively, were lack of access to computers and lack of an instructional model.

Comp, Inv, TBf, TAnx, Lrng (TE)


Fourth and fifth grade high ability (n=27) students and their teacher participated. Seven students were traced on how they used both their invented representations and two structured representations: fraction strips and the ratio table. The target students did not impart the same meanings to structured representations as the curriculum developers and the teacher.

Rep, Frac (EL)


Instructional materials, written by the author, were applied in five- to ten-minute daily lessons for six weeks (n=146). Parent and student-tutor groups showed significant gains in achievement. Attitude measures provided inconclusive results.

Est, Ach, Att, Gend, Arth (EC)


It was concluded that the writing group was superior in written mathematical communication and that the writers showed greater reductions in math anxiety than did the non-writers. No differences between groups were revealed on standardized mathematics tests.

Writ, Ach, Anx, Comm, Assm, Alg (HS)


This study examines cognitive representation of arithmetic facts in the context of a single-case training study of an adult with developmental dyscalculia.

Rep, Styl, Arth, D/R (PS)


The effects of changing mathematical content/tasks, mathematical communications/discussion, and classroom environment on students’ attitudes was studied. Results indicated that using a constructivist teaching approach does positively influence students’ attitudes.

Att, Prsv, Curr, Lrng (TE, EL)


This study compared student achievement and attitudes between students enrolled in Applied Algebra I and students enrolled in traditional Algebra I. There was a significant positive change in the attitude of students from a low socioeconomic level in Applied Algebra I. No differences were detected in achievement nor for gender.

Ach, Att, Alg, Gend, Soc, Patt (HS)


One instructor used a Computer Algebra System (CAS), Derive (n=89), while another instructor used traditional methods of instruction (n=86). Results showed significantly higher achievement and conceptual understanding scores in the CAS group. Lower attitude scores of the CAS group were believed to result from the students’ attitude toward the extra time to learn a CAS.

CAI, Ach, Att, Alg, Comp (PS and TE)

Results of a statewide survey (n=266) indicated that teacher concerns were highest at the awareness and information stages and lowest on the consequence and management stages. Teacher characteristics which predicted four stages of concern are identified.


Chinese children were interviewed (n=98) and results were compared to studies of American and Genevan children. Findings indicated that all of these children probably go through the same developmental sequence of comprehending place value, but that the Chinese children formed the base-10 conceptual structure at an earlier age.


The significant predictors of college mathematics achievement were high school GPA, placement test scores, and algebra I GPA. Significant predictors of college program achievement were high school GPA, algebra I, participation in traditional articulation and dual enrollment (n = 287).


The study (n=36) specifically considered the acquisition of the concept of variable in fourth grade. A pattern enhanced experimental group outperformed a control group in its ability to generalize problem situations and showed higher levels of understanding of algebraic notation.


College preparatory students (n=130) enrolled in developmental mathematics participated. Eight factors were identified as possible contributors to underachievement in high school. The instrument developed was demonstrated to be a valid, reliable, and stable instrument for assessing underachievement.


Abilities needed to translate two dimensional drawings into three dimensional objects and to translate three dimensional objects into two dimensional drawings were examined.


This study employs structural equation modeling to explore students’ motivation within a developmental perspective. It examines how specific aspects of motivation, i.e., interest, importance, career relevance, perceived competence, and success attributions are related to students’ achievement in mathematics and science.


A time series design over four instructional units (n=17) showed no statistically significant difference in achievement between computer-assisted instruction and traditional methods of teaching.


The treatment consisted of calculus enhanced with labs utilizing Mathematica. A control group was taught using traditional methods. Students in the treatment group scored significantly higher on conceptual understanding and on traditional calculus questions.

No counting strategies were taught for addition or subtraction. Strategies were based around fives and tens. Manipulatives included a special abacus, overlapping place value cards, and pictures of ones, tens, hundreds, and thousands. Final interviews showed that the experimental class developed a multidigit concept of numbers (n=32).

The study was based on case studies of three students within an Algebra II class. Based on findings from clinical interviews, teaching episodes were designed. Students exhibited links between their understanding of the graph of a cubic function and the graphs of linear and quadratic functions.

The study determined whether, and to what degree, a formal curricular change process was followed by the school district. Persons with a role in the decision-making process were interviewed (n=9). It was found that the curricular change process was carried out as specified by the district.

Classroom with a View (CView) provided education students with opportunities to observe, discuss, and analyze classroom practice in a mediated environment. Observing several teaching styles encouraged students to abstract general meaning across examples of individual teachers' actions.

This study is an examination of student motivation and mathematics complexity with fifth, sixth and seventh grade. The results of the study suggest there are differences in the cognitive complexity of instruction and positive motivation between elementary and middle school mathematics classrooms.

Three students were selected for case studies. A set of indicators of conceptual growth was established utilizing ideas from the writing to learn mathematics literature. Further exploration of these indicators is needed to establish convincing theoretical links between conceptual growth and journal writing.

An experimental study examined the anxiety of eighth grade females and the effect of intervention strategies designed to decrease the level of anxiety. Effects of intervention strategies were not significant in reducing anxiety nor increasing performance.

**Anx, Gend. Ach (MS)**


The majority of the teachers (n=459) delivering the curriculum use it as a primary resource in public high schools that include grades 9 through 12. Based on this study's positive findings, continued use, evaluation, and refinement of applied or context-based curricula such as Applied Mathematics (CORD) should be supported.

**Curr, PS, Assm (HS)**


From various philosophical points of view, the study sought to initiate the process of identifying the rhetoric of mathematics as a distinct field of research. The three NCTM documents are not completely successful in the goal of encouraging teachers to change viewpoint. The study also examined the Standards as a movement.

**Phil, Comm, Rsch. Curr, Tchg, Assm (ALL)**

Duvall, Ardith Dale. (1996). *School districts’ per-pupil instructional expenditures and academic performance at the fourth-grade level in mathematics and reading as measured by the Kentucky Instructional Results Information System Assessment Program* (University of Kentucky) DAI-A 57(06), p. 2289, Dec 1996. [AAC 9633876]

In two groups of 30 school districts based on per-pupil instructional expenditures, there was a significant difference between the upper and lower brackets in reading and mathematics in 1991-92, but not between the brackets in either reading or mathematics in 1993-94.

**Assm, Arth (EL)**


A sample of volunteers (n=75) encountered open-ended problem solving tasks. Quality of diagrams and total number of diagrams drawn were good predictors of problem solving performance. The open-ended problem format resulted in higher quality diagrams and greater problem solving success.

**PS, Blf, Vis. Mtcg, Ach, Gend (PS)**


Two courses were randomly selected to be taught using algebra tiles. Content learning of polynomial multiplication increased significantly for community college students who received manipulative instruction over students who received traditional symbolic instruction (n=90).

**Manp, Alg, Rep (PS)**


Students (n=4) enrolled in a secondary methods course were the subjects of case studies. For teachers with essentially the same level of subject-matter knowledge, their knowledge and beliefs about the learner and mathematics are significantly related to their early instructional practices.

**TKnw, TBlf, Prsv,Calc, Tchr, Tchg (TE,HS)**


Abstract not available.

**Mtcg, Lrng, Styl (SE)**

The accuracy and response rates in verifying single-digit multiplication problems were studied. An interpretation of the results is offered in terms of Siegler's (1988) distribution of association model of arithmetic fact retrieval.


This study developed a teacher-efficacy model and examined the relationship between teacher efficacy (n=131), teaching strategies, and student outcomes (n=1475) in mathematics in Ugandan primary schools. The findings of the study suggest that teacher efficacy might influence teachers' beliefs about the use of instructional strategies and teaching behaviors.


This study is an effort to describe the emerging complexity of women's relationship with mathematics. Elementary school teachers (n=7) participated in the study, each contributing to the creation of her own mathematical biography through interviews, questionnaires and writing.


Children in a college laboratory school wrote “math stories” based on their everyday experiences. Children constructed schematic knowledge necessary to understand word problem structure across problem types, knowledge they did not have at the outset of the study.


Community college students enrolled in a developmental mathematics course were studied. The best predictor of the final grade was attendance (over post-secondary GPA, prerequisite course-taking patterns, class level). Required placement testing and attendance policies are recommended.
of arithmetic computational skills prior to the learning of more theoretical logical skills. Results indicated that computation did not significantly affect success in problem solving.

Arth, Lrng, Ach. Gend. PS (PS)


The sample (n=100) tested consisted of students in grades 6 through 8. Measures included a basic facts task, two estimation tasks, and a maze reading task. The study suggests that teachers can use simple, direct measures of performance to predict student proficiency in mathematics.

Arth, Assm, LD, Est (MS)


Two expert first-grade teachers using the Everyday Mathematics curriculum were identified, and their beliefs, knowledge, and instructional practices were analyzed. From the in-depth stories, recommendations of effective teaching strategies that support reform mathematics instructional goals are made.

Curr, Tchg, TBlf. TKnw (TE, EC)


A qualitative study (n=26) of gender perspectives of mathematics and science showed few gender differences, but provided information on the extent and sources of student interest. One of the most significant influences on student's interest in mathematics or science was the teacher.

Gend, Att, Tchr. TBlf (HS)


The effect of cooperative learning experiences on the self-esteem of seventh grade mathematics students was investigated. There was no significant difference on self-esteem between the treatment group (n = 20) and a control group (n = 20).

Grpg, Aff, Comm (MS)


Three case studies investigated field experiences of secondary mathematics pre-service teachers with respect to curriculum reform based on socio-cultural theories of learning. The impact of the program on the perspectives and development of the three student teachers and the three graduate student mentors was investigated.

Tchg, Curr, Prsv. Lrng (TE)


Results indicate that there was no correlation between seventh-and eighth-grade mathematics teachers’ (n=41) beliefs about the NCTM standards and the level of mathematics anxiety of their students(n=772). There was no significant difference in anxiety level between grade level.

Alg, PS, CAI (HS)


A computerized instruction program uses fundamental rules or formulas together with a series of questions as the main strategies enhanced by graphics, animation, and sounds to help students learn how to solve mathematics problems specific to uniform motion. Pretest and posttest mean scores were significantly different for ninth grade students (n=21).

Tchg, Curr, Prsv. Lrng (TE)


The purpose of this study was to investigate how advanced calculus students used visual representations while creating mathematical proofs. Students used visual representations in four ways: (a) to understand information, (b) to judge the truthfulness of statements, (c) to make discoveries, and (d) to write out ideas.

Teachers of secondary school mathematics (n=129) responded to a 12-item questionnaire. It was found that 66% of the respondents use manipulatives, but 79% do not use them during student assessment.

**Manp, Tchg, Assm (HS)**


Students' (n=645) solving processes of geometric activities whose underlying transformation is a spatial rotation were studied. Cognitive strategies were classified as decision, processing, and focusing. Spatial orientation ability depended on the students' capacity to successfully use one of these strategies.

**Vis, Geom, Lrng, Mscn (SE)**


The mathematics achievement and attitude of 63 precalculus students in single-sex and mixed-sex settings were studied in two simultaneous experiments (1, males; 2, females) over 28 weeks. Two teachers participated (A = male; B = female). Results indicate that the single-sex setting may improve female achievement. Results for males are unclear.

**Gend, Ach, Att, Grpg (HS)**


The study investigated the performance by adolescents (n=28), on a series of tasks with a strong spatial component not previously encountered in school. Playful, experimental students comfortable with drawing pictures and handling materials performed better.

**Vis, Gend, Manp (HS)**


A series of seven semi-structured interviews was conducted with elementary education students (n=8). The dominant concern participants had when thinking about teaching mathematics dealt with how they could get students to learn mathematics. Issues of reform-minded teaching were also considered.

**Prsv, TKnw, Plan, TBlf (TE, EL)**


The relationship of a technology enhanced curriculum, test scores and student motivation were explored. The group with the technology enhanced curriculum did not lead to higher test scores but did impact student motivation to learn mathematics.

**Tech, Ach, Aff (MS)**


Fifth-grade students (n=26) designed the software for use by younger students. Knowledge design as a process of constructing new knowledge via collaboration between teachers and students provided a framework for the study. Software was tested with the intended users after ten weeks of development.

**Comp, Knw, Lrng (MS)**


The study investigated the relationship of mathematics anxiety and mathematics preparation and related variables. The results had two significant correlations: mathematics anxiety increased with more years of experience and decreased as mathematics grade point average increased.

**TAnx, TKnw (EL, TE)**


This research analyzed young children's understanding of shape, specifically of triangle and rectangle, and defined patterns in the development of this understanding from ages three through six. Ten task-based individual interviews with children (n = 24) as they classified shapes were videotaped.

**Geom, Lrng, (EC)**
Dissertations Produced in 1996


Qualitative and quantitative methods were used to examine first-grade children's (n=6) concepts. The study suggests that children's meaning of the fractions can develop from a qualitative unit to a quantitative unit.

Frac, Lrng, Knw (EC)


A random sample of 7340 problems in 22 textbooks used in grades four, five, seven, and nine was analyzed. It was concluded that there are more similarities than differences between problems presented in the textbooks of the two countries.

CC, Matl, PS (K-12)


Students from four schools were divided into treatment and control groups (n=56). Significant correlations were found between mental rotations, math anxiety, and math concepts. Female students reported more math anxiety than male students.

Geom, Gend, Anx, Curr, Lrng (MS)


Data were collected from fourth grade teachers (n=6). Teacher beliefs were found to have profound effects on the implementation of innovations and on the way that the teachers interpreted other factors in their teaching environment.

Curr, TBlf, Lrng, Comp, PS (TE,EC)


A field studies design was used (n=40). From the original list of twelve reasoning characteristics, three showed gender-based differences while nine were found to be used by males and female students with the same or relative effectiveness.

PS, Gend Tchg (ALL)


Incongruence of conceptions of mathematics between the staff developers and the participants created a mismatch in objectives and purposes. The critical role of content knowledge in how an innovation is valued and implemented is demonstrated.

Insv, TKnw, TBlf, TAtt, Curr (MS,TE)


This study compared computer-assisted instruction with the traditional lecture and drill-and-practice, to teach remedial mathematics skills at the secondary level. The results suggested that students using computer-assisted instruction achieved at a higher level than those students using the traditional instruction.

CAI, D/R, Frac, Whol, Decm (HS)


Computer science teachers (n=25) were surveyed to investigate how much computer programming they teach and their opinions of the role of computer programming in mathematics curricula. Teachers who teach programming believe their curricula enhance mathematics learning more than do mathematics teachers who do not teach programming.

Comp, TBlf, Tchg, Curr (HS, TE)


The three settings included the host site, the remote site, and a traditional classroom setting. No significant differences in mathematics achievement were found among the three developmental algebra groups. No differences in student attitudes toward enrolling in a future televised course were found.

MMed, Att, Ach, D/R, Alg (PS)

High school students were tested under two time conditions, standard or extended time, as well as two test formats, multiple choice or open-ended on the Scholastic Aptitude Test. Male students were more likely than female students to successfully use algorithmic strategies on conventional items and intuitive strategies on unconventional items.

**Ach, Gend, Assm (HS)**


This is a study of student perceptions of achievement, in three algebra II classes. Expectation for success or failure is a primary concern throughout the study. Mathematical anxiety was seen as the participants’ initial concern, which was reduced by a comfortable classroom climate.

**Ach, Alg, Blf, Aff, Anx (HS)**


The purpose was to study the mathematical teaching activities of fifth grade Japanese elementary school teachers through classroom observations, interviews, text book analysis and other data collection in and around Tokyo, Japan. What type of mathematical pedagogy and environment create an effective mathematics classroom?

**Tchg, Ethn, CC (MS)**


This qualitative study blended constructivism as a theory of learning and phenomenology as a philosophical framework. Teacher beliefs included using a variety of instructional approaches, providing for individual differences, and creating a positive environment. Some inconsistencies between beliefs and actions were observed.

**TBlf, Tchr, Lrng (EC, TE)**


Underlying deficits in arithmetic ability in children with Tourette’s Syndrome (TS) were explored. Visuospatial and attentional measures significantly predicted math performance for TS children (n=54); only visuospatial measures were significant predictors of arithmetic for the control group (n=25).

**Arth, LD, Vis (K-12)**


Students (n=6) participated in a unit on functions from the Mathematics in Context curriculum. Tasks included solving realistic problems and working with tabular data. It was found that students’ informal knowledge about functions could be attributed to ideas of dependency.

**Rep, Knw, PS, Curr, Lrng (MS)**


Four preservice teachers who had different mathematics backgrounds and contrasting beliefs about mathematics were selected for the study. The study revealed that life histories and previous experiences in mathematics were significant in indicating those preservice teachers who were willing to change in accordance with the reform movement.

**Prsv, TKnw, TBlf, RaPc, Curr (TE)**


In a large, suburban district, two schools were described by their principals as outcome-based and two were described as traditional. Analyses of student achievement and teacher level of Outcome-Based Education (OBE) practice provided limited support for a positive relationship between the implementation of OBE and student achievement in mathematics.

**Curr, Ach (HS)**
It was concluded that current GPA was the most influential factor predicting achievement. Attitude was the next most influential variable predicting achievement followed by learning strategies and then learning style. Attitude, time-on-task and age correlated with other learner variables.

Stat, Ach, Lrng, Att, Styl (MS)

The study was conducted at a two-year technical institute (n=961). Multiple regression showed spatial visualization, gender, and number of math courses taken had a significant effect on course grade. Higher-level courses produced higher spatial visualization scores.

Vis, Gend, Ach, Calc, D/R (PS)

Fourth-grade students in four elementary schools were studied and the treatment was compared to textbook instruction. At each of three posttest measures, the treatment group’s achievement was significantly higher than the control group.

Frac, Ach, Manp, LD, Insv (EC)

This study investigated differences in mathematical problem solving between males and females (n=37) in algebra. The first strategy used by a majority of males was to select a variable and create an equation, while females’ first choice was a trial and error strategy.

Gend, PS, Alg (PS)

This study investigated differences in mathematical problem solving between males and females (n=37) in algebra. The first strategy used by a majority of males was to select a variable and create an equation, while females’ first choice was a trial and error strategy.

Gend, PS, Alg (PS)

This study investigates the possible relationship between the acquisition of similar skills in mathematics and reading in kindergarten (n=71). The study showed no statistically significant correlational link between counting and corresponding reading tasks.

**Patt, NSns (EC)**


Students in the experimental group received thirty minutes of computer-assisted instruction each week in addition to their regular classroom instruction. No significant difference in achievement was found in comparison to the control group (n=171).

**CAI, Ach (EC)**


The quantitative and multi-case study examined teacher change and student performance when implementing an innovation. Six teacher participants, in three settings, taught problem-solving and assessed their students with a mathematics scoring rubric. Teachers and students generally agreed that the rubric contributed to improved student performance.

**Assm, PS, Ach (Not given)**


Students' perspectives about mathematics and about themselves as learners and doers of mathematics in relation to their social and cultural backgrounds and the social context of the classroom were investigated. Teachers must become aware of and act upon the social and cultural issues relevant to students.

**Ethn, Lrnr, Blf, Alg, Tchg, Aff (PS)**


Six graduate teaching assistants taught a first semester engineering reform calculus class using collaborative learning. There were statistically significant relationships between students' final examination scores, students' perceptions of collaborative learning, and the class section. Instructors' perceptions of collaborative learning were mixed.

**Calc, Grpg (PS)**


The study examined students (n=134) in grades 9-12 enrolled in resource room, cluster class, self-contained, and comparison groups. The mean grade level score for non-LD students was one full grade level higher than LD students in mathematics achievement.

**LD, Ach, Arth (HS)**


The study investigates the pedagogical ideas of Guatemalan mathematics teachers. In spite of the repression that characterized Guatemala, the teachers demonstrated surprising control over their pedagogy which was greatly impacted by their students' expectations and successes.

**Tchg, TKnw, Ethn (TE)**


Two case studies of students in a summer instructional program are presented. A mismatch between teachers' and students' perspectives was found. A two-part framework is proposed for examining students' thinking that separates functions from functional relationships. Students attended principally to the representations themselves and only implicitly to functions.

**Calc, Knw, Rep, Lrng (HS)**


Graduates from two schools (n=735) were studied to examine patterns of enrollment and achievement from grade one to postsecondary placement. Although males and females were equally represented in advanced level mathematics in grades nine and ten, females did not tend to persevere afterwards.

**Ach, Curr, Gend, Soc (HS)**

A set of written tasks were given to participants (n=40), 16 of whom also participated in pair problem solving and interview tasks. It was found that preservice teachers hold qualitatively different conceptions of probability that largely depend on contexts determined by tasks and settings.

Prsv, Prob, TBIf, PS (TE, SE)


The differential effects of unity-balance treatments on effort, worry, and math achievement were studied. Visualization and short-term memory were also measured. Evidence for an achievement effect was suggestive but not significant. Effort was significantly related to achievement; worry was not.

Comp, Ach, Anx, Vis (Level not given)


Although all teachers (n=6) in the study had integrated into their practice teaching strategies associated with the math reform movement, the majority of these teachers maintained a transmission mode of teaching. Beliefs and practices that distinguish the transmission style of teaching from teaching for understanding are identified.

TBIf, TKnw, Tchg, Curr (PS, TE)


Sixth graders participated in the mathematics achievement phase (n=454) and the mathematics anxiety segment (n=430).

Students instructed with incremental development texts had lower levels of anxiety and higher levels of achievement. There was no gender difference in achievement. Females had slight, significantly higher levels of mathematics anxiety.

Ach, Anx, Matl, Gend (MS)


Students in a beginning statistics class (n=5) were observed and interviewed. The calculator's authority seemed to be heightened when students had repeatedly solved similar problems using the technology. A connection was also found between the authority of the instructor and that of the calculator.

GCal, Stat, Blf, Rep, Tech (PS)


The study focused on the instructional use of three heuristic sets: Polya's Problem Solving Plan, Directed Inquiry Activity, and K-W-L (n=138). Instruction was for three weeks. Subjects in the K-W-L group outperformed subjects in each of the other two groups on all problem types.

PS, Curr (EC)


The primary purpose of the study is to research ways of enhancing the content, presentation, and methodology of a course in mathematics for early childhood and elementary education majors and to continue the evolution of the course.

Curr, Tchg (TE, EL)


The study investigated one mathematics classroom of an urban high school in terms of complexity during the period of preparation: the roles of the students, and the role their teacher played. Results indicated students are not passive recipients of teacher instruction but are active interpreters of the classroom environment.

Ethn, Ach, Assm. Lrng (HS)

The goal of instruction in eighth grade was for small groups to create statistics projects that addressed a meaningful research question. The effectiveness of elaborating on criteria through examples (library) or through the text was considered. Students' understanding of sampling was significantly better as a result of receiving the library treatment.

Stat, Tchg, Assm, Curr, Lrng (MS)


The dissertation describes the evolution of the teaching of arithmetic in French Canada between 1800 and 1920.

Arth, Curr (EC)


The program studied Chapter I students studying reading and mathematics. Participating Chapter I males assumed the profile of non-Chapter I males during posttests in reading and math. Participating Chapter I females showed significant gains in mathematics.

Assm, Ach, Gend, Soc (EC)


The main sources of data were observation, interviewing and subjects' written assignments (n=3). Participants built strong procedural and conceptual knowledge and connected them appropriately through computer explorations.

Prsv, Comp, Lrng (TE)


Third and fourth graders (n=62) studied multiplication and English language with instruction in English. An integrated approach (treatment) was compared to teaching the disciplines separately (control). Both experimental and control groups significantly improved their scores in language and multiplication, but differences in improvement between groups was not significant.

IC, M/D. Ach (EC)


Abstract not available.

CC, Ethn, Soc. Ach (Not given)

Lemoine, Claudine. (1995). Modeliser à l'aide d'une fonction: Compétences et conceptions des élèves qui entreprennent le premier cours de calcul différentiel et integral au collégeal (Universite de Sherbrooke). MAI 34/03, p. 955, Jun 1996. Language: French. [AAC MM04501] [Title in English: Modeling with the help of a function: Competencies and conceptions of students beginning the first course of differential and integral calculus at the college level]

Conclusions include that students entering college calculus have not mastered the entire scheme of modeling a real function in a real variable, but they do possess some elements of the scheme. These results may aid in prescreening tasks necessary for developing a first calculus course.

Calc, Rep, Knw (PS)


Forty-seven female students participated in a study based on the assumption that cognition and technology converge to activate powerful brain potential. Significant differences were detected in geometric conjectures but not in achievement. The results indicate that students learn geometry skills with greater efficiency and understanding with Geometer's Sketchpad.

Comp, Geom, Lrng. (HS)

The software package Learning Logic was used in high school algebra by the experimental group. A significant difference was found in student enrollment in higher mathematics classes favoring students in the experimental group. Significant differences in posttest performance were found for gender, ethnicity and socio-economic background.


A major finding was that children (n=12) believed that fractions are whole numbers. They used whole number thinking to describe what a fraction is and in finding equivalent fractions. Teachers should take children’s previous knowledge of whole numbers into consideration as they provide them with fraction experiences.

Frac, Whol, Blf, D/R (EC)


Fifty fourth and fifth grade students completed both kinds of assessment measures. Participants achieved significantly higher levels of performance using the hands-on instrument than they did using paper and pencil instruments.

Assm, Knw, Manip (EL)


Students (n=7) who demonstrated difficulty in fraction and decimal comprehension were trained in 24 conditional relations. Posttest performance indicated the emergence of 48 new relations, implying the emergence of 12 stimulus equivalence classes.

Frac, Decm, Eqv, Lrng (MS)


The mathematics anxiety levels of the preservice elementary teachers (n=112) were reduced after completing the course. Self-efficacy expectations were found to be important in the reduction of mathematics anxiety.

TAnx, TAtt, Prsv. Tchg (TE, EL)
negative affect on both self-regulated learning and achievement.

Ach, Anx, Blf, Lrnrt, Aff, Att (HS)


The prealgebra approach presented algebra concepts early in the semester. Four classes were assigned to each instructional approach. Although no significant differences in achievement were found, prealgebra students appeared to have a better understanding of beginning algebra.

D/R, Alg, Arth, Ach (PS)


A single-session, personalized short story was an effective method for raising learner precepts of mathematics self-efficacy (n=104). There were no effects on mental computation. Further testing of social cognitive theory is proposed.

Comp, Att, Arth, Att, Lrng (MS)


Third-grade students (n=6) were trained to use two arrangements (individual and tutoring) to practice mathematics facts. Choice and no-choice conditions had little effect on students' behavior. Preferred and non-preferred conditions resulted in higher rates of facts completed correctly.

LD, Ach, Arth, Grpg (EC)


The participants saw the rationale for change as suspect, saw selected components of the new program as problematic, and were apprehensive when trying to implement a curriculum based upon constructivism. Challenging teachers' attitudes was seen as an integral part of teacher development.

Curr, TAtt, TBIf, Insv, Tchg (EC, TE)


The achievement of first graders using manipulatives (n=590) and utilizing a traditional approach (n=515) was compared. Interrelationships among method, race, gender, and socioeconomic status were considered. Differences were detected, and the assumption that manipulatives are best for all students needs further study.

Curr, Manp, Ach, Gend, CC (EC)


The reliability and validity of four performance assessment tasks on the Mathematics Problem-Solving Assessment (MPSA) were examined, accounting for gender and ethnicity. Generalizability studies indicated that only a small percent of variance in students' scores (n=101) could be attributed to universal score (true score).

Assm, Ach, PS, Gend, Ethn (MS)


The Van Hiele test appeared to be the best predictor of geometry achievement. The individual differences theory was found to be the best predictor of overall success (combining achievement, proof, and problem solving). The cognitive development stage (Piaget) assigned to a subject was a moderate predictor of geometry performance (n=252).

Geom, Ach, Prf, PS, Lrng, Phil (HS)


A first-grade teacher guided the development of mathematical argumentation, redescribing students' interpretations and solutions, and acknowledging the role of imagery in discourse. Analysis of student interviews indicated that students' mathematical development during the year was substantial.

Tchg, Oral, PS, Comm (EC)
A written test and interviews were employed to study students' understanding of limits, differentiation, and integration. Students studying the traditional curriculum (n=10) had greater understanding of the limit concept and on conceptually-oriented items, while C & M students (n=16) were more successful at problem solving.


Statistically significant results were obtained (n=97) relative to the relationship between parent involvement and each of reading and mathematics achievement.


A qualitative study explored methods of teaching mathematics that encourage student decision-making.


This teaching experiment employed a pretest and post-treatment interviews of secondary students identified as high-, mid-, and low-achieving. The experimental unit was based on the model of understanding by Herscovics and Bergeron, and lasted 1-1/2 months.

Monticelli, Carla A. (1996). Effects of using the graphing calculator as compared to the scientific calculator on achievement and attitude in college algebra (Temple University). DAI-A 57(03), p. 1066, Sep 1996. [AAC 9623791]

There was no significant difference between the adjusted means for subjects in the graphing calculator group (2 sections) and the scientific calculator group (2 sections) in college algebra achievement, attitude toward mathematics, or attitude toward calculators.


Four algebra curricula from England and Russia were considered along with two age groups. Analyses revealed profound cross-cultural and cross-curricular differences in students' algebraic reasoning for both age groups.

CC, Alg, Curr, Knw, Prf, Lrng (SE)


Students (n=49) were randomly assigned to two groups. After nine weeks of instruction, mean posttest achievement scores of the cooperative learning group were significantly higher than those of the whole class group.

Grpg, Geom, Ach (HS)


Data was categorized into three areas: student effects, teacher effects, and student and teacher effects. Ten outcomes of writing are identified, including the promotion of student comprehension, the facilitation of student-teacher dialogue, and the promotion of alternative assessment.

Writ, Alg, Comm, Assm, Mtcg (PS)


High school geometry students (n=59) in the treatment group viewed videotapes of the teacher being coached by an assistant principal. No significant difference was found between treatment and control groups in their ability to solve geometry problems and in their use of metacognition.

Mtcg, PS, Geom, Blf (HS)


A research project engaged teacher and students in the use of journal writing to inform a fifth-grade teacher's efforts toward promoting mathematical dispositions in her students and toward the teacher's self-analysis and personal growth in an effort to improve instruction.

Writ, Lrnr, Tchg, Tchr (MS)


The study explored high school teachers' knowledge prior to and as a result of a summer institute on mathematical modeling with discrete mathematics (n=40). Overall, teacher's knowledge of recursion grew as a result of the in-service intervention.

DscM, TKnw, Insv, Rep (TE,HS)


This study explored the teaching processes in mathematics education for adults and how they are shaped by certain social and institutional forces. The teaching of mathematics was dominated by the transmission of facts and procedures, and largely consisted of repetitive activities, problems, and tests.

Tchg, Tchr, Curr, Soc (PS)


A study of the development of algebraic language in a first-year high school algebra class. The study describes the algebra class from the perspective of the students as they work with signed numbers, translate words into algebraic language, and solve equations.

Alg, Lang (HS)


Data acquisition consisted primarily of field work and interviews with the instructor and six of the students. Students perceived the course as an obstacle they must overcome to take the courses they wanted. The course tried to accomplish too much for the amount of time allotted.

Calc, Att (PS)


The Touch Math method of instruction was examined in count-all addition procedures (n=4). The intervention was successful for the teaching of simple addition.

LD, A/S, Manp (EC)

Gender and enrollment status were significant factors in the science attrition model, but cumulative grade point average did not demonstrate a significant causal link toward leakages (n=258). Students who switched out of science had higher cumulative grade point averages than those of the science persisters.

**Ach, Aff, Gend (PS)**


The results of the study showed that the sixth grade students (n=25) learned about proportions by using the CAI game, and the students' attitude towards learning by CAI was highly positive.

**CAI, RaPc, Att, Comp (K-12)**


Using a regression analysis for each of the African-American, Hispanic, and White racial/ethnic groups, gender, mathematics self-efficacy, and ethnic identity were entered as predictor variables on the criterion variable, math/science career interests. Mathematics self-efficacy contributed significantly to the variance for each of the three racial/ethnic groups.

**CC, Gend, Aff, Ethn, Styl (HS)**


Academic records of university students (n=498) were examined. Results indicated that remediation did not influence students' grades in subsequent math courses and students' high school math performance and GPA were reliable predictors of performance in university-level math courses.

**D/R, Ach, Gend (PS)**


A group of 42 prefreshman students majoring in science and engineering was compared to two groups (n=1271) who did not participate. Enrollment rates in entry-level mathematics courses were higher for program participants, but successful course completion rates were lower.

**IC, D/R, Ach, Calc, PS (PS)**


Four teachers and five classes grade 10 and grade 11 used Zap-A-Graph as a tool for graphing and transforming functions. Students found using the software fast, accurate and easy, and teachers liked the variety.

**Alg, Comp, Matl (HS)**


Participants in the study were 262 undergraduate college students, 47 of whom were preservice elementary teachers. Mathematical subject matter knowledge positively correlates with mathematical beliefs, and mathematical beliefs positively correlate with opinions on calculator use in elementary school.

**Knw, Blf, Ctr, TKnw (PS, TE)**


The purpose of this study was to examine how parents participated in the reform of high school mathematics, and what factors affected parental involvement. The study found that teachers viewed parents as not understanding their mathematics programs and they relied primarily on traditional forms of communication to involve parents.

**Curr, Tchr, Soc (HS)**


Computer-assisted instructional software was developed by the author for a group of high school algebra students to learn the Pythagorean Theorem. Instruction resulted in a successful transfer of knowledge and a high level of interest in the subject.

**CAI, Alg, Geom (HS)**

The study was based on the NCTM curriculum and teaching standards. Variables which promoted the development of an understanding of mathematical power in the student teachers included discourse about challenging mathematical problems and modeling of the pedagogy of cooperating teachers.

Prsv, TKnw, Curr, Tchg, Lrng, PS (TE)


This study explored the personal histories of four practicing school mathematics teachers in order to gain insight and a holistic understanding of the cognitive, affective, and social processes involved in their lives that relate to the development of their views about the nature of mathematics and how to teach it.

Tchr, Insv, Aff, TKnw, TAtt, TBIf (TE)


This study investigated 28 preservice teachers' involvement in a ten-week long e-mail project linking them with elementary students in a mathematical problem solving activity. Three preservice teachers with high levels of mathematics anxiety and three with low anxiety were selected to be examined in case studies.

Tech, PS, Prsv, TAnx (TE, EL)


A four-year study evaluated subjects' ability to solve addition problems with sums no greater than nine. The subjects progressed in a manner similar to nondisabled children with regard to strategies, order of strategy development, error patterns, and order of number pair memorization.

A/S, LD, Whol (EL)


This study analyzed the reformulation of complex additive problems following the first reading of the problems, and sought to determine which elements of a problem are reformulated and what relationship exists between the reformulation and the solution. Results indicate differences by grade level and ability.

PS, Arth (EC)


A naturalistic teaching experiment (n=8) sought to determine students' modes of reasoning and how these modes relate to the rules of mathematical discourse. Although students used plausible reasoning, their attempts to operate within the constraints of mathematical discourse were often immature.

Prf, Phil, Mtcg, Calc, (PS)


Data from "think-aloud" sessions were compared with data from students' journals in a ninth-grade algebra class (n=20). The value of using journal writing to characterize problem solving was demonstrated. Students using journals also had significantly greater success in correctly solving problems.

Writ, PS, Alg, Mtcg (HS)


The study determined whether children (n=3) could be taught to add pairs of single-digit numbers using the Touch Math method. The children were able to master the program and to retain the Touch Math method from 1 to 5.5 months afterwards.

LD, A/S, Manp (EC)


The study examined the effectiveness of a computer assisted instruction (CAI) program on student achievement in algebra in seventh grade (n=30). The results indicate that the subjects demonstrated a significant gain in achievement.

CAI, Ach, Alg, Comp, Curr, Assm (ALL)

Dissertations Produced in 1996

The study featured collaboration by university staff with classroom teachers and representatives of the intended end-user group, eighth-grade students and their parents. The process, more conceptual than procedural, was driven by the designers' belief in the efficacy of utilizing a video trigger (video-based mathematics homework materials) to motivate a mathematical activity.

**Rep, Curr, MMed (EL)**


Each case study (n=4) includes a description of the teacher's background on learning about the Standards, unifying themes that emerged from the data collected, and constraints that the teacher believed interfered with his/her implementation of the Standards.

**Curr, Tchr, TBIf, TAtt, Lrng (SE)**

Redden, Lolan, Jr. (1995). *Attitudes toward mathematics of prospective primary teachers at Cumberland College who have completed a mathematics methods course as compared to those who have completed a first concepts course* (University of Tennessee). DAI-A 56(08), p. 2989, Feb 1996. [AAC 9540115]

Students taking the methods course had already completed two prerequisite concepts courses. The methods group entered the semester with significantly more positive attitudes than the concepts group. The methods group showed a significant decline in attitudes by the end of the semester (n=44).

**Prsv, Att, TKnw (TE,EC)**


Students in grades two and five were studied. Problems dealt with arithmetic, geometry, and measurement. Many grade-five students experienced difficulty with algorithms and concepts, even those to which they had been exposed three years earlier.

**PS, Arth, Geom, Meas (EL)**


Whole-class instruction, small-group interactions, and student-parent conversations of elementary school students were examined to trace the development of students' ideas, strategies, and answers. Students' conversations at home often had a greater influence than those in school.

**Comm, Soc, Lrng (EL)**


This study investigates the effect of homework on achievement in precalculus. The sample consisted of 351 United States Air Force Academy cadets (experimental n = 161, control n = 190) in their first semester of college.

**Calc, Ach (PS)**


Three groups of high school students participated (n=59): control, multiple representations, and dynamic linked multiple representations. Instruction with multiple representations tended to show larger effects on a retention test that on an immediate posttest.

**Rep, Calc, Ach, Tech, Lrng (HS)**


Demographic factors included mathematics background, student status, and equity and access to mathematical opportunity. A positive correlation existed between number of high school math courses completed and V.H. level. Equity and access were not significantly related to V.H. level.

**Prsv, Geom, Soc, Ethn, Gend, Ach (TE, EL)**


Relationships among students' (n=158) spatial visualization ability, mathematical ability, and problem-solving strategies with and without the use of the software were examined. Computer availability was not a significant factor for performance on a locus-motion inventory.

**Geom, Comp, PS, Ach, Vis (HS)**

Concept-based instruction, utilizing manipulatives and discourse, was compared to symbolic instruction which emphasized algorithmic approaches. Concepts studied were limited to perimeter, area, and volume. The concept-based approach was found to be the superior method of instruction.

Algebra, Achievement, Ethnicity, Manipulatives, Writing, Attitudes (MS)

Rosenberg, Carolyn. (1996). The relationship between the New Jersey mandate to provide all students with calculators during the administration of the grade 11 high school proficiency test in mathematics and calculator use in mathematics classroom instruction in New Jersey public high schools (Seton Hall University). DAI-A 57(03), p. 1067, Sep 1996. [AAC 9623160]

Teachers (n=155) view the differences in calculator use in mathematics curricula, instruction, and assessment uniformly across socioeconomic level and school. In contrast, students (n=4,801) view the differences in calculator use as being related to socioeconomic level, school, and teacher.

Mathematics, Calculator, Socioeconomic Status, Curriculum, Assessment (HS)


Elementary and secondary teachers and paraprofessional staff (n=49) took programs in the use of computer-based technology. The results indicated that the best predictor of either computer anxiety or success in staff development programs is self-reported persistence level scores, followed by previous inservice and computer experiences.

Computer, Technology Anxiety, Inservice, Technology Attitudes (TE)


The study describes the design of an innovative Logo environment, Turtle Math. Based on the results of field tests, the Turtle Math environment had a positive effect on students' motivation to engage in most goal behaviors.

Technology, Geometry, Attitude (EL)


Students' verbal accounts of their problem solving processes involving various graphics (such as pictures, tables, etc.) were analyzed to determine the relationship between these graphic representations and the problem solving process itself, and to determine whether the graphics were helpful to or inhibitive of the process.

Representation, Problem Solving (SE)


Preservice teachers' reported conceptions of geometry were not always consistent with what they did in the classroom. Their conceptions about geometry and their belief that geometry was linear in nature were so strong that these views became connected with their views of teaching geometry.

Preservice, Geometry, Teaching Beliefs, Teaching (TE, SE)


This research was an assessment of a five-year teacher development project in mathematics for teachers of grades one through six. A guiding question was whether students taught by project teachers performed better in classroom problem-solving and task-based interviews than students taught by non-project teachers.

Inservice, Teaching, Teacher, PS, Learning, Assessment (TE, EL)


Contrasting a behavioral instruction format and a traditional lecture-discussion format among psychology majors, measures of statistics anxiety, mathematics avoidance, and attitudes toward mathematics were obtained at the beginning and end of the semester (n=86).

Statistics, Anxiety, Attitude (PS)


Students' verbal accounts of their problem solving processes involving various graphics (such as pictures, tables, etc.) were analyzed to determine the relationship between these graphic representations and the problem solving process itself, and to determine whether the graphics were helpful to or inhibitive of the process.

Representation, Problem Solving (SE)
Dissertations Produced in 1996


A CAI intervention was compared to a traditional intervention and a cost-effectiveness analysis was also performed. No significant difference was found on test performance. CAI math was about six times more costly than the traditional intervention per point gained on the proficiency test.

CAI, Ach, Gnd, Ethn (HS)


Treatment and comparison groups (n=49) both focused on the knowledge needed to represent and solve problems, but the comparison group approached representation less systematically. The treatment group practiced cognitive strategies of problem representation applied to three mathematical structures. Results support the use of an integrated approach to daily instruction in problem solving.

PS, Rep, Lrng (PS)


Two regular educators, nine mainstreamed students, and 50 regularly assigned students participated. The performance of all students improved in rate and accuracy of verbal responses and written responses. Once teachers demonstrate proficiency in its use, direct instruction becomes viable in the integrated classroom of students with or without disabilities.

LD, Ach, Tchng, Curr (EL)


Community college students' (n=251) tolerance of ambiguity, belief in commonly held misconceptions about the nature of mathematics, mathematics self concept, and math anxiety were examined. Relationships between these variables and GPA, gender, age, race, and ethnicity were explored.

Anx, Att, Blf, Gnd, Ethn, Msxn (PS)


A discourse group and a writing group were selected and assigned geometric tasks. The students were better at communicating their understanding through speaking than through writing. It is suggested that a verbal math communication assessment be included in grade four.

Assm, Oral, Writ, Geom, Knw, Comm (EC)


An analyses of ten videotaped eighth-grade mathematics lessons from Japan and the United States was implemented. Results from the observation and analysis of these cross-cultural data suggest three important factors crucial to on-line assessment and to teaching for understanding.

Comp, Assm, CC (MS)


The case study provided an in-depth look at the evidence gathered by one middle school teacher. Tracking growth in a student’s knowledge requires a shift in perspective toward an increased awareness of specific indications of the student’s knowledge, away from the class as a whole, and the opportunity for the teacher to reflect and make inferences about growth.

Assm, Curr (MS)


The study investigated the relationship of learning modality strength and mathematics achievement of 90 ninth-grade students in one rural school. The teachers in this study were not successful in identifying learning modality strength detected by an instrument by observing student behavior.

Ach, Styl (HS)


Students in the experimental groups watched a videotape of a seventh-grade student solving a problem before attempting a related problem. All of
the students receiving this treatment developed a more complete global problem-solving plan and used a more advanced strategy in solving the related problem (n=34).

PS, Tech (MS)


Teachers, counselors, and students were surveyed and interviewed. The study identified a heavy reliance on standardized testing in placement.

Assm, Grpg, Curr (MS)


A quasi-experimental study of 15 schools with 40 fifth-grade classes was conducted. Treatment group teachers were trained to use self-efficacy instructional strategies while teaching a four-week unit on measurement. Students of teachers using these strategies had significantly higher self-efficacy scores.

Att, Ach, Insv, Gend, Meas (MS)


Sixth and eighth grade students (n=128) participated. Instruction with the computer microworld was compared to instruction with concrete manipulatives and to instruction using both manipulatives and the microworld. The microworld was generally found to be the most effective teaching method.

Int, Comp, Manp, Knw, Lrng (MS)


For a sample of 85 students who completed a course in intermediate algebra, scores on a basic algebra test are highly valid predictors of success in the course. The two affective measures and gender contribute neither statistically nor practically significant increments to the validity of placement.

Alg, PS, Anx, Gend, Aff, Assm (PS)


The study focused on a veteran teacher making the transition from traditional teaching methods to methods consistent with mathematics education reform. Three dilemmas were identified: ensuring student success, portfolio assessment, and the role of teacher as facilitator.

Insv, Tchg, Curr (MS, TE)


Data related to students' (n=112) solutions and tool use were collected from a group survey instrument. Tool use reflected the instruction students had received. As student level of confidence and achievement increased, the use of mental and written computation increased and calculator use decreased.

Cltr, Mtcg, Ach, Aff (MS)


An undergraduate course in problem-solving through writing was developed, which is responsive to the recommendations of the National Council of Teachers of Mathematics Standards for Teaching Mathematics and the Mathematical Association of America report (Leitzel, 1991) which includes recommendations for the preparation of teachers of mathematics.

PS, Writ, Prsv (TE, HS)


The results of this study could be useful in constructing computerized tutorials on performing mathematical operations using rational numbers in fraction form. Its methods may also be used to develop error profiles for other mathematics objectives (n=370).

Frac, Mscn, D/R, Comp (SE, PS)

The primary purpose of this quantitative/qualitative study was to study three calculus teaching methods, Project CALC, Revised Illinois Project, and (c) the traditional course. Overall the Project CALC students had a better understanding of series and derivative. Students from the other two methods did better at explaining convergence.

Tech, Calc, Lrng, Att (PS)


An exploratory study was conducted to gather data on teachers’ personality parts and the mathematics anxiety levels of their students. Fifth and sixth grade Greek Cypriot teachers (n=148) and their 3,891 students. None of the teachers’ personality structures were found to be related to students’ math anxiety levels.

Anx, Pers (MS, TE)


The study hypothesized that using metacognitive questions and varying verbal interaction in instruction can effect problem solving achievement. No significant effects (n=81) were found.

PS, Clln, Lrng, Alg, Comm (HS)


Students taught by nontraditional instructional methods (inductive reasoning, computers & group work), performed better on applications and held a more positive attitude towards geometry. Traditionally instructed students had higher scores on geometry concepts (n=204).

Geom, Ach, Att, Comp, Grpg (HS)


Priorities for action in the classroom are particularly sensitive to situations, contexts and individual needs which exist within the classroom. The teacher’s past experience, belief system and practical knowledge of the classroom nearly always take precedence over theory.

Calc, Lrng, Blf (PS)

A curriculum based on the NCTM Standards was introduced in a school for students with learning and social disabilities. Although the project was not without difficulties, it became evident that students were capable of learning non-traditional and often complex mathematical topics.

**LD, Curr, Comm, PS, Grpg (Not given)**


Third-grade children were given extensive practice quantifying computer-generated arrays of blocks that were either (a) random and varying from trial to trial, or (b) non-varying and canonically-organized. Results showed significantly greater gains for the group exposed to canonical non-varying block arrangements.

**Rep, Arth, Lrng, Manp (EC)**


The author describes her experiences teaching a course for elementary and middle school education majors. She reflects and theorizes about curriculum, dialogue, and methods classes. The metaphor of a journey is applied with "new views" and "stopping places" as an organizing image for theoretical insights.

**Insv, Tchg, Oral. Plan, Phil (EL, TE)**


Computation and spatial sense skills of students in grades 2-5 were considered utilizing Base Ten Blocks and attribute shapes. Significant differences for computation were found for students who used both manipulatives and software. Spatial sense had no significant results.

**Comp, Manp, Lrng, Vis, A/S, M/D (EL)**


Test item formats considered were multiple-choice versus short-answer. Answers to certain basic arithmetic concepts was found to provide better predictive results that the complete test score. The short-answer item format was found to be a better predictor of student success.

**D/R, Assm (PS)**


An investigation of the beliefs and practices of a teacher in the building of mathematical understanding in the classroom resulted from a university/school collaboration. The study revealed that the teacher demonstrated an increased awareness and understanding of learning and teaching, resulting in positive changes in practice and beliefs.

**Insv, Tchg, TBif, Lrng (EC, TE)**


The skills of (n = 66) third-grade students, 26 mathematics disabled (MD) and 40 academically normal children were measured. The results indicate that the math disabled children display a memory deficit.

**LD, Knw, Lrng, Styl, A/S (EL)**


The similarities and differences across six state curriculum frameworks were examined, focusing on four broad areas: purposes, processes used to develop, content characteristics, and the connection of systemic reform elements to the frameworks. The state curriculum frameworks have sparked and energized efforts to reconceptualize mathematics content and upgrade expectations.

**Curr, Phil (ALL)**


The study investigated how computer activities and the pedagogy of a particular kind of non-traditional calculus course affect the learning of the Fundamental Theorem. It was found that the learning of this topic was far less linear than reflected by a preliminary hypothesized model.

**Calc, Curr, Lrng, Tech, Grpg (PS)**

The study (n=132) investigated the effectiveness of a program of instruction in polynomials and factoring making extensive use of manipulative materials. Results indicated student success using concrete materials can predict the ability to perform abstract operations.


After the 14-week journal writing treatment, tests and a mathematics attitude inventory were administered to the (n=59) students. No significant differences were found between experimental and control groups in terms of attitudes or achievement. Males and below median subjects had significantly lower attitude scores.


This study examined the relationships between four learning styles (environmental, emotional, sociological, and physical), feelings and beliefs about technology (scientific calculator, graphing calculator, and computer) and mathematics achievement. Learning styles and feelings and beliefs about technology do influence mathematics achievement (n=377).


High mathematics anxious and low mathematics anxious teachers participated (n=12). Teachers and teaching methods were identified as major causes of anxiety in these participants. Teachers' anxiety did not have as severe an impact on teaching mathematics as had been expected. High anxious teachers could better deal with high-anxious students.


There was no significant difference in the whole number computational abilities nor in the mathematical attitudes of kindergarten children receiving developmental instruction and kindergarten children receiving traditional instruction. No gender differences were detected.


The preservice teachers (n=52) experiencing a constructivist mathematics classroom, showed a positive overall change in attitudes/beliefs about mathematics as well as in their perceptions of mathematics and school practice. They also showed changes in attitudes/beliefs about instructional practices.


A departmentalized urban elementary school was compared with a similar self-contained elementary school. With respect to content popularity and higher student achievement in mathematics, the departmental model was determined to be a viable instructional model which deserves strong consideration at the elementary level.

The influence of race, socio-economic status, and gender on students’ perceptions was examined. Data were obtained from the First Follow-up of the National Education Longitudinal Study of 1988 (n=400). Race was the only variable which appeared to significantly influence perceptions.

Ethn, Gend, Blf, Soc (HS)


The study had two strands: (1) to link the achievement regions of the NAEP fourth grade mathematics score scale to similar achievement regions of the Iowa Test of Basic Skills and (2) to link the ITBS score scale to the NAEP score scale. The comparability of the corresponding achievement regions using the methods of this study cannot be readily determined.

Assm, Ach (EC)


The main purpose was to search for methods to teach children to learn fractions through understanding mathematical meaning rather than algorithms. The software demonstrates fractions in various ways to establish the close connection between fractions and real-world objects through a variety of mathematical representations.

Frac, Comp, Rep (EL)


Kindergarten teachers were examined to understand their knowledge of the mathematical thinking of individual children in their classes, the ways they acquired that knowledge, and the uses they made of that knowledge. Each teacher’s beliefs were reflected in the instruction, and the knowledge of student's mathematical thinking appeared to influence instruction.

TBIf, TKnw, Tchg. Tchr (EC)

The study was part of a year-long first-grade teaching experiment in which two instructional sequences were developed. Students made significant progress in both the nature and quality of their mathematical activity during the year.

**Arth, Lrng, Comm.** Patt, Rep (EC)


This study investigated mathematics portfolios from the perspective of high school students (n=3) and their teacher in a twelfth grade class using integrated, innovative mathematics curriculum. Grading the portfolios was problematic. The value of portfolios was as an information source for the teacher and as a learning tool for the students.

**Assm, Curr, IC, Comm, Aff, PS (HS)**


The project was a collaborative effort between Kansas State faculty and a Manhattan, Kansas school district. Qualitative data included interviews, a questionnaire, and an attitude scale. Participants were found to have substantially changed their beliefs, attitudes, and behaviors.

**Insy, TAtt, TBlf, Tchr (EL, TE)**


Community college students (n=32) enrolled in an introductory calculus course were studied. Student achievement was not significantly related to learning style and calculator usage but was related to attitude toward mathematics. Integration of graphics calculators into the curriculum is recommended to improve attitudes.

**Styl, Att, Ach.** GCal, Calc (PS)

Williams, Gregory Dagobert. (1996). An examination of computer-aided instruction, the self-concept and achievement levels of developmental mathematics community college students (Baylor University). DAI-A 57(03), p. 992, Sep 1996. [AAC 9624013]

This study investigates the effect of computer-aided instruction on the self-concepts and persistence levels of developmental community college students (n=313). There was no improvement of student self-concept in when students used computer aided instruction.

**CAI, Anx, D/R, Tchg (PS)**


This study investigated the effects on learning using one form of oral alternative assessment, the interview, compared to the traditional pencil and paper technique. The mean score of the class traditionally taught probability problems was significantly higher than the experimental class which was assessed orally.

**Assm, Prob (MS)**


Questionnaires were returned from 253 kindergarten to fourth grade teachers at 60 schools. There was considerable variability among teachers regarding their practices. Lectures and silent independent seatwork were used to a large extent. Manipulatives and group work were used more often than integration with language arts or thematic units.

**Tchg, Tchr, Assm, Grpg, Manp, TBlf (EC)**


The instructional intervention was studied using a pretest-posttest quasi-experimental design and was found to significantly improve mathematics achievement as compared to traditional instruction. There were no similar effects on student self-ratings, however.

**Ach, Curr (SE)**


This study is a comparison of the state-mandated learning objectives, the state-adopted textbooks, and the statewide tests in Texas for elementary mathematics. The curriculum in Texas elementary mathematics attains only a surface alignment with what is mandated in the state law.

**Curr, Matl, Assm (EL)**

A pretest-posttest, nonrandomized design was implemented (n=44). A significant difference between mean calculus scores favored the control group. No significant difference in critical thinking scores between groups was found. No significant difference in attitudes was found.

**Calc, Att. Patt (PS)**


Two groups (n=44) participated, one using base-ten blocks and one using the computer program Blocks Microworld. Results indicated that there were some limited advantages in using the computer program.

**PlcV, Manp, Comp, Lrng (EC)**
### Dissertations and Theses by Institution

#### Canada
- **Dalhousie University**
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- **Memorial University of Newfoundland**
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- **Universite de Montreal**
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- **Universite Laval**
  - Bensbaa; De Kee; Lavoie
- **University of Alberta**
  - Bjarnason; Enon; Oberg
- **University of British Columbia**
  - Koirala; Nesbit
- **University of Manitoba**
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- **University of Ottawa**
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George Mason University
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Rice University
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- **University of Northern Colorado**
- **University of Pennsylvania**
- **University of Pittsburgh**
University of Regina
Seaman

University of San Francisco
Lester: Stallworth-Stevens

University of South Carolina
Bass; Lewis; Mayo; Witherspoon

University of South Dakota
Fiksal

University of South Florida
Soash

University of Southern California
Kwon; Malpass; Smith; Thomas

University of Southern Mississippi
Larmon

University of Tennessee
Cleare; Redden; Williams

University of Texas at Austin
Boehm; Bullock; Fischer; Yang

University of Toledo
Dwyer; Hoover; Scott; Terwilliger; Wang

University of Utah
Gould

University of Wisconsin
Adajian; Ansell; Szydlik

University of Wisconsin - Madison
Brinker; Frykholm; Guckenber: Hung; Hutchinson; Jacobs; Kitchen; Peressini; Shafer; Warfield

University of Wyoming
Alsup

Vanderbilt University
McClain; Whitenack

Virginia Polytechnic Institute and State University
Chernault; Strand

Walden University
King; Lataille

Washington State University
Azim; Cockburn

Washington University
Taylor

Wayne State University
Johnson; Roberts

West Virginia University
Campbell; Seman; Wolfersheim

Widener University
Lafferty

46
Research Articles in Mathematics Education Published in 1996

Teresa H. Rehner & Parisa Vafai, The Ohio State University

This section lists 158 articles in mathematics education research that were published in 1996. Each entry is coded (see Key to Codes) with one to three major topic codes (in bold type) and any number of minor topic codes, as well as the grade level (in parentheses). Studies related to preservice or inservice teacher education are indicated by the appropriate topic codes (Prsv, Insv). The “Level” designated for teacher education or teacher studies first indicates the grade level(s) at which the intern or teacher participants teach, followed by the level “TE” for “teacher education” or “teacher.” All entries are indexed by major codes at the end of the volume (see page 83). A list of the journals searched and the number of articles included from each is provided at the end of this section (page 55).


Research on the importance of strong professional communities for supporting reform is reviewed. National Center for Research in Mathematical Sciences Education (NCRMSE) found significant correlation between teachers’ professional community and reformed mathematics instruction.

Impl, Insv, Tchg. Phil (TE)


This study addresses the early stages of children’s introduction to the use of variables in formal algebraic notation. It describes a teaching approach that aims to situate the use of formal notation in meaningful contexts. It also presents a study of a teaching sequence based on children using the approach with graphical feedback in problem solutions.

Alg, Tchg, Comm, Rep, Tech (EL)


This article describes the principles of computer-assisted learning (CAL) environments in which the software is interactive and adaptable to different styles of learning and teaching. Initial evaluation showed marked performance improvements and explained how design features contributed to understanding.

CAI, Styl, Tchg (ALL)


This article describes a professional development research project. Project goals include teacher collaboration to learn about equity, racism, and schooling. Through the sharing of personal experiences, teachers learn how gender and cultural bias affect mathematics learning and their interactions with their students.

Insv, Ethn, Gend, Aff, Eqty, ClIn (TE)


This paper describes changes in instruction implemented in one university’s mathematics education classrooms. The effects of change in instructional pedagogy and classroom environment on preservice teachers’ beliefs about mathematics learning and teaching and attitude toward mathematics are examined.

Prsv, Lrng, TBIf, TAtt. Tchg (TE)


This article reviews the claims on situated learning. The authors focusing on mathematics education, critically evaluate each claim and discuss some educational implications.

Impl, Phil, Lrng, Styl (ALL)


This paper discusses the growing concern of the inability of students entering universities in giving proof or logical justification for assertions they make. The results of a first-year undergraduate study is included.

Prf, AdvM, Knw (PS)

Case studies of two students detail contrasting passive and active learning behaviors. The nature of a student's metacognitive knowledge and the quality of learning strategies are critical factors in successful learning outcomes.

*Mtg, Styl, Lrng, Tchg (SE)*


The study examined (n=12) Year 12 students' awareness and application of learning strategies. Five possible reasons for students' failure to use appropriate learning strategies in mathematics were identified.

*Lrng, Mtg, Styl, Aff (HS)*


This article examines and discusses how teachers learn new teaching approaches, what teachers bring to learning about new pedagogies, and what should be learned to "scale up" reforms.

*Tchr, Lrng, Tknw, Tchg (TE)*


Cognitive operations such as coordination, integration, and structuring as manifested in a spatial context were explored. Spatial thinking is related to enumeration strategies. Interviews with 45 third graders and 78 fifth graders suggest that students initially see arrays of cubes as uncoordinated sets of faces and later as space-filling structures.

*Geom, Vis, Manp (EL)*


The major aim of the research project was to evaluate first-year teacher education students' understanding of subject matter knowledge in the domain of area measurement. This study focuses on the student teachers' substantive knowledge about the nature and discourse of mathematics, mathematics in society, and their disposition towards mathematics.

*Psrv, Meas, Tknw, TBlf, TAtt (TE)*


The paper describes interviews of (n=31) graduate students in mathematics or computer science which focused on identifying factors influencing women and men to pursue graduate education in these fields.

*Gend, Blf, Att (PS)*


*Impl, Enth, Soc, Lmr (ALL)*
This article attempts to examine the place of mathematics in terms of the goals within education and in particular to seek reconsideration regarding who has the right to make such decisions. It stresses that there is no one answer because many influences change over time and students may decide they do not wish to learn a subject.

**Curr, Plan, Att (K-12)**


This paper presents a comparison study of textbooks widely used in English, German, and Swiss primary schools relating to their approach of teaching arithmetic.

**Ethn, CC, Matl, Curr, Arth (EL)**


Pre- and posttests and interviews concerning misconceptions and alternate conceptions of rates of change were administered to (n=42) students in first-semester calculus using a conceptually-motivated curriculum. An emphasis on visual representations through construction and interpretation in conjunction with teacher-student analysis is a meaningful environment for student change.

**Calc, Mscn, Rep, Curr, Vis (PS)**


A case study of a 16-year-old student working on transformations of functions in a computer-based, multi-representational environment is reported. An analysis of the work during the transition from the use of visualization and analysis of discrete points to the use of algebraic symbolism is presented.

**CAI, Rep, Alg, Vis, IC (HS)**


The study investigates teachers' roles and conceptions by analyzing choices taken by mathematics teachers when faced with curriculum reform induced by introducing informatics, and educational technology in secondary school courses.

**Tchg, Tech, Tblf, Curr, Plan (SE)**


This article presents an analysis of a teacher's teaching of the lesson about finding decimal estimates for fractions. It also includes a conception of the mathematics curriculum entitled Middle Grades Mathematics Project.

**Tchg, Frac, Decm, Curr, Tblf, Insv (MS, TE)**


This article describes a study in which Australian children aged 5-8 years old (n=70) were presented with a range of measurement tasks to determine the strategies and devices that they would choose to use to measure length. Results are in conflict with the normal curriculum sequence.

**PS, Meas, Geom, Ethn (EC)**


This article describes a study that investigates the subtraction skills of primary students (N=65) in two schools. Students solve tasks and explain procedures, and their teachers are interviewed to determine their objectives and strategies.

**A/S, Knw, Rep, PS, Tchg (EL)**


This two-year study documents and examines the changes in four teachers' beliefs and practices while they were in transition from traditional practices to a closer approximation of a mathematics program that reflected the National Council of Teachers of Mathematics' (NCTM) Standards. Types of support and difficulties encountered during the implementation were studied.

This study examined the usefulness of selected aspects of Tharp and Gallimore's theory of assistance as a theoretical framework for describing and analyzing change efforts in a middle school mathematics reform project. One particular classroom assistance activity is presented and analyzed in terms of characteristics that should lead to significant learning.

Lrng, Tchg, Insr, Plan, Curr, TKnw (MS, TE)


This study addresses the problems and methods of assessing individual performance within a group project. A peer evaluation technique was implemented in which group members were asked to identify the percent contribution they and other group members made to categories such as creativity, research, writing, and organizing.

Assm, Grpg, Writ (All)


The paper describes the mathematics classroom from the perspective of social phenomenology. It introduces a framework through which mathematical work is seen as taking place in the imagined world through the filter of the world in immediate perception.

Phil, Soc, CIIn (K-12)


The article discusses the role of language in mathematical understanding, focusing on a classic debate between two leading writers in hermeneutics, Gadamer and Habermas. It suggests that personal learning of mathematics is inseparable from the social practices within which learning occurs.

Lang, Impl, Lrng, Soc, Rsch (K-12)


This article endorses the projects approach to learning as helping students acquire contextual, personal knowledge rather than learning only isolated bits of content.

information. Describes the five-step process for doing projects.

PS, Knw, Patt. Curr. Rep, Tchg (EL)


Analyzes the functions of semiotic mediation in a long term teaching experiment, Mathematical Discussion, on the plane representations of three-dimensional space by means of perspective drawing in grade 2 to 5 classrooms.

Oral, Vis, Rep, Geom, Lang, Tchg (EL)


This paper examines Project IMPACT, a school-based teacher enhancement model for mathematics instruction designed to improve student performance and support teacher change in predominately minority schools. Comparative data show IMPACT schools having significantly higher mathematics achievement scores that are persistent over time.

Insr, Ach, Ethn, Soc, Tchr, Tchg (TE, EL)


This paper describes a research-based model of children's thinking that teachers can use to interpret, transform, and reframe their informal or spontaneous knowledge about student's mathematical thinking.

Curr, Lrng, PS, Impl, Insr, Tchg (EC, TE)


This article looks at some characteristics of young children's thinking about numbers and operations with numbers. It concludes the role of a teacher as an assistant in communication, helping the student make sense of their peers sense-making.

Lrng, Comm, Nsns, Tchg, Lang, Arth. (EL)

Results of a whole-class test on mental computation problems given to 5th-graders who had been in a reform-based mathematics curriculum were compared with those of students in a traditional mathematics curriculum. Students in the reform-based program performed much higher than the comparison group on all but one problem.


The study examines problem-solving results among 2nd-grade students in three schools that were all using a reform mathematics curriculum. Except for one problem, more students used a mental procedure than the standard written algorithms, and both methods were used with approximately the same degree of accuracy.


Presents examples and case studies of statistical reasoning, thinking, and intuition that may arise in perception of randomness and in particular for random walks. Explores the relationship between art and science through various notions for the statistical concepts of randomness.


This article discusses the relevance of teaching algebra to all students. Issues examined include the desperate need for reform in the algebra curriculum, developing a curriculum for a broad range of people, and rethinking how mathematics courses are structured and taught.


An experimental group of 17 eighth graders and 16 controls conducted two iterations of an activity to design wind collectors. Experimental received science and math instruction between iterations. To explain higher control scores, interviews showed the experimental tried to apply science concepts; the controls depended on what they were taught and what they observed.


The article presents a framework for differentiating between five levels of extension of knowledge. Comparison of the extent of knowledge use exhibited by (n=14) Year 11 Australian students on a range of plane geometry problems found that high-achieving students exhibited greater extension of knowledge than low-achievers at each level tested.


Sixteen middle school students ranked the lengths of various paths in problem-solving interviews. Every student invoked at least one of four intuitions that originated from their everyday experiences: compression, detour, complexity, and straightness. Students continued to use their inadequate intuitions in the posttest before applying learned algorithms.


The effects of an Integrated Learning System (ILS) on the mathematics test scores of elementary school children was studied. Results indicate that ILS software had its greatest effect on mathematics concepts scores, which is contrary to the commonly held opinion that mathematics software is effective primarily in drill and practice of computational skills.


Children (n=336) in grades 1-5 were interviewed individually using a Piagetian task to study development from additive to multiplicative thinking. Multiplicative thinking was found to appear early (in 45% of second graders) but to develop slowly (only 48% of fifth graders used consistently solid multiplicative thinking).

The study investigated the development of turn and turn measurement concepts within a computer-based instructional unit. Written assessments, interviews, and interpretive case studies of 3rd and 4th graders found that turns were less salient for children than forward and back motions.

**Comp, CAI, Meas, Geom (EL)**


The article describes a method whereby data are first analyzed episode-by-episode in comparison to each other. Conjectures thus generated are then meta-analyzed to create chronologies structured by general assertions grounded in students' mathematical activity. The relationship between psychological and social processes is clarified.

**Impl, Rsch, Soc (K-12)**


This study compared the effects of a field-based mathematics methods course and a traditional university-based mathematics methods course on preservice teachers in their development of teaching concepts in elementary mathematics. Case studies indicated significant differences in their teaching concepts.

**Prsv, Tchl, TKnw. (TE, EL)**


The paper begins with a description of the research paradigm and the theoretical perspective. Following is a description of the evolution of a genetic decomposition of the limit concept. It concludes with some suggestions for instruction that relate to how the limit concept can be learned.

**Rsch, Impl, Tchl, Curr. Lrng, Calc (TE)**


Learning and teaching mathematics in the information era are explored from a Vygotskian perspective. A systemic approach is taken to investigate the ways in which information technologies have changed the contexts for and forms of mathematical activity in society and the challenge that this change presents to mathematics educators at all levels.

**Lrng, Tchl, Tech, Plan, (K-12)**


The article examines possibilities for learning offered by a piece of software, Fonctuse, likely to encourage the linking of algebraic and graphical representations of functions. Influence of prior algebraic knowledge on the cognitive processes and constructions of knowledge in this environment were studied.

**Lrng, Alg, Comp. Knw (SE)**


Case studies conducted to identify, describe, and compare (n=3) preservice mathematics teachers' beliefs about teaching and learning mathematics during their initial 6 months in a teacher education program found 6 emerging themes: classroom relationships, management, discovery activities, assessment, communication, and motivation.

**Prsv, Tblf, Tknw, Assm (TE, SE)**


This "Research" section contains three articles. "Pedagogy" and "Practice" discuss phonics instruction combined with whole language to teach reading. "Findings" reviews briefly three studies on mixed-age classrooms; esteem and violence; and boys, girls, and math.

**Lrng, Gend, Aff, Revw (EC)**


This article describes a study of the estimation skills of mathematicians (N=44), accountants (N=44), psychology students (N=44), and English students (N=44). Explores their methods of estimating the products and quotients of 20 problems.

**Est, M/D, Lnrn (PS)**

The article introduces a theoretical framework, a language of description, which has been developed for the sociological analysis of school texts, mathematics texts in particular. The language is introduced through the practical description of extracts from the texts which were analyzed in its development.

**Assm, Soc, Matl, Impl (SE)**


The article shows how an empirical approach to geometry using computer-based dynamic geometry software can create didactic situations in which students require proofs. Reports classroom experiences that show where students felt the need for proof in order to explain phenomena or to convince themselves of counterintuitive results.

**Prf, Geom, Comp, Revw (HS)**


The article describes a project conducted by the Freudenthal Institute in which observation of student behavior supported the premise that the graphics calculator can stimulate the use of realistic contexts, the exploratory approach to mathematics, a more integrated view of mathematics, and more flexible behavior in problem solving.

**GCal, PS, Patt, Knw, Tchg (SE)**


A model for conceptualizing teacher change was developed during a two-year study of mathematics teachers' implementation of an innovative curriculum. Based on constructivist views of teaching and learning, the model suggested that one way to promote change in teaching practice is to structure interactions among teachers to promote reflective thinking.

**Insv, Lrng, TKnw, Curr, Tblf (TE)**


A case study data of low- and high-achieving 9-year-olds focused on construction and analogical transfer of knowledge during novel problem solving, as reflected in strategies for dealing with isomorphic combinatorial problems presented in hands-on and written form. Achievement level does not predict children's attainment of higher stages of strategy construction.

**PS, Lrng, Lrnr, Manp, Knw (EL)**


Presents a theory of the development of algebraic abstraction that extends Sfard's and Mason's ideas on learners' progress from operational or process-oriented thinking to the abstract or structural perspective. Analyzes secondary school students' approaches to classifying a set of complex equations.

**Lrng, Alg, Knw (SE)**


This study identifies teacher decisions related to achievement gains by implementing the NCTM standards. The results of the study indicate that there was a correlation between time span and problem solving gain, computation achievement gain, and the number of times teachers chose to use manipulatives to teach.

**Plan, Ach, Curr, PS, Arth, Manp (TE, MS)**


This paper describes an experimental study of 213 pre-university students' strategies when assessing correlation in scatter plots. Three different students' misconceptions concerning statistical association is discussed.

**Mscn, Stat, (SE)**


Analysis of observations in precalculus classrooms in which graphing calculators were integrated with the curriculum found evidence that students and teachers shifted their roles when technology was in use.

**Gcal, Calc,Tchg, IC, Tech (HS)**

The article reports three experiments that show that anxiety effects were prominent in two-column addition problems, especially those involving carrying. It elaborates a theory of mathematics anxiety.

Anx, A/S, Styl, Lrng (EL)


Examined changes in beliefs and instruction of (n=21) primary grade teachers over a 4-year period in which the teachers participated in a CGI (Cognitively Guided Instruction) teacher development program that focused on helping teachers understand the development of children’s mathematics thinking.

Insv, TBIf, Tchg, Lrng (EL)


The author investigated high school students’ beliefs about mathematics and science, including beliefs about mathematical and scientific truths, the value and importance of inquiry, gender equity and ability with respect to the pursuit of mathematics and science careers, the relationship between mathematics and technology, and the role of science in society.

Att, Blf, Soc, Gend, Eqty (SE)


Questionnaires given to (n=187) 9th-grade students about their beliefs on mathematics and language arts found that males and females hold different attitudes concerning themselves as learners of mathematics and English and about causal attributions for success and failure in these subjects.

Blf, Gend, Att. Lrnr. Ach (HS)


This article describes a study that explores the relationship between classroom factors and students’ beliefs about themselves as learners of mathematics.

Blf, Gend, Att. Lrnr. Ach (HS)


Examined effects of problem size in mental addition among elementary children in China (n=104) and identifies classroom factors that might influence students’ beliefs.

Aff, Blf, Soc, Gend (K-12)


Observations and interviews with preservice elementary teachers examined their beliefs, conceptions, and practices and their views of mathematical and pedagogical content knowledge. Results revealed symbiotic relationships between their views of content knowledge and their instructional actions that remained problematic.

Prsv, TBIf, Tknw, Tchg. (TE, EL)


Describes aspects of research conducted with two secondary mathematics teachers and seven senior students which explored their perceptions of mathematics from their experiences and beliefs about personal excellence in school mathematics.

Blf, Tblf, Ach. Att, TAtt (HS, TE)


Discusses meta-analysis results for gender differences in mathematics achievement.

Gend, Ach, Impl, (ALL)


This study suggests that involving Russian experts in solving concrete educational problems, and providing curriculum development in the United States could be very useful. A primary goal would be to change the attitudes and beliefs of teachers and an extension of teachers’ views on teaching mathematics.

Curr, CC, TBIf, TAtt (K-12)
Missouri (n=105) and among undergraduates in China (n=26) and Missouri (n=35). For all Missouri subjects and Chinese through first grade, larger-valued numbers took longer and induced more errors.


The article describes a study of two secondary students working problems over a ten-week period. Information on metacognitive awareness, confidence, and ability were collected through two videotaped sessions and questionnaires. Results suggest impulsiveness and perceived order of merit inhibit effective problem solving.


This study examines the assessment beliefs and practices of four middle school mathematics teachers implementing a reformed mathematics curriculum for the first time. The constraints on change in assessment include parent and student beliefs and time available to develop, implement, and interpret alternative assessments.


An eight-week study on sixth-grade students (n=23) was to determine the effect of personalizing word problems on students' motivation and ability to write correct mathematical expressions. Data from weekly quizzes and student attitude surveys revealed student motivation and achievement were both enhanced.


This article describes two experiments that investigate how "buggy algorithms" in multi-digit subtraction are used. The first experiment tested third grade students (N=110) and repeated the test two years later. The second experiment tested students in grades 3-6 (N=301).
students constructed and used procedures to complete set translation tasks and (2) two-thirds of observed errors arose from consistent implementation of ill-formed procedures.

**Mscn, Rep, Vis, Patt (PS)**


This constructivist teaching experiment investigated the role of whole-number knowledge in fraction learning. Two 9-year-old students worked for one year with a computer program (Copycat) and demonstrated that the development of whole-number knowledge and rational-number knowledge are interdependent.

**Whol, Frac, CAI, Nsns, Knw, Lrng (EL)**


Interviews with 107 children, ages 4-7, about uncounted quantities, counted quantities, and numerical equations showed that the ability to predict changes to counted quantities increased with age. Only 7-year-olds were able to use covariance and compensation in the purely numerical context of derived equations.

**Mtcg, Lrng, Nsns, RaPc (EC)**


This study examined the positive effects of cooperative learning, comparing mathematics achievement, friendship, attitude toward mathematics, and self-concept outcomes of students taught with and without cooperative learning in private schools. Significant increases in mathematics achievement surfaced for cooperative learning groups.

**Grpg, Aff, Ach, Att, Blf (K-12)**


This paper discusses the pros and cons of a National Curriculum by analyzing the visits to a French School. Six recommendations are made.

**Curr, Ethn, CC (K-12)**


The study validates a framework for assessing children's thinking in multidigit number situations and uses the framework to evaluate instructional programs. Key constructs: counting, partitioning, grouping, and number relationships appear stable within each of five levels across 12 case studies suggesting a possible hierarchy.

**PlcV, Assm, Tchg, Lrng, NSns (EL)**


This article reports on a longitudinal study based on Years 7-12 for girls' achievement in mathematics and science. The data suggest that Year 9 is crucial for girls' perceptions of how they have performed in math and science in relation to boys' achievements in these fields.

**Gend, Aff, Blf, Eqty, Ach (SE)**


The study investigates the differences between students' and instructors' perceptions of similarities among basic computation-related rational number skills. Results indicate that college students in developmental mathematics do see some relationships among rational number computation skills, although not necessarily the ones seen by instructors.

**Frac, Blf, TBlf, Arth, NSns, D/R (PS)**


Children with arithmetic learning disabilities (n=16) and normally achieving controls (n=16) in grades 3-5 were administered a battery of computerized tasks. Memory spans for both letters and digits were found to be smaller among the learning disabled children. Implications for teaching are discussed.

**LD, Lrng, Arth (EL)**

This article reviews research on block scheduling as related to the study of mathematics. It suggests what issues to consider when deciding whether or how to improve such schedules. It also discusses mathematics achievement under a block schedule.

**Ach, Revw, Curr (SE)**


The study analyzes (n=346) grades 4-8 children's partitioning strategies in terms of a framework that translates economy in number or size of pieces and use of perceptual cues into sophistication in unitizing. Proportionately more students used economical partitioning strategies than used less economical cut-and-distribute strategies.

**Styl, NSns, Manp, Frac (MS)**


This article argues that the organization of cognitive structures for technical domains can be visualized as a network of connected thinkable models. It describes a taxonomy of models that has been developed and discusses the issue of how representations relate to human modes of perception and action.

**Lrng, Rep, Phil (ALL)**


The article considers the use of technology, particularly programmable or graphics calculators and computer software, in the transition years from secondary to higher education. It reports a pilot study of the use of Mathematica in this context.

**Gcal, Tech, Comp, CAI (SE, PS)**


The editorial discusses the growing interest in and focus on the social and cultural context of the mathematics classroom in mathematics education research.

**Rsch, Soc, Etnh. Tchg (ALL)**


Reports the results of a teaching experiment involving like terms and equations in algebra. Seventh-grade students (n=6) experienced difficulties in decomposing an additive term into a difference.

**Arth, Alg, Knw, Patt (SE)**


This article argues that genuine problem solving and investigation on the part of pupils rarely occurs in mathematics classrooms in Hong Kong and other Asian countries. It provides a rationale for drawing problems from the content of a curriculum or syllabus.

**PS, Curr, Etnh. CC (SE)**


Examines the effects of cooperative homework on mathematics achievement. Taking into account team characteristics. Middle- and low-achievers all benefited from cooperative mathematics homework. High achievers did not, but they maintained their top position in mathematics achievement.

**Grpg, Ach, Etnh. Phil (SE)**


Interviews of one child through grades 1-5 on several combinatorics tasks indicated the student's progress in classifying, organizing, and reorganizing data. Provides significant insight into the process by which the student learned to make proofs.

**Lrng, Prf, Prob (EL)**

The article examines the differences in mathematics learning and practice in and out of school maintaining the position that while some differences may be inherent, many differences can be narrowed so that mathematics learning and practice in school and out of school can build on each other and be connected.

**Lrng, Lrnr. Patt (K-12)**


The study of undergraduates enrolled in a writing-intensive algebra course revealed that writing activities are successful in terms of facilitating student comprehension of mathematical content. The use of words allows student writers to gain ownership of the algebraic content.

**Writ, Curr, Alg, Mtcg, Lrng, Knw (SE, PS)**


This article describes how preservice teachers perceive their role and the practice of mathematics teaching during their teacher education. Data were drawn from a study on elementary school teacher preparation at a state institution.

**Prsv, Tchg, Rsch. TBIf (TE)**


Two problems are posed to small groups (8-10) of kindergarten children to challenge and to encourage discourse. Results showed various levels of understanding and demonstrated various approaches which serve to give the teacher insight into the level of understanding of the class and the possible need to re-visit the concept later.

**PS, ClIn, Grpg, Tchg (EC)**


Interviews of 8 teachers and 15 learners and 85 hours of observations in the adult basic education setting led to these findings: teacher-centered approaches prevail, math instruction is similar to inculcation, teachers and textbooks are ultimate authorities, and the notion of one solution and one method of reaching it is prevalent.

**Tchg, D/R. BIf. TBIf. Knw (PS)**


This article describes the “T-cubed” or Teachers Teaching with Technology program and their courses utilizing hand-held technology such as graphic calculators, data-loggers and the TI-92 hand-held computer. It describes practical experiments involving discharge, a temperature probe, and an oscillating water sprinkler.

**Gcal, Tchg, InsV, Tech (SE)**


This article examines technology access and use by using data from the eight-grade cohort of the 1988 National Educational Longitudinal Survey. Results indicate significant differences in the use of mathematical technology in school settings, and that inequalities in educational opportunity still need to be addressed.

**Tech, Eqty. (MS)**


This study argues that the challenge for teachers of algebra in Australia is to find ways of making the structural aspects of algebra accessible to more students. The zero product principle is used to provide an example of a common student error grounded in the difficulty of understanding the structure of algebra.

**Alg, Mscn, Knw, Ethn (K-12)**


The article reviews recent research into the effectiveness of the graphing calculator as a tool for instruction and learning within precalculus and calculus. Much research fails to provide clear guidance or informed debate regarding the role of graphing calculators in mathematics teaching and learning.

**Impl, Gcal, Revw, Calc, Lrng. Tchg (TE)**
Articles Published in 1996

This article discusses challenges faced by participants in Mathematics Education, Equity and Leadership (MEEL) project. The participants worked to develop the new knowledge, habits of mind, and resources needed to maintain reforms.

Eqty, Impl, Soc (TE)

The common goal of the empirical studies discussed in this analysis was to assist children in developing a meaningful understanding of the rational number construct, founded on durable fraction concepts. Some research has focused on partitioning; some on ratio and proportion.

Impl, Frac, Revw, RaPc (K-12)

This article tells stories of children in their first year of school (mostly age five) who were using calculators for the first time. Learning mathematics with calculators is more like the learning of language than traditional classroom mathematics.

Cltr, Mtcg, Lrng, Ethn (EC)

This article presents an interesting problem intended to help students make the transition from arithmetic to algebra. It uses different problem representations including making successive approximations, interpreting graphs, and solving equations. Pedagogical issues are discussed.

PS, Alg, Arth, Rep (SE)

This article discusses some serious issues concerning the use of calculators in elementary school education. Questions are addressed: Is computation still important in elementary school? When is calculator use appropriate? How should a calculator driven curriculum look?

Cltr, Curr, Arth, Soc (EL)

This article reports research designed to explore the possibility that conceptually different forms of common fraction understanding can be identified. Such forms may be associated with differences in fraction problem-solving performance.

Frac, PS, Knw (K-12)

Analysis of self-concept among (n=16) male and female teachers found the greatest difference in attitudes toward mathematics, the teaching of mathematics, and perceptions of themselves as salient role models between teachers with very high and very low self-concept profiles.

Tatt, Tchr, TBlf, Gend, Tknw, Tchg (TE)

This article profiles a teacher's use of problems from a mathematics curriculum project, and reports that problem-solving-oriented curricula leads to student confusion and uncertainty.

PS, Curr, Meas, Geom, Mscn (MS)

Describes the history and current status of qualitative research in science education research. Discusses the issue of the quality of research.

Rsch, Impl (ALL)

This article discusses whether teachers should teach what they believe to be mathematics, teach the mathematics of students' backgrounds and aspirations, or teach the mathematics they think society expects them to teach. Teachers should define mathematics and share those definitions with students.

TBlf, Phil, Curr, Soc, Ethn (K-12)

Rochowicz, John A. Jr. (1996). The impact of using computers and calculators on calculus instruction:

The article reports a research study that determined that calculus educators are slow to use technologies in instruction because they perceive a lack of clarity regarding the use of technology, technology is rapidly changing, and using technology requires too much time and effort.

**Tech**, **Calc**, **TAtt**, **Tchg**, **Curr** (PS)


Interviews with fourth, fifth, and sixth graders found that they thought about the concept of average as mode, median, and/or a procedure. Approaches to develop the concept of average are presented.

**Blf**, **Knw**, **Tchg**, **Stat**, **Curr** (MS)


This article describes a study that provides information about the extent to which students actually use their mathematical resources and strategies to solve problems.

**PS**, **Knw** (SE)


The article describes the case of a woman who experienced disparity in mathematics classrooms between learning (which for her was necessarily relational) and its validation by a system that did not ratify meaningful learning but instead rewarded the behavioral products of rote or instrumental learning.

**Styl**, **Lrng**, **Gend**, **Blf** (PS)


Examination of (n=186) 8th-grade students found marked differences between boys and girls on a mathematics test which were paralleled by differences in both trait-like self-referenced cognitions (academic self-concept of mathematical ability, goal orientation, and attribution) and task-specific appraisals.

**Gend**, **Aff**, **Blf**, **Styl**, **Knw** (SE)


A longitudinal teaching experiment engaged students in activities to produce fraction problems using specific terminology and satisfying certain criteria. Classroom interactions developed a common system of meanings and required negotiation of new social norms, leading to a new didactic contract.

**Frac**, **Soc**, **CIn**, **PS**, **Comm** (EL)

Shoenfeld, Alan H. (1996, November). In fostering communities of inquiry, must it matter that the teacher knows “the answer”? *For the Learning of Mathematics*, 16(3), 11-16.

The author discusses the similarities in learning outcomes from two very different environments: a research group and a problem-solving course. He gives examples that characterize the two environments and point to similarities in outcomes and speculates about why the similarities exist.

**Lrng**, **PS**, **Curr**, **Tchg** (ALL)


Middle school teachers (n=53) and prospective secondary teachers (n=28) posed problems related to billiards before and after solving a sample problem. More problems were posed and more systematic problem generation occurred before solving a sample problem. Problems posed were not always solvable.

**Insv**, **Prsv**, **PS**, **Tchg** (TE, SE)


The author postulates a form of mathematical reasoning that learners engage in spontaneously which is not inherently inductive or deductive. This transformational reasoning is generated through the learner’s inquiry into how a mathematical system works.

**Lrng**, **PS**, **Phil**, **Knw** (ALL)


Analysis of episodes from a mathematics course for prospective elementary teachers run as a whole-class constructivist teaching experiment provides a detailed
look at how classroom norms for mathematical justification were established given the prospective teachers’ traditional expectations and the teacher’s reform-oriented notions.

Prsv, Tknw, Prf, Lrng, Styl (TE, EL)


The article analyzes the tension between the traditional foundation of efficacy in teaching mathematics and current reform efforts in mathematics education. It presents suggestions for research to chart the development of, and change in, mathematics teachers’ sense of efficacy.

Rsch, Tchg, Tblf, Insv, Aff (K-12)


This article describes a study that investigates the relationship between secondary students’ written responses and the mathematical and cognitive processing used when solving a complex problem.

PS, Writ, Lrng (SE)


The article attempts to reconstruct the productive ideas that evolved from already existing sources for the teaching and understanding of negative numbers. It discusses examples from developmental research.

Impl, Tchg, Int Lrng (EL)


This article highlights the historical aspects and issues surrounding equity in urban school mathematics. The author summarizes five articles that examine the significant problems facing urban school mathematics reformers as well as how to address these problems. Several examples of school reform efforts are included.

Eqty, Impl, Curr (K-12)


The article discusses critical constructivism which addresses the socio-cultural contexts of knowledge construction and serves as a powerful referent for cultural reform.

Phil, Lrng, Soc, Ethn (K-12)


Interviews, questionnaires, and observation of mathematics teachers in their implementation of computers in their classroom found that use of computers is unlikely to result in changes in learning or teaching unless the personal philosophy of classroom practice held by each teacher undergoes a major transformation.

Comp, Tchg, Tblf, Tech, Tatt (TE)


The article analyzes instructional actions designed to help a student understand distance, time, and speed. It focuses on the mathematical knowledge that guided instructional decisions and actions and discusses implications for content preparation of teachers.

Tknw, Tchg, Impl, Insv, Prsv (MS,TE)


This article reviews some of the research on indirect proof, discusses implications of the research for teaching, and offers some specific examples and strategies that can increase students’ success with this important proof technique.

Prf, Impl, Geom (SE)


The article describes a project-based situation in mathematics with 12- and 13-year-old students in Edinburgh, Scotland. The main theme, the results, and afterthoughts are presented to illustrate differences in the behavior and attitudes between students in the last year of primary and those in the first year of secondary school.

Att, Ach, IC, Blf, Ethn, Rep (SE)

The article discusses reasons why practical work is used only sporadically in lower secondary school math classes. It presents results of a comparative study between Greece and Scotland, focusing on culture as a differentiating factor of students' performance.

**CC, Ach, IC, Assm, Ethn, Manp (SE)**


Differences of problem-solving procedures and thinking structures between science and nonscience Chinese graduate students were explored. Differences in designing experiments, exploring new questions, planning, assumptions, and validity are discussed.

**PS, Lrng, Ethn, Rep (PS)**


The article reports on part of a study that was conducted with individual students (N=5) and five groups of students who worked together in the first course of experimental Calculus classes. The goal of the study was to discover how the concept of inverse function can be learned.

**Calc, Lrng Curr (PS)**


This article discusses the importance of calculators in the teaching and learning of mathematics. It argues graphing calculators let all students use computer visualization on a regular basis.

**GCal, Tech, Rep Vis (SE)**


This paper investigates second graders’ schemes to coordinate two units. Four different types of schemes to coordinate units were identified. A theoretical model was constructed based on the schemes children have constructed.

**Blf, Lrng, Frac (EL)**


The article reports on (n=11) student attempts at three combinatorial questions focusing mainly on three aspects of strategy: (1) listing, (2) subdivision into cases, and (3) use or misuse of four standard formulas.

**Prob, PS, Knw (PS)**


Provides details of a study that examined interactions and questioning patterns in the electronic communication exchanges of students (N=21) enrolled in a course designed to provide direction in using an electronic network as an instructional medium.

**Tech, Comm, ClIn, Comp, Tchg (ALL)**


Six English-Korean bilingual students were studied to investigate language difficulties and cognitive processes in solving mathematics word problems. These six case studies revealed distinct patterns of difficulties in solving problems written in English and Korean, especially for students in transition stage.

**Ethn, PS, Lang, Ach, Styl, Mscn (K-I2)**


Data from (n=4) students in grades 3-6 showed a consistent parallel between the types of units constructed in a geometric setting with those in a numeric context. Students who constructed abstract composite units in
Tiling the plane also did so in adding and subtracting whole numbers.

Lrng, Geom, NSns, Whol, A/S (EL)


Responses to rate-of-change problems were collected during and after 24 hours of conceptual calculus instruction given to first-year university students. Analysis revealed three categories of error in which variables were treated as symbols to be manipulated rather than quantities to be related. Contains test questions.

Calc, PS, Knw, Patt (PS)


This is the fourth in a series of articles introducing the recently initiated Activities Integrating Math and Science (AIMS) program for the development of a pattern-based mathematics/science curriculum. It discusses several representations of proportional relationship and proportional reasoning.

Rep, RaPc, IC, Curr, Patt (K-12)


This article describes the development of a mathematics profile to assess students in terms of intended outcomes. Development included determining what counts as progress: justifying the curriculum in terms of expected outcome; and basing judgments about the success of the system, school, and student on the outcomes achieved.

Assm, Curr, Knw (EL)


Open-ended questioning and semi-structured interviews of (n=50) grade 9 students' preferences and perceptions of the learning environment of the Hong Kong mathematics classroom led to what were considered important factors that led to satisfactory results.

Att, Blf, Ethn, Ach (SE)


To understand an individual student's learning in the complexity of the mathematics classroom, it is necessary to examine the events before, during, and after learning. To illustrate, the process by which two children each construct new mathematical meanings is examined from these perspectives.

Lrng, ClIn, Knw, Impl (EL)


Six classes received problem-centered mathematics instruction for two years in second and third grade. Results indicate that students in these classes scored significantly higher than students in traditional classes on standardized measures of computational proficiency and conceptual understanding.

Curr, Tchg, PS, Arth, Assm, Lrng (EC)


The article presents a way of interpreting mathematics classrooms by advancing the notion of sociomathematical norms to explain how students develop mathematical beliefs and values and become intellectually autonomous in mathematics. Episodes from a second-grade classroom illustrate the process.

Blf, Soc, ClIn, Lrng, Tchg, Phil (EC)


Inservice (n=36) and preservice (n=67) mathematics teachers were asked for a commutative, nonassociative binary operation. Responses were analyzed for correctness, productiveness, mathematical content, and underlying difficulties. Both groups exhibited a weak concept.

Tknw, Insv, Prsv, Lrng (TE)


College students (n=32) in their first abstract algebra course were asked to list elements and find the product of two elements in the dihedral group D4. Most students
found solutions using a combination of visual approaches and analytic strategies. The Visualizer/Analyzer model is proposed.

AdvM, Lrng, Alg, PS (PS)


The study investigates procedural and conceptual aspects in preservice elementary school teachers' understanding of the Fundamental Theorem of Arithmetic. Participants' allowing a possibility of alternative prime decompositions influenced their ability to make inferences regarding factors and divisors of natural numbers.

Prsv, Tknw, Prf, Lrng (TE, EL)


Constructivism has assumed a dominance in mathematics education, but it ignores the social implications of the construction of meaning. It is argued that constructivism valorizes the individual construction of meaning often ignoring the social and political contexts within mathematical knowledge and legitimizing the marginalization of many social and cultural groups.

Phil, Lrng, Ethn, Eqty (ALL)


The article describes a study that explored the attitudes of students (N=501) and teachers (N=53) toward computers. It argues that the views of teachers and students concerning the integration of computers in science teaching should be taken into consideration in course design and implementation.

Att, TAtt, Comp, Tech, Tchg (ALL)
Journals Searched

Action in Teacher Education (2)
Adult Basic Education (1)
AIMS (1)
AMATYC Review (0)
American Educational Research Journal (0)
American Journal of Education (0)
Australian Mathematics Teacher (3)
Australian Primary Mathematics Classroom (2)
Australian Senior Mathematics Journal (1)
Child Development (0)
Cognition and Instruction (0)
Cognitive Psychology (0)
College Mathematics Journal (0)
Community College Journal of Research and Practice (0)
Computers in Human Behaviors (0)
Developmental Psychology (0)
Education & Urban Society (1)
Educational and Psychological Measurement (0)
Educational Researcher (1)
Educational Review (0)
Educational Studies in Mathematics (31)
Educational Technology (0)
Elementary School Journal (1)
Exceptional Children (0)
Exceptionality (0)
Focus on Learning Problems in Mathematics (8)
For the Learning of Mathematics (2)
Gifted Child Quarterly (0)
Hiroshima Journal of Mathematics Education (5)
Instructional Science (0)
Japanese Journal of Educational Psychology (0)
Journal for Research in Mathematics Education (21)
Journal for the Education of the Gifted (0)
Journal of Applied Behavior Analysis (0)
Journal of College Science Teaching (0)
Journal of College Student Development (0)
Journal of Computer Assisted Learning (1)
Journal of Computers in Mathematics and Science Teaching (6)
Journal of Counseling Psychology (0)
Journal of Early Adolescents (0)
Journal of Educational and Psychological Consultation (0)
Journal of Educational Computing Research (0)
Journal of Educational Measurement (0)
Journal of Educational Psychology (0)
Journal of Educational Research (0)
Journal of Educational Technology Systems (1)
Journal of Elementary Science Education (0)
Journal of Experimental Child Psychology (0)
Journal of Experimental Education (0)
Journal of Experimental Psychology: General (0)
Journal of Learning Disabilities (0)
Journal of Mathematical Behavior (The) (20)
Journal of Negro Education (0)
Journal of Research & Development in Education (1)
Journal of Research in Science Teaching (0)
Journal of Research on Computing in Education (0)
Journal of School Psychology (0)
Journal of Science Education and Technology (0)
Journal of Social Psychology (0)
Journal of Teacher Education (2)
Journal of Technology Education (1)
Learning Disabilities Research and Practice (0)
L'Insegnamento della Mathematica e delle Scienze Integrate (0)
Mathematical Cognition (5)
Mathematics and Computer Education (0)
Mathematics Education Research Journal (8)
Mathematics Educator (1)
Mathematics in School (1)
Mathematics Teacher (The) (6)
Mathematics Teaching in the Middle School (0)
New England Mathematics Journal (1)
Ohio Journal of School Mathematics (0)
Perceptual and Motor Skills (0)
Phi Delta Kappan (2)
Physics Teacher (The) (0)
PRIMUS (1)
Psychological Reports (0)
Psychological Science (0)
Remedial and Special Education (0)
Research in Middle Level Education Quarterly (1)
Research in Science Education (1)
Review of Educational Research (0)
Reviews on Mathematical Education (1)
Scandinavian Journal of Educational Research (0)
School Science and Mathematics (3)
Science (0)
Science Education (1)
Teacher Magazine (1)
Teaching & Teacher Education (1)
Teaching Children Mathematics (5)
Teaching Mathematics and Its Applications (5)
Teaching Statistics (1)
Urban Education (2)
Zentralblatt fur Didaktik der Mathematik/International
Research Papers and Monographs in Mathematics Education Produced in 1996
S. Asli Özgün-Koca & Hea-Jin Lee, The Ohio State University

This section lists 101 papers and monographs in mathematics education research that were produced in 1996 and included in the ERIC database by the end of July, 1997. Each entry is coded (see Key to Codes) with one to three major topic codes (in bold type) and any number of minor topic codes, as well as the grade level code (in parentheses). Studies related to preservice or inservice teacher education are indicated by the appropriate topic codes (Prsv, Insv). The level designated for teacher education or teacher studies first indicates the grade level(s) at which the intern or teacher participants teach, followed by the level code, “TE” for “teacher education” or “teacher.” All entries are indexed by major codes at the end of the volume (see page 83).


This report summarizes the TIMSS results for secondary 1 and secondary 2 pupils in Scotland. Results are reported in two sections: mathematics and science, each of which includes performance, examples of test items, and Scottish features and international comparisons.

CC, Ach, Assm, Curr, Ethn (SE)


This program is the curriculum framework for identifying beliefs about math, general and specific student outcomes, and illustrative examples agreed upon by 6 jurisdictions of Western Canada. The intent is to communicate expectations for students and facilitate the development of common learning resources.

Curr, Blf, Ach, Matl (K-9)


This document presents 1994 results of the Assessment of Achievement Programme, established by the Scottish Office Education and Industry Department to monitor performance of pupils in Scottish schools in particular areas of the curriculum.

Ach, Assm, Ethn, Curr (K-12)


This document summarizes and reviews mathematics education research reported in Australasia, or conducted by Australasians and reported elsewhere, during 1992-1995.

Revw, Ethn, Impl, Lrng, Tchg (ALL)


The purpose of this book is to assist teachers in integrating children’s literature, mathematics, and language to connect the teaching of mathematics to other curricular areas in a natural and logical way.

IC, Lang, Patt, Matl, TKnw, Tchg (TE & EC)


The nature and evolution of one preservice secondary teacher’s beliefs about mathematics are described in this paper. It describes how the teacher’s conceptions about mathematics, teaching, and learning evolved during a secondary methods course and student teaching.

Prsv, TAtt, T Knw, Tchg. Tchr (TE, SE)


This book is intended to support educators in their challenging enterprise by focusing attention on errors and their use in mathematics instruction.

Tchg, Lrng, Ms cn, Curr (ALL)

This paper reviews and discusses National Science Foundation Statewide Systematic Initiative (SSI) program monies in Maine. SSI is a model for improvement of mathematics and science education based on systemic reform.

Curriculum, Plan (K-12)


This book contains activities using a technique that allows students to practice routine arithmetical operations. Activities with this technique from other disciplines are included.

Arithmetic, NS, Pattern, Manipulation, Algebra, Geometry (EL)


This book provides a model for taking instruction from the traditional focus on content to a student-centered focus. The four sections: Introduction, Content/concept standards and performance benchmark (grades 3, 5, 8, & 12), Technology Connections, and Performance Designers.

Curriculum, Technology, PS, Pattern, NS, Algebra, Geometry (K-12)


This book brings together papers by scholars from around the globe on the historiography and history of mathematics and their integration with mathematical pedagogy.

Core, Teaching, Algebra, Calculus (ALL)


The purpose of this book is to bring together research and theory about motivation for mathematics from different perspectives, by the influence of gender, culture, the classroom environment, and curriculum on children’s mathematical performance and motivation.

Attitude, Ethnic, Research, Blf, Curriculum, Achievement (K-12)


A study followed Wellesley College (Massachusetts) women students (n=445) matriculating in 1991 through their college years to isolate factors associated with persistence in math and science.

Attitude, Achievement, Gender, ADVANCED M (PS)


This document contains papers presented at the 19th annual conference of the Mathematics Education Research Group of Australasia.

Learning, Technology, PS, TAttitude, Curriculum, Measurement (K-12)


Materials to support teachers and teacher education students who are interested in developing a culture of inquiry and communication in their mathematics classes are included.

Communication, Mathematics, Transfer Knowledge, Teaching, Inquiry, Research (TE)


Missouri’s frameworks provide indicators of what students should know and be able to do by the end of grades 4, 8, and 12. They contain suggested resources, discussions of issues and current practices. Contains 12 references.

Mathematics, Curriculum, IC, Technology, PS, Teaching (K-12)


This report details methods and results of an evaluation of the implementation trial. Sources of information included interviews, questionnaires, log sheets, and reports.

Assessment, Achievement, Comp, Mathematics (EL)

This issue features materials that encourage active learning through the use of hands-on materials designed to engage students in minds-on active learning. Information about a cross section of materials in different media or formats and at various grade levels along with ordering and price information is included.

**Matl, Manp, Tchg, MMed, Curr, Styl (K-12)**


This volume includes 10 reports that present findings and recommendations for advancing women in science, mathematics and engineering.

**Eqty, Gend, Impl, Curr (ALL)**


The mathematical content of this software package focuses on the relationships between equations and their graphs. The including four programs are: Equation Grapher, Linear and Quadratic Graphs, Green Globs, and Tracker.

**Alg, Comp, Matl, Tchg (SE)**


This paper discusses reading achievement in mathematics. Suggestions for improving the reading level of students in mathematics, as well as for reading abstract symbols, are given.

**Ach, Lang, Writ (K-12)**


This paper discusses reading achievement in mathematics. Suggestions for improving the reading level of students in mathematics are given, as well as suggestions for keeping dairies, writing problems, and using computers.

**Ach, Lrng, Lang, Writ, PS, Comp (K-12)**


Selected philosophies in the teaching of mathematics can provide guidance to the teacher. This paper discusses four such philosophies of teaching mathematics: Idealism, Realism, Experimentalism, and Existentialism.

**Phil, Curr, Tchg, Lrng (TE & ALL)**


This book contains 28 articles about establishing discourse communities in mathematics classrooms, its challenge and the role of language in mathematics discourse.

**Comm, Lang, Tchg, Lrng (ALL)**


This study includes 1) a status report of teachers' concerns regarding curriculum reform, 2) data regarding teachers' background, and 3) feedback to curriculum directors. Teachers active in professional organizations and science teachers have more positive attitudes toward reform than mathematics teachers.

**Curr, TBlf, TAtt, Tchr (TE)**


This keynote address focuses on equity in science and mathematics education. The discussion about the politics of knowledge acquisition involves a discussion of race, class, and gender.

**Eqty, Ethn, Gend, TAtt, Tchr, Curr (ALL)**


The chapters of this guide highlight such issues as a constructivist perspective on learning, National Council of Teachers of Mathematics goals and curriculum standards, the classroom climate, integrated learning, and alternative assessment procedures. Contains 87 references.

**Curr, Assm, Lrng, IC, Tchg (K-12)**


This document presents the agreements on principles and goals for mathematics assessment reached at the National Summit on Mathematics Assessment on April 23-
24, 1991, at the National Academy of Sciences in Washington, D.C.

**Assm, Ach, Curr, Soc, Plan (K-12)**


This book provides project descriptions and NSF Collaboratives for Excellence in Teacher Preparation Awards. The projects described received either new, continuation, or supplemental awards in Fiscal Year 1996. These projects provide models of exciting programs in teacher education.

**Prsv, TKnw, Tchg (TE)**

**Giesbrecht, Norman. (1996). Strategies for developing and delivering effective introductory statistics and methodology courses.** [SE 057 914]

This paper explores several key issues in statistical instruction. Tables in the appendix present research findings related to teaching techniques and essential topics in introductory-level statistics and research methods courses. It contains 67 references.

**Stat, TKnw, Tchg, Tchr, Curr, Anx (SE)**

**Gimenez, J.; and others. (1996). Becoming a primary teacher: Issues from mathematics education.** Sevilla, Spain: Gracia Alvarez. [SE 059 054]

This book includes an overview of the whole book, analyses the historical evolution of primary teacher education in Spain, and a discussion of issues related to mathematical knowledge. Contains 278 references.

**Prsv, TKnw, Rsch, Phil, Etnh, Lrng (TE, EC)**


This study investigated the nature and validity of teacher (n=28) judgments about student motivation as part of a project related to the teaching of mathematics.

**TBlf, Att, Blf, TAtt, Lrnr, Assm (TE, EL)**


This report presents the findings and recommendations of a workshop regarding the effect of international economic and technological changes on graduate student training in the physical sciences and mathematics.

**Impl, Eqty, Curr (PS)**


This article examines issues that were critical for eight preservice teachers learning to teach mathematics and social studies in the context of reform-minded methods classes.

**Prsv, TAtt, TKnw, TBlf, Styl, Tchg (TE, EL)**


The books contain puzzles which present a wealth of opportunities for discovering interesting facts about numbers and their interrelationships and some basic principles of elementary number theory.

**Matl, Tech, Curr, Comp (ALL)**

This report provides a description of the Dwight D. Eisenhower Mathematics and Science Regional Consortium Program's early operations as a first step in a study.

TKnw, Assm, Matl (ALL)


This report contains findings of a year-long evaluation of the Mathematics and Education Reform (MER) Forum, a voluntary association targeting the academic mathematics community in four-year colleges and universities.

Curr, Impl, Assm, TKnw (ALL)

Heidari, Farzin. (1996). *Laboratory barriers in science, engineering, and mathematics for students with disabilities*. [ED 397 583]

This report addresses the barriers college students with disabilities face in the laboratory setting.

LD, CAI, Tech, Matl (PS)


The first interim report on the Eisenhower State Curriculum Frameworks Projects examines the progress grantee states have made in completing mathematics and science curriculum frameworks and developing new approaches to teacher education, certification, recertification, and professional development.

Curr, TKnw (ALL)


This document includes a collection of activity-based mathematics lessons for grades 5-8 from the Arithmetic Teacher journal.

Matl, PS, Frac, Tchg, Manp (MS)


This document is a collection of activity-based mathematics lessons for grades K-4 from the Arithmetic Teacher journal.

Matl, PS, Arth, Tchg, Manp (EC)


This book, geared for grades 4-8, includes ideas and suggestions for setting up problem solving classroom and assessment strategies. Real life problems and possible approaches to their solutions are included.

PS, Curr, PAtt, Sty, Matl, Assm (EL)


This document contains 75 research reports, 32 oral reports, and 28 posters presented at the 18th Annual Meeting of the PME-NA sponsored by the Florida State University in October, 1996.

Rsch, Lrng, Phil, Curr, Tchr, Tchg (K-12 & TE)

Jaramillo, James. (1996). *Do learners restructure or recreate a second language in the content area of mathematics?* [SE 058 838]

This paper summarizes how mentalists have employed the concepts of recreating and restructuring to explain how children and adults acquire a second language, and to show how the context of these terms is integrated within the content area of mathematics.

Lang, Lrng, Patt, Tchg (SE)


This book contains materials to present mathematics concepts using cooperative learning activities.

Grpg, Matl, Lrng, Manp, Arth, Geom (EL)


This book details the theory and practice of portfolio assessment in mathematics and science for the elementary and middle grades as implemented in the Authentic Assessment for Multiple Users project funded by the National Science Foundation.

Assm, Lrng, Matl, Writ (MS)

This paper discusses the benefits of technology for mathematics education and describes developments in the mathematics curriculum at Middle Tennessee State University. It contains 12 references.

**Tech, Tchg, Prsv, Curr, PS, Comm (TE)**


This paper discusses the internet use in education and provides a guide for hands-on experience with internet in order to improve mathematics and science education for students everywhere.

**Tech, Comp, Matl, Eqty, Tchg (ALL)**


This book is a collection of 191 mathematical problems aimed at the advanced high school student level and above. The book is divided into two sections: 1) Problems themselves. 2) The solutions, historical and other notes.

**Matl, PS, Patt, AdvM, Geom, Alg (SE)**


This book is a collection of articles on assessment in mathematics selected from issues of three journals: the Arithmetic Teacher (later published as Teaching Children Mathematics), the Mathematics Teacher, and Mathematics Teaching in the Middle School.

**Assm, Revw, Impl (K-12)**


This paper describes a project in which the focus was to investigate the effects of the use of "Hands-On Equations" mathematics manipulatives on students' confidence, interest in, and ability to solve and retain understanding of algebraic equations.

**Manp, Alg, Att, Lrng, Tchg (SE)**


A study to determine whether a test item characterization scheme could be created based on a state policy document that serves as the driving force behind large-scale performance assessment in the context of the development of a possible national mathematics assessment.

**Assm, Curr (K-12)**


This book includes rationale on how storytelling benefits learning are presented, how students can best benefit from storytelling exercises, stories to get teachers started, and a list of resources and books of stories for classroom.

**Lang, Comm, Lrng, Matl, Tchg (EL)**


This monograph is the first in a series of three which will report on TIMSS in Australia, one for each of these populations, and contains a description of the procedures used and results. Appendices include statistical tables, item difficulty maps, publications used for document analysis, and a bibliography.

**Ach, Assm, CC, Impl, Ethn (SE)**


This issue of Learning reports on the QUASAR Project, begun to help revolutionize middle-school math instruction and performance in low-income neighborhoods. This article highlights some of the methods, strengths, and outcomes.

**Tchg, Lrnr, Lrng, PS, Manp, Grpg (MS)**

This book contains fun and creative ways to integrate mathematics with a diversity of areas. The units in this book fall into two main categories: those adapting the integrated model and those adapting a modified version of the shared model. Contains 26 references.

IC, Matl, Patt, Grpg. PS (K-12)


This brochure explains a number of aspects of the three sets of standards established by the National Council of Teachers of Mathematics. Included in the brochure are the rationale, the nature, and an overview of the standards.

Curr, Assm, PS, Plan (K-12)

*Mathematics and science education around the world: What can We learn? From the Survey of Mathematics and Science Opportunities (SMSO) and the Third International Mathematics and Science Study (TIMSS)*. (1996). Washington, DC: National Research Council, Mathematical Sciences Education Board or Committee on Science Education K-12. [SE 059 190]

Topics covered include: information on TIMSS, opportunity to learn, kinds of information collected by TIMSS researchers, challenges and opportunities of cross-national research, information on SMSO, what can be learned from SMSO, intended curriculum, implemented curriculum and instructional practices, and questions that might be explored by TIMSS.

Assm, CC, Curr, Tchg (K-12)


This brochure includes a timeline for the release of the TIMSS data and directions about whom to contact for further information. The ideas of intended and implemented curricula are discussed and a number of questions related to these ideas that TIMSS may answer are listed.

Assm, Curr, Ach, CC, Rsch (K-12)


This report describes the steps ACT has taken to ensure that the content foundations of the ACT Assessment Mathematics Test are solid. Evidence is provided.

Assm, Curr, Ach, Matl (PS & HS)


Assm, Ach. Impl (K-12)


This document highlights what is needed to ensure excellence in mathematics education as teachers and schools prepare students for the world beyond the classroom.

Curr, Tchg, Soc, PS. CIIn (K-12)


Zoo Zillions contains five activities: Annie's Jungle Trail, 3D Gallery, Number Line Express, Gnu Ewe Boutique, and Fish Stories. Overviews of the programs are included in the documentation and a troubleshooting guide is provided.

Comp, Vis, Arth, NSns, Matl, PS (EL)


This book shows parents how to transform their family's involvement in mathematics with valuable and practical ways to expose their children to the mathematics. It contains 47 references.

Patt, Soc, Matl (EL)

Findings from a 4-year study of exemplary science and mathematics programs for middle school students with limited English proficiency (LEP) are presented.

Lang, Ethn, Att, Tchg (MS)


This paper provides comparative assessments of students (8th grade in Minnesota, n=5000) outcomes, instructional practices, curricula, and cultural context.

Assm, Ach, CC, Curr, Soc, Tchg (MS)


Investigations into children's number learning have been a feature of recent mathematics education research in Australasia. This book is divided into 4 sections: The Development of Counting; Numeration and Place Value; Computational Processes and Strategies; and Computation and Number Sense.

NSns, Lrng, PlcV, Arth, Ethn (EL)


This software is a database of more than 950 entries that describe projects, resources, and organizations dedicated to significantly improving K-12 mathematics and science education.

Insv, Matl, Tech, Curr, Comp (ALL)


This book is designed to prepare students for taking the SAT I - Reasoning Test using a problem solving focus.

PS, Matl, Assm, Ach (HS)


This book focuses on curricular issues involved in preparing students for taking the SAT I - Reasoning Test using a problem solving focus.

Assm, PS, Alg, Geom (HS)


A broad spectrum of ideas in the area of the problem solving in mathematics is included. 20 articles in this book reveal various aspects of problem solving. Appendices include sources for problems and readings on problem solving.

PS, Lrng, Matl, Grpg, Tchg (K-12)


Details of position statements of the National Council of Teachers of Mathematics (NCTM) are provided.

Curr, Matl, Tech, Att (K-12)


The four volumes of these conference proceedings include: research reports; descriptions of posters; reports of working groups and discussion groups; and plenary addresses.

Rsch, Phil, Lrng, Gend, Assm, Ethn (All)


This is an addenda to the conference proceedings. Three papers included in response to papers in Volume 1 are: Mathematizing; Mathematics Teacher Development; and
Improving Knowledge, Professional Growth and Monitoring the Development of Mathematics Teachers. Contains 49 references.

**Rsch, Lrng, Rep, TKnw, TAtt (ALL)**


This paper reports a subset of findings from an extensive investigation of (n=61) preservice elementary teachers' beliefs about and knowledge of alternative mathematics assessment.

**TKnw, Assm, TBlf, TAtt (TE, EL)**


This report on Project Kaleidoscope includes information about the project, the institutions and people involved, important issues and activities, and future plans.

**Impl, Curr, Matl, Tchg, Rsch (PS)**


Essays about calculus reform effort are presented. Basic themes, the vision of calculus reform, planning, assessment and the effect of calculus reform on precalculus and advanced courses are discussed. List of sources including internet resources are included.

**Calc, AdvM, Matl, Assm, Curr (PS)**


This paper looks at the Teacher Education Equity Project (N=61), which was designed to bring gender equity to teacher education.

**Eqty, Gend, Prsv, TKnw (TE)**


This book contains 13 narratives containing a wealth of detailed and specific images by teachers who are working with constructivist methods and principles to transform their practice along the lines mandated by the NCTM Standards. 5 essays written by teacher educators to reveal some of the broader issues are included.

**Lrng, TKnw, TBlf, Tchg (TE)**


This book contains 9 narratives written by teachers describing their struggle to understand constructivism and its application to learning mathematics, and transform their mathematics instruction. Four essays written by teacher educators which explore some of the challenges posed by the new mathematics pedagogy are included.

**Lrng, TKnw, TBlf, Tchg (TE)**


This document contains the executive summary of the final report of a committee of the Advisory Committee to the Education and Human Resources. The year-long review revealed significant change and important measurable improvements in the past decade.

**Curr, Matl, Rsch (PS)**


This report is divided into four sections. Each section outlines the background and purpose of the review, highlights the recent history of education reform and undergraduate programs, contains the findings of the review, and includes recommendations.

**Curr (PS)**


This monograph presents first-hand experiences of teachers and students using the Internet in K-12 math and science, as well as articles on getting the right hardware, choosing an Internet service provider, designing an online project, and fostering acceptable use.

**Tech, Matl, Tchg, Grpg, Lrng (K-12)**

This book contains 18 reproducible Math Storymats. Each storymat is accompanied by guides to 2 different activities. Each guide comprises target skills, materials list, steps for the activity, read-aloud story, math talk tips, and journal extensions.

**Arth, Manp, Lang, Matl (EC)**


Recommendations for using technology in mathematics classrooms are discussed from various aspects.

**Tech, Comp, Ctr, Tchg, Lrng, Ethn (ALL)**


This book brings together papers by scholars from around the globe on the historiography and history of mathematics and their integration with mathematical pedagogy.

**CC, Ethn, Tchg, Soc, Alg, Calc (ALL)**


This book contains 100 puzzles that were specifically designed to be both fun and challenging and to promote the idea that becoming a better problem solver can be a rewarding experience.

**PS, Matl, Lrng, Tchg (K-12)**


This guidebook contains: 1) general information about the 16 agencies, and 2) features nationwide agency-sponsored mathematics and science programs for elementary and secondary education.

**Curr, Matl (K-12)**


This information booklet describes the design and development of TIMSS, its coordination and schedule, and its components including student assessments, performance assessments, questionnaires, curriculum analysis, videotape observations, and case studies.

**Assm, CC, Ach, Curr. (K-12)**


This book illustrates how constructivist ideas can be used by science and mathematics educators for research and the further improvement of educational practice.

**Lrng, Tchg, Rsch, Curr, TKnw (ALL)**


This document reviews the five partnership projects developed by the teacher education program at William Woods University (MO), including mathematics and science teacher education.

**Prsv, LD (TE)**


The principal focus of this study was the assessment of mathematics in primary education within Realistic Mathematics Education (RME). Contains 429 references and includes a summary in Dutch.

**Assm, Tchg, Ethn, Curr, RaPc, Matl (EL)**
Papers and Monographs Produced in 1996


This document is a user's manual for administering the Mathematics Competency Test. It contains sections on preparation, instructions for administration, using the test with poor readers, scoring key, interpreting scores, using profiles, validity, reliability, item analysis procedures, and sub-scales.

Assm, Ach, Ethn (ALL)


An experimental study examined the effects of preschool attendance on third graders' (n=111) mathematics achievement. It contains 12 references.

Ach, Ethn (EC)

What schools can do to improve math and science achievement by minority and female students. (1996). [SE 059 538]

This pamphlet has been prepared for teachers, counselors, and administrators who serve in school systems that have federally funded programs or activities. It reviews survey data concerning the representation of minority and female students in mathematics and science courses at elementary and secondary levels.

Eqty, Ethn, Gend, Revw (K-12)


This book presents a rationale for multicultural mathematics education, including an overview of issues, features of a multicultural mathematics curriculum, and connections between mathematics and literature. Classroom activities and lists of 214 resources and 99 references are included.

Ethn, Eqty, Matl, Curr, Patt (K-12)


This document contains the proceedings of the China-Japan-U.S. Seminar on Mathematical Education that was held in 1993 in China. One of the main purposes of the seminar was to examine the present states of problem solving in school mathematics in China, Japan, and the U.S.

CC, PS, Tchg, Curr, Lrng, TKnw (K-12)
Every dissertation, journal article, paper, and monograph listed in the preceding three sections is indexed by 1-3 Major and any number of Minor topic coes (see Key to Codes). The 77 major codes have been clustered into 18 groups of related topics for the purposes of indexing. Only the Major codes are listed after each entry in the index.

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| Articles | Papers |
|-------------------|---------------------------|-----------------------------|------------------------|
| Campbell | Insv, Ach, Ethn | Erickson | Plan, Ach, Curr | Blf, TBff, Ach |
| Friedman | Gend, Ach, Impl | Hart | PS, Att, Ach | Grpg, Aff |
| Jacobs | Grpg, Aff, Ach | Ma | Grpg, Ach, Ethn | Hodge-Hardin |
| Kramer | Ach, Revw | Triadafilidis | Att, Ach, IC | Hook |
| Lafferty | Lapp | Lewis | Frac, Whol, Blf | PS, Ethn, Att |
| McBee | “Achievements of” | “Alberta program” | Curr, Blf, Ach | Malceod |
| Middleton | “Math and science” | “Math and science” | Assm, Curr, Ach | Malpass |
| Morrow | “Mathematics framework” | “Mathematics framework” | Assm, Ach | Martinez |
| Nguyen | “Minnesota TIMSS” | “Minnesota TIMSS” | Assm, CC, Ach | Nguyen |
| O’Conner | “Third International” | “Third International” | Assm, CC, Ach | Newell |
| O’Neal | “Achievements” | “Achievements” | Assm, Curr, Ach | O’Brien |
| Quinteros | “Mathematics framework” | “Mathematics framework” | Assm, Ach | Payne |
| Revak | “Minnesota TIMSS” | “Minnesota TIMSS” | Assm, Curr, Ach | Pobre |
| Revak | “Third International” | “Third International” | Assm, CC, Ach | Redden |
| Revak | “Achievements” | “Achievements” | Assm, Curr, Ach | Sarama |
| Revak | “Mathematics framework” | “Mathematics framework” | Assm, Curr, Ach | Sciuco |
| Revak | “Minnesota TIMSS” | “Minnesota TIMSS” | Assm, Curr, Ach | Senfeld |
| Revak | “Third International” | “Third International” | Assm, CC, Ach | Siegle |

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- **Smith**: Alg, PS, Anx
- **Spanias**: Anx, Pers
- **Stansberry**: Geom, Ach, Att
- **Szydlik**: Calc, Lrng, Bif
- **Thurlow**: Writ, Ach, Att
- **Tynker**: Whol, Att, Ach
- **Wallace**: Ethn, Gend, Bif
- **West**: Curr, Ach, Att
- **Williams**: Styl, Att, Ach
- **Williams**: CAI, Anx, D/R
- **Yarema**: Calc, Att

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- **Childs**: Cooley
- **Curtin**: De Kee
- **Dyer**: Farrer
- **Gibson**: TAnx
- **Hook**: TB1f
- **Johnson**: Content Knowledge
- **Klein**: Teachers (characteristics of)
- **Lemoine**: Calc, Rep
- **Lewis**: CAI, Alg, Ach
- **Mack**: D/R, Alg, Arth
- **Meel**: Calc, Gend
- **Moser**: Calc, Tech
- **Mower**: Alg, Ctr, GCal
- **Newberg**: CC, Alg, Curr
- **Newell**: Writ, Alg
- **Oberg**: Calc, Att
- **Petock**: Alg, Comp
- **Pugalee**: CAI, Alg, Geom
- **Quinteros**: Calc, Lrng, Bif
- **Rodgers**: Calc, Curr, Lrng
- **Smith**: Manp, Alg, Sty
- **Smith**: Calc, Lrng, Alg
- **Ainley**: Alg, Tchg
- **Anderson**: Prf, AdvM
- **Blanon**: Calc, Mscn, Rep
- **Borba**: CAI, Rep, Alg
- **Chazan**: Alg, Mscn, Knw
- **Chernault**: AdvM, Lrng, Alg
- **Daghet**: Lrng, Alg, Comp
- **English**: Lrng, Alg
- **Farrell**: GCal, Calc, Tchg
- **Linchevski**: Arth, Alg, Knw
- **Mower**: Writ, Curr, Alg
- **Padula**: Alg, Mscn, Knw
- **Quinn**: PS, Alg, Arth
- **Rochowicz**: Tech, Calc, TAtt
- **Vidakovic**: Calc, Lrng
- **White**: Calc, PS
- **Zuknis**: AdvM, Lrng, Alg

### Dissertations and Theses

- **Abuloum**: Alg, TBlf, GCal
- **Agwu**: Calc, Tech
- **Allsopp**: Ach, Alg, PS
- **Anthony**: Calc, Curr
- **Arnold**: Comp, Alg, Prsv
- **Barton**: GCal, Calc, TBlf
- **Burchett**: Ach, Att, Alg
- **Chamblee**: GCal, Alg
- **Chernault**: Ach, Alg, Aff
- **Dugdale**: Alg, Comp, Matl
- **Leinenbach**: Manp, Alg, Att
- **Roberts**: Calc, AdvM, Matl

### Anxiety (teacher’s) (TAnx);
- **Attitudes (teacher’s) (TAtt);
- **Beliefs (teacher’s) (TB1f);
- **Content Knowledge (teacher’s);
- **pedagogical knowledge (TKnw);
- **Teachers (characteristics of) (Tchr)"
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**Classroom interaction (CI); Communications (Comm); Oral communication, classroom discourse (Oral); Writing, journals (Writ)**

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### Gender differences (Gend)

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### Geometry (Geom); Measurement (Meas); Spatial visualization (Vis)

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#### Geometry (Geom)

#### Measurement (Meas)

#### Spatial visualization (Vis)
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Metacognition, reflection (Mtcg);
Patterns, relationships, math connections (Patt);
Problem solving, reasoning (PS);
Proof, justification (Prf)

Dissertations and Theses

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