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ABSTRACT

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. Asli Ozgun-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 CSMEE Clearinghouse for Science, Mathematics, and Environmental Education

Research in Mathematics Education 1996

Edited by

Douglas T. Owens

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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 elemtentary level were coded TE,EL, for example.

Topic Codes

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

Level Codes

EC	Early childhood, K-4	EL	Elementary, K-8
MS	Middle grades, 5-8	SE	Secondary, 5-12
HS	High school, 9-12	K-12	All school levels
PS	Post secondary, 13+	ALL	All student levels
TE	Teacher education, teachers		

Dissertation Research in Mathematics Education Reported in 1996

James D. Atkinson & John M. Wetzel, *The Ohio State University*

This section lists 270 dissertations in mathemtics 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).

Abuloum, Khaled Moh'd. (1996). *Graphing calculators: Teacher perceptions, training, and attitude* (University of Nebraska - Lincoln). DAI-A 57(03), p. 1063, Sep 1996. [AAC 9623616]

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)

Adajian, Lisa Byrd. (1995). *Teachers' professional community and the teaching of mathematics* (University of Wisconsin). DAI-A 56(08), p. 3038, Feb 1996 [AAC 9536148]

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)

Agwu, Nkechi Madonna Adeleine. (1995). *Using a computer laboratory setting (CLS) to teach college calculus* (Syracuse University). DAI-A 57(02), p. 611, Aug 1996. [AAC 9619032]

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.

Calc, Tech, PS, Att, ClIn (PS)

Akujobi, Clifford Orindu. (1995). *Teachers' knowledge and beliefs about the use of computers in high school mathematics* (Michigan State University). DAI-A 56(07), p. 2594, Jan 1996. [AAC 9537184]

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)

Albertson, Ann-Michelle. (1995). *Computational estimation: A comparison of learning disabled students and controls* (MGH Institute of Health Professions). MAI 34(04), p. 1353, Aug 1996. [AAC 1378541]

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)

Allsopp, David Henderson. (1995). *Classwide peer tutoring and the acquisition of algebra problem-solving skills for middle school students at risk of math failure in mainstream general math classes* (University of Florida). DAI-A 56(11), p. 4347, May 1996. [AAC 9607485]

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)

Alsup, John Keough. (1995). *The effect of mathematics instruction based on constructivism on prospective teachers' conceptual understanding, anxiety, and confidence* (University of Wyoming). DAI-A 56(08), p. 3038, Feb 1996. [AAC 9540142]

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)

Alvarez, Laura. (1996). *An application of the hybrid model to a state competency test in mathematics (remediation)* (City University of New York). DAI-A 57(01), p. 140, Jul 1996. [AAC 9618042]

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)

Amabile, Teresa M. (1996). *Implications of students' beliefs about the nature of ability for classroom experiences and learning* (Brandeis University). DAI-A 57(01), p. 98, Jul 1996. [AAC 9614429]

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)

Ansell, Ellen Sue. (1995). *Understanding children's strategy use as classroom activity* (University of Wisconsin). DAI-A 56(07), p. 2594, Jan 1996. [AAC 9528646]

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)

Anthony, Tamara Lynn. (1995). *An introduction to linear algebra: A curricular unit for pre-calculus students* (Rice University). MAI 34(03), p. 954, Jun 1996. [AAC 1376980]

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

Calc, Curr (HS, PS)

Arnold, Stephen Mark. (1996). *Learning to use new tools: A study of mathematical software use for the learning of algebra* (University of New South Wales). DAI-A 57(06), p. 2439, Dec 1996. [Not available from UMI]

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)

Azim, Diane S. (1995). *Preservice elementary teachers' understanding of multiplication with fractions* (Washington State University). DAI-A 57(06), p. 2439, Dec 1996. [AAC 9632236]

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)

Baker, Kay Mandzak. (1995). *Second- and third-grade children's understanding of multiplication word problems* (University of Maryland). DAI-A 57(03), p. 1063, Sep 1996. [AAC 9622024]

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)

Barton, Susan Dale. (1995). *Graphing calculators in college calculus: An examination of teachers' conceptions and instructional practice* (Oregon State University). DAI-A 56(10), p. 3868, Apr 1996. [AAC 9604292]

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, TBlf, Tchg, Curr (PS)

Bass, Deborah L. (1995). *Fifth graders' thoughts and dispositions in mathematics journals* (University of South Carolina). DAI-A 56(08), p. 3039, Feb 1996. [AAC 9541209]

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, Mtcg, Att (MS)

Beirne, Mary Helen. (1996). *Observation-based assessment: staff development influence on first grade teachers' mathematical beliefs and practices* (Temple University). DAI-A 57(06), p. 2340, Dec 1996. [AAC 9632012]

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.

Ach, Assm, TBlf, TAtt (EL, TE)

Benedetto, Caatherine Marie. (1995). *Fourth and fifth graders conceptions of fractions of discrete sets* (University of Maryland). DAI-A 57(03), p. 1064, Sep 1996. [AAC 9622025]

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.

Frac, Knw, PS, Eqv, M/D (EL)

Bensbaa, Abderrezak. (1994). *Proposition d'une approche didactique fondee sur l'idee de genese conceptuelle, a l'usage de l'enseignement des mathematiques: Geneses virtuelles des operateurs differentiels vectoriels* (Universite Laval). DAI-A 56(07), p. 2595, Jan 1996. Language: French. [AAC NN97740] [Title in English: *Proposal for a didactic approach to teaching mathematics based on the idea of conceptual genesis: Virtual geneses from differential vector operators*]

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.

Phil, Tchg (TE)

BJarnason, Leona Darlene. (1995). *Strategies for improving the mathematics 30(CAI) course(Alberta)* (University of Alberta, Canada). MAI 34(04), p. 1339, Aug 1996. [AAC MM06385]

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.

CAI, Curr (TE)

Boehm, Elizabeth Jane. (1996). *Linking conceptual understanding in teaching with learning 5th grade mathematics* (University of Texas at Austin). DAI-A 57(06), p. 2399, Dec 1996. [AAC 9633092]

Conceptually-based instruction on whole numbers, decimals, fractions and basic geometry was provided in two fifth-grade classrooms, and conventional textbook-based instruction was provided in other fifth-grade classrooms. Children receiving conceptually-based instruction performed significantly better on fraction and geometry items.

Lrng, Manp, Rep, Whol, Frac, Geom (MS)

Boissy, Leo Paul. (1994). *Teaching and assessing mathematics 12: A departure from tradition* (Simon Fraser University). MAI 34(02), p. 495, Apr 1996. [AAC MM01037]

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.

Grpg, Assm, Tchg (SE)

Bough, Mary Ellen. (1996). *A survey of support measures and objectives foundational to a focus on mathematical problem-solving as perceived by selected elementary school teachers and principals* (Temple University). DAI-A 57(03), p. 1064, Sep 1996. [AAC 9623750]

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.

Curr, PS (TE, EL)

Bourgeois, Waltine M. (1995). *The impact of peer tutoring and lecture methods in urban college developmental mathematics courses on student academic performance* (Texas Southern University). DAI-A 56(10), p. 3868, Apr 1996. [AAC 9544972]

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.

D/R, Att, Ach, Styl, Grpg, Gend (PS)

Boyk, Daniel Warren. (1996). *An introductory probability unit designed to counter representativeness misunderstandings* (University of Michigan). DAI-A 57(06), p. 2399, Dec 1996. [AAC 9635489]

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)

Brickner, Dianna Lynn. (1995). *The effects of first- and second-order barriers to change on the degree and nature of computer usage of mathematics teachers: A case study* (Purdue University). DAI-A 56(07), p. 2647, Jan 1996. [AAC 9540219]

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, Insv, TBlf, TAnx, Lrng (TE)

Brinker, Laura Jane. (1996). *Representations and students' rational number reasoning* (University of Wisconsin - Madison). DAI-A 57(06), p. 2340, Dec 1996. [AAC 9629584]

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)

Brown, David Stuart. (1995). *The effect of using a systematic application of mental math on math achievement and attitude of fourth-grade students using three modes of presentation: teacher, parent, and student-tutor* (State University of New York at Buffalo). DAI-A 56(10), p. 3869, Apr 1996. [AAC 9603567]

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)

Brown, Scott Alan. (1996). *The mathematics learning log and its effects on mathematics achievement, anxiety, and communication* (Montana State University). DAI-A 57(06), p. 2399, Dec 1996. [AAC 9633816]

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)

Buchman, Andrea. (1996). *Arithmetic fact retrieval in a case study of developmental dyscalculia* (MGH Institute of Health Professions). MAI 34(05), p. 1737, Oct 1996. [AAC 1378892]

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)

Bullock, Velma Lucille. (1995). *The influences of a constructivist teaching approach on students' attitudes toward mathematics in a preservice elementary teachers mathematics course* (University of Texas at Austin). DAI-A 57(02), p. 611, Aug 1996. [AAC 9617181]

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)

Burchett, Amy Ragan. (1995). *Student achievement and attitudes in applied math: A tech prep initiative* (Baylor University). DAI-A 56(11), p. 4258, May 1996. [AAC 9608420]

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)

Campbell, Clyde Preston. (1994). *A study of the effects of using a computer algebra system in college algebra* (West Virginia University). DAI-A 56(09), p. 3489, Mar 1996. [AAC 9543411]

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)

Chamblee, Gregory Eugene. (1995). *Using graphing calculators to teach first-year algebra: North Caro-*

lina mathematics teachers' concerns (University of North Carolina at Chapel Hill). DAI-A 56(10), p. 3869, Apr 1996. [AAC 9605099]

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. **GCal, Alg**, Gend, TKnw (SE,TE)

Chang, Sy-Ning. (1995). *Development of place-value numeration concepts in Chinese children: Ages 3 through 9* (University of North Texas). DAI-A 56(08), p. 2993, Feb 1996. [AAC 9543209]

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.

PlcV, CC, Lrng, Knw (EC)

Chernault, Edward Neal. (1996). *The relationship of mathematics prerequisites and other academic factors to student achievement in two Virginia community colleges* (Virginia Polytechnic Institute and State University). DAI-A 57(02), p. 560, Aug 1996. [AAC 9618958]

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).

Ach, Alg, Aff (PS)

Childs, Kimberly McRae. (1995). *An investigation of the role of patterns in developing algebraic thinking* (Texas A&M University). DAI-A 57(01), p. 141, Jul 1996. [AAC 9615789]

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.

Patt, Alg, Curr (EC)

Cleare, Brendamae C. (1995). *The development of an instrument to identify factors which contribute to underachievement in mathematics in the Bahamas* (University of Tennessee). DAI-A 56(08), p. 3092, Feb 1996. [AAC 9540085]

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.

Assm, D/R, Ach, Ethn (HS & PS)

Cockburn, Karen Sue. (1995). *Effects of specific toy playing experiences on the spatial visualization skills of girls ages 4 and 6* (Washington State University). DAI-A 57(06), p. 2350, Dec 1996. [AAC 9632241]

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

Vis, Manp, Gend (EC)

Cogan, Leland Scott. (1996). *Evaluating students' motivation in predicting mathematics and science performance: a developmental perspective* (Michigan State University). DAI-A 57(05), p. 1957, Nov 1996. [AAC 9631251]

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.

Aff, Soc, Ach (Not given)

Cook, Carol Eileen. (1995). *The effect of microcomputer-assisted instruction on the achievement scores of third grade math students* (Central Missouri State University). MAI 34(03), p. 942, Jun 1996. [AAC 1377603]

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.

CAI, Ach (EC)

Cooley, Laurel Alma. (1995). *Evaluating the effects on conceptual understanding and achievement of enhancing an introductory calculus course with a computer algebra system* (New York University). DAI-A 56(10), p. 3869, Apr 1996. [AAC 9603282]

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.

Comp, Calc, Ach, Lrng, Knw (PS)

Cotter, Joan A. Donohoo. (1996). *Constructing a multidigit concept of numbers: Teaching experiment*

in the first-grade (University of Minnesota). DAI-A 57(04), p. 1465, Oct 1996. [AAC 9626354]

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).

A/S, PlcV, Manp, NSns (EC)

Curran, Judith Ellen. (1995). *An investigation into students' conceptual understandings of the graphical representation of polynomial functions* (University of New Hampshire). DAI-A 57(02), p. 611, Aug 1996. [AAC 9617070]

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.

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

Dale, Nancy Jo. (1995). *A case study of the mathematics curriculum change process of a senior high school* (University of Minnesota). DAI-A 56(08), p. 2983, Feb 1996. [AAC 9541309]

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.

Curr, Insv (HS)

Daniel, Patricia Churchill. (1995). *Study of an interactive multimedia environment in mathematics and science teacher preparation* (Georgia State University). DAI-A 56(12), p. 4730, Jun 1996. [AAC 9610044]

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.

Prsv, MMed, Tchg, Lrng (TE)

Day, Dennis Paul, Sr. (1994). *Teacher perceptions of PSInet as a computer teleconferencing network for the improvement of science and mathematics education* (Drake University). DAI-A 56(10), p. 3923, Apr 1996. [AAC 9603228]

Results of a survey of "new user" educators of the People Sharing Information network indicated that teachers are more apt to promote student use than self use and to communicate locally than long distance. PSInet was found to be easy to set up and use.

MMed, TAtt, Insv (TE)

De Kee, Sonja. (1994). *La comprehension des rapports et des fonctions trigonometriques sinus et cosinus chez del eleves du secondaire* (Universite Laval). DAI-A 56(07), p. 2595, Jan 1996. Language: French. [AAC NN97830] [Title in English: *Secondary students' understanding of the sine and cosine functions and trigonometric relationships*]

Secondary students in Quebec were found to have deeper understanding of the sine and cosine functions in the triangle/rectangle context than in that of the trigonometric circle. Few students had developed links between the two contexts.

Calc (SE)

DeLoach, William Arthur. (1995). *The validity of using authentic assessments to insure the attainment of learner outcomes in secondary mathematics courses* (University of Nebraska - Lincoln). DAI-A 56(10), p. 3870, Apr 1996. [AAC 9604406]

Qualitative methods were used to produce three case studies followed by a cross-case analysis. It was determined that students viewed the assessment an authentic task, teachers were positive about the assessment, and significant mathematics skills were embedded in the assessment.

Assm, Blf, TAtt, Tech (SE)

Di Cintio, Matthew James. (1996). *Student motivation and the complexity of mathematics instruction before and after the middle school transition* (Pennsylvania State University). DAI-A 57(04), p. 1482, Oct 1996. [AAC 9628071]

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.

Aff, Lrng, Tchg, Styl (MS)

Doctorow, Gordon. (1995). *Writing to learn high school mathematics and conceptual growth* (University of Toronto). DAI-A 56(12), p. 4688, Jun 1996. [AAC NN02894]

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.

Writ, Lrng, Mtcg, Aff (HS)

Dolezel. Susan Mcaleavey. (1996). *The effect of intervention strategies on mathematics anxiety among eighth grade females* (Christopher Newport University). MAI 34(06), p. 2125, Dec 1996. [AAC 1380600]

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)

Drager-McCoy, Judith Ann. (1996). *An assessment of the implementation of the Applied Mathematics (CORD) curriculum in Pennsylvania* (Pennsylvania State University). DAI-A 57(04), p. 1586, Oct 1996. [AAC 9628073]

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)

Dreher, Michael R. (1995). *Counting on you: The rhetoric of the National Council of Teachers of Mathematics "Standards"* (Louisiana State University) DAI-A 56(11), p. 4202, May 1996. [AAC 9609081]

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)

Dwyer, Nancy Kay. (1995). *The effects of beliefs and question format on the quality of diagrams drawn in problem solving* (University of Toledo). DAI-A 57(01), p. 141, Jul 1996. [AAC 9613750]

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)

Dyer, Laura A. (1996). *An investigation of the use of the algebra manipulatives with community college students* (University of Missouri - Saint Louis). DAI-A 57(05), p. 1985, Nov 1996. [AAC 9631869]

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)

Ebert, Christine Louise. (1994). *An assessment of prospective secondary teachers' pedagogical content knowledge about functions and graphs* (University of Delaware). DAI-A 56(08), p. 3039, Feb 1996. [AAC 9540518]

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)

El Moutaouakil, Touriya. (1995). *Etude descriptive des strategies cognitives et metacognitives d'eleves forts et faibles en mathematique au secondaire* (Universite de Sherbrooke, Canada). MAI 34/03, p. 955, Jun 1996. Language: French. [AAC MM04473] [Title in English: *Descriptive study of cognitive and metacognitive strategies of high- and low-achieving secondary mathematics students*]

Abstract not available.

Mtcg,Lrng, Styl (SE)

Ellis, Maureen Ann. (1995). *Multiplication verification in students with arithmetic learning disabilities and math level matched peers* (MGH Institute of Health Professions). MAI 34(02), p. 0513, Apr 1996. [ACC 1376827]

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.

M/D, LD, Whol (EL)

Enon, Julius Caesar. (1995). *Teacher efficacy: Its effects on teaching practices and student outcomes in mathematics* (University of Alberta, Canada). DAI-A 57(03), p. 995, Sep 1996. [AAC NN06207]

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.

Ach, Att, TBlf, Tchg, Tchr (EL)

Erchick, Diana Brandy. (1996). *Women and mathematics: Negotiating the space/barrier* (The Ohio State University). DAI-A 57(05), p. 1985, Nov 1996.

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.

Gend, Soc (TE)

Etheredge, Susan Mary. (1995). *A constructivist instructional approach to arithmetic word problem solving: Children as authors and collaborators* (University of Massachusetts). DAI-A 56(08), p. 3040, Feb 1996. [AAC 9541102]

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.

PS, Lrng, Knw, Arth (EL)

Faro-Schroeder, Julia D. (1995). *Development education: Factors that contribute to academic success* (Southern Illinois University). DAI-A 56(07), p. 2652, Jan 1996. [AAC 9536533]

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 coursetaking patterns, class level). Required placement testing and attendance policies are recommended.

D/R, Ach (PS)

Farrer, Carol A. (1995). *A comparison of Kentwood Public Schools' algebra standards and the UCSMP algebra objectives* (Grand Valley State University). MAI 34(02), p. 481, Apr 1996. [AAC 1376758]

The paper includes an examination of national recommendations and publications which influenced the authors of the UCSMP text and the national and state publications which influenced Kentwood's curriculum committee.

Alg, Curr (SE)

Fast, Gerald Ray. (1994). *Using analogies to overcome probability misconceptions* (University of Toronto). DAI-A 56(07), p. 2596, Jan 1996. [AAC NN97184]

The study applied a methodology previously applied to physics misconceptions. Misconceptions were identified and anchoring situations were generated. The overall success rate in overcoming misconceptions was 72% for high school students (n=41) and 75% for university students (n=24).

Prob, Mscn, Blf (HS & PS)

Fernandez, Maria Lorelei. (1996). *Secondary school mathematics student teachers' reflections on student teaching and perception of its role in developing teacher knowledge* (University of Georgia). DAI-A 57(03), p. 1097, Sep 1996. [AAC 9624052]

Prospective teachers perceived knowledge development during student teaching in four areas: general teaching knowledge, mathematics teaching knowledge, knowledge about students, and knowledge of the context. Oral and written reflections on student teaching reveal experiences at all three levels of reflectivity outlined by van Manen (1977): technical, practical, and critical.

Prsv, TKnw (TE)

Fiksal, Janel Kay. (1995). *The effects of instruction in heuristics on the use of problem-solving strategies and problem-solving performance of preservice elementary education majors* (University of South Dakota). DAI-A 57(03), p. 1064, Sep 1996. [AAC 9542565]

An experimental group received instruction in five problem-solving heuristics. The students used the heuristics with greater frequency following instruction and their problem solving performance improved.

PS, Prsv (TE, EL)

Fischer, Joyce Faye Brown. (1995). *Cognition in pure and applied mathematics: A study of the relationship between success in a basic college mathematics course and computational versus logical reasoning ability* (University of Texas at Austin). DAI-A 56(10), p. 3870, Apr 1996. [AAC 9603840]

The study (n=226) investigated whether mathematics courses should be sequenced according to the learning

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)

Foegen, Anne Marie. (1995). *Reliability and validity of three general outcome measures for low-achieving students in secondary mathematics* (University of Minnesota). DAI-A 56/08, p. 3077, Feb 1996. [AAC 9541316]

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)

Fraivillig, Judith Louise. (1996). *Case studies and instructional frameworks of expert reform mathematics teaching* (Northwestern University). DAI-A 57(06), p. 2400, Dec 1996. [AAC 9632689]

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)

Froebe, Jamie Smith. (1996). *Voices of high school girls and boys reflecting on math and science education* (Claremont Graduate School). DAI-A 57(01), p. 141, Jul 1996. [AAC 9617439]

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)

Frost, Jewell Yvonne. (1996). *Effect of cooperative learning on self-esteem of seventh grade mathematics students* (Central Missouri State University). MAI 34(06), p. 2122, Dec 1996. [AAC 1379822]

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)

Frykholm, Jeffrey Allen. (1996). *Rethinking supervision: Learning to teach mathematics in community* (University of Wisconsin - Madison). DAI-A 57(06), p. 2400, Dec 1996. [AAC 9632315]

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)

Furner, Joseph Michael. (1996). *Mathematics teachers' beliefs on using the National Council of Teachers of Mathematics "standards" and the relationship of these beliefs to students' anxiety toward mathematics* (University of Alabama). DAI-A 57(06), p. 2400, Dec 1996. [AAC 9633924]

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.

TBlf, Anx, Phil (MS)

Gessesse, Haile. (1996). *Problem solving: Uniform motion* (California State University, Dominguez Hills). MAI 34(06), p. 2138, Dec 1996. [AAC 1380007]

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).

Alg, PS, CAI (HS)

Gibson, David Richard. (1996). *Advanced calculus students' use of visual representations in the creation of mathematical proofs* (University of Kentucky) DAI-A 57(03), p. 1064, Sep 1996. [AAC 9623975]

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.

AdvM, Calc, Rep (PS)

Gordon, Sandra Rene. (1996). *The use of manipulatives in secondary school mathematics classrooms* (Christopher Newport University). MAI 34(06), p. 2138, Dec 1996. [AAC 1380602]

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)

Gorgorio Sola, Nuria. (1994). *Estrategies, dificultats i errors en els aprenentatges de les habilitats espacials* (Universitat Autonoma de Barcelona). DAI-C 57(04), p. 1062, Winter 1996. Language: Spanish. [Not available] [Title in English: *Stategies, difficulties and errors in the learning processes of spatial abilities*].

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)

Gould, Christine J. (1996). *The effect of mixed-sex and single-sex classes on the mathematics achievement and attitude of high school students* (University of Utah). DAI-A 57(02), p. 612, Aug 1996. [AAC 9619225]

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)

Gould, Suzanne Louise. (1996). *Strategies used by secondary school students in learning new concepts which require spatial visualization* (Columbia University Teachers College). DAI-A 57(02), p. 612, Aug 1996. [AAC 9620152]

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)

Grant, Theresa J. (1995). *Preservice teacher planning: An analysis of the journey from learner to teacher in mathematics and social studies* (University of Delaware). DAI-A 56(12), p. 4731, Jun 1996. [AAC 9610473]

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)

Grooters, Mary, Ann. (1996). *A study of the relationship between use of technology in math and higher test scores* (Grand Valley State University). MAI 34(04), p. 1340, Aug 1996. [AAC 1378518]

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)

Guckenberg, Thomas Frederick. (1995). *The design approach to software development utilizing children as the designers of learner-centered Logo-based mathematics software* (University of Wisconsin, Madison). DAI-A 56(07), p. 2543, Jan 1996. [AAC 9531675]

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)

Hamilton, Valerie T. (1996). *Mathematics anxiety and the elementary school teacher* (Christopher Newport University). MAI 34(06), p. 2138, Dec 1996. [AAC 1380603]

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)

Hannibal, Mary Anne Zeitler. (1996). *The child's developing understanding of basic geometric shapes* (State University of New York at Buffalo). DAI-A 57(06), p. 2401, Dec 1996. [AAC 9634439]

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)

Harder. Virginia Margrit. (1994). *Acquisition of fraction concepts one-half and one-fourth by first grade students using a constructivist approach* (University of Florida). DAI-A 56(11), p. 4307. May 1996. [AAC 9607069]

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)

Harding, Darlene Carol. (1995). *A comparative study of German and American school mathematics textbooks in their approach to problem solving* (State University of New York at Buffalo). DAI-A 56(07), p. 2596, Jan 1996. [AAC 9538085]

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)

Harpole, Carolyn Annetta. (1995). *Effects of a mental rotations curriculum on mathematical conceptualization and math anxiety in eighth-grade male and female students* (Oklahoma State University). DAI-A 57(02), p. 612, Aug 1996. [AAC 9618394]

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)

Henry, Julie Jacobs. (1995). *Interactions between teacher beliefs and the implementation of a mathematics curriculum innovation* (State University of New York at Buffalo). DAI-A 56(10), p. 3870, Apr 1996. [AAC 9603599]

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)

Herrelko, Janet M. (1996). *Content analysis of algebraic word problems for gender-based reasoning patterns* (University of Lowell). DAI-A 57(06), p. 2401, Dec 1996. [AAC 9635181]

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)

Herrera. Theresa Ann. (1995). *Teacher change in the staff development setting: Case studies of three middle school teachers of mathematics* (The Ohio State University). DAI-A 56/12, p. 4689, Jun 1996. [AAC 9612192]

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)

Hicks, Betty Jane. (1996). *Student mastery of basic mathematics skills: a comparison of two instructional approaches* (Christopher Newport University). MAI 34(06), p. 2139, Dec 1996. [AAC 1380604]

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)

Hitchcock, Charlotte R. (1996). *Do high school computer science teachers think that computer programming enhances mathematics education?* (Southern Connecticut State University). MAI 34(04), p. 1354, Aug 1996. [AAC 1378764]

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)

Hodge-Hardin, Sherri Lynn. (1995). *Interactive television in the classroom: A comparison of student math achievement among three instructional settings* (East Tennessee State University). DAI-A 56(11), p. 4366, May 1996. [AAC 9608988]

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)

Holst. Patricia Marie. (1996). *A cognitive processing approach to gender differences in mathematics performance among high school students* (Rutgers The State University of New Jersey - New Brunswick). DAI-A 57(05), p. 1961. Nov 1996. [AAC 9630719]

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)

Hook, Joseph Edward. (1996). *Student experience of achievement in second year algebra classes* (University of Pennsylvania). DAI-A 57(06), p. 2401, Dec 1996. [AAC 9632520]

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)

Hoover, Lois Marie Miller. (1996). *The mathematical teaching activities of 5th grade Japanese elementary school teachers* (University of Toledo). DAI-A 57(03), p. 1065, Sep 1996. [AAC 9621851]

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)

Horsman, Helen Marina. (1995). *An analysis of early elementary teachers' beliefs about their mathematics teaching* (University of Saskatchewan). DAI-A 57/06, p. 2402, Dec 1996. [AAC NN09293]

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)

Huckeba, Wendy Marie. (1996). *The relationship of attention and visuospatial skills to arithmetic performance in Tourette's Syndrome* (University of Houston). DAI-B 57(05), p. 3432, Nov 1996. [AAC 9629544]

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)

Hung, Chih-Cheng. (1995). *Students' reasoning about functions using dependency ideas in the context of an innovative, middle school mathematics curriculum* (University of Wisconsin, Madison). DAI-A 57(01), p. 87, Jul 1996. [AAC 9608124]

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)

Hutchinson, Elaine Joan. (1996). *Preservice teacher's knowledge: A contrast of beliefs and knowledge of ratio and proportion* (University of Wisconsin - Madison). DAI-A 57(01), p. 174, Jul 1996. [AAC 9611421]

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)

Ingram, Debra Marie. (1996). *Outcome-based approaches in high school mathematics: A study of implementation and impact on achievement* (University of Minnesota). [DAI-A 57(04), p. 1530, Oct 1996. [AAC 9627817]

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)

Ito-Hino, Keiko. (1994). *Proportional reasoning and learning in American and Japanese sixth grade students: Case studies* (Southern Illinois University). DAI-A 56(07), p. 2596, Jan 1996. [AAC 9536551]

Written tests, observations, and interviews were used to assess students' (n=8) learning. Students in the two groups showed contrasts in their approaches and strategies. Students' struggles between the spontaneous use of their own strategies and the use of more formal taught strategies were documented and categorized.

CC, Eqv, Knw, Lrng, Ethn (MS)

Jacobs, Victoria R. (1996). *Children's informal interpretation and evaluation of statistical sampling in surveys* (University of Wisconsin - Madison). DAI-A 57(06), p. 2402, Dec 1996. [AAC 9625805]

Two studies investigated upper elementary children's informal understanding of sampling and statistical inference in the context of interpreting and evaluating survey results. Specifically, these studies investigated children's evaluation of sampling methods, means of drawing conclusions from multiple surveys, and thinking about inference.

Stat, Knw (MS)

Johnson, James Leslie. (1995). *Conceptual knowledge of preservice mathematics students* (University of Nebraska - Lincoln). DAI-A 56(09), p. 3490, Mar 1996. [AAC 9600740]

Preservice secondary mathematics students (treatment group) were compared to noneducation math majors and high school calculus students (n=112). The treatment group received conceptually-based instruction. Students in the treatment group scored significantly higher than the noneducation mathematics majors on conceptual understanding.

TKnw, Prsv, Lrng, AdvM (TE,SE)

Johnson, Kerry Dayne. (1996). *A system for mathematics students; Placement in college algebra* (Oklahoma State University). DAI-A 57(06), P. 2402, Dec. 1996. [ACC 9632940]

The purpose of this study is to develop a placement system for College Algebra using multiple regression models using various predictor variables. The two largest contributors to the models were high school grade point average and rank percentile in the graduating class.

Alg, Assm, Grpg (PS)

Johnson, Rayneld Rolak. (1996). *An analysis of learner variables related to achievement in an introductory graduate statistics course* (Wayne State University). DAI-A 57(04), p. 1530, Oct 1996. [AAC 9628905]

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 (PS)

Jones, Susan Joyce Sundquist. (1994). *An investigation of the relationships of gender, spatial visualization, final course grade, participation, and placement in college-level and developmental mathematics* (Tennessee State University). DAI-A 56(11), p. 4308, May 1996. [AAC 9608777]

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)

Jordan, Sarah Luann. (1995). *The effects of concrete to semiconcrete to abstract instruction on the acquisition and retention of fraction concepts and skills* (University of Florida). DAI-A 56(11), p. 4351, May 1996. [AAC 9607533]

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)

Kallam, Linda Gail. (1996). *Gender differences in mathematical problem-solving* (Kansas State University). DAI-B 57(04), p. 2897, Oct 1996. [AAC 9629045]

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)

Kaplan, Alan Marshall. (1995). *Beginning alternative assessment in the math department of a suburban middle school: A case study* (Columbia University). DAI-A 56(07), p. 2545, Jan 1996. [AAC 9539825]

The study describes the uneven progress and the complex relationships that shaped the assessment project's development. At the conclusion of the two year research period, the project had not induced the growth that had been anticipated.

Assm, Insv (MS)

Keig, Patricia. (1996). *Emerging Literacy* (California State University, Fullerton). MAI 34(03), p. 945, Jun 1996. [AAC 1376975]

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)

Kenney, Margaret Ann. (1995). *The effect of computer-assisted instruction on mathematics achievement of second grade students* (Central Missouri State University). MAI 34(01), p. 39, Feb 1996. [AAC 1375249]

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)

Kerr, Keron Hess. (1996). *Change through alternative assessment: Improving student performance* (University of Central Florida). DAI-A 57(03), p. 1025, Sep 1996. [AAC 9625064]

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)

Khoury, Hani Qustandi. (1995). *Exploring perspectives about mathematics within the cultural context of a college algebra class at a community college: A case study* (Syracuse University). DAI-A 57(04), p. 1530, Oct 1996. [AAC 9625862]

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)

Kilday, Beth Ann. (1996). *Perceptions of graduate teaching assistants and their students on collaborative learning in reform calculus and its relationship to instruction and achievement* (Montana State University). DAI-A 57(06), p. 2402, Dec 1996. [AAC 9633830]

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)

King, Daphne May. (1995). *A comparison of reading and mathematics achievements of low-achieving regular education high school students with learning disabled peers in three academic settings* (Walden University). DAI-A 56(11), p. 4352, May 1996. [AAC 9608101]

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)

Kitchen, Richard Stanley. (1996). *Mathematics pedagogy in a developing nation: The work of two inner-city, Guatemalan teachers* (University of Wisconsin - Madison). DAI-A 57(06), p. 2403, Dec 1996. [AAC 9629594]

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)

Klein, Georgianna Tonne. (1995). *Exploration of the role of context in high school students' conceptions and representations of linear, quadratic, and exponential functions* (Michigan State University). DAI-A 57(02), p. 613, Aug 1996. [AAC 9619845]

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)

Koelpin, Nina Shields. (1995). *Coursetaking patterns in two suburban high schools* (Northwestern University). DAI-A 56(07), p. 2632, Jan 1996. [AAC 9537458]

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)

Koirala. Hari Prasad. (1995). *Conceptions of probability held by preservice teachers of secondary school mathematics* (University of British Columbia). DAI-A 57(03), p. 1087, Sep 1996. [AAC NN05990]

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, TBlf, PS (TE, SE)

Kwon, Hyungkyu. (1995). *The effects of unity-balance screen design on the learning of mathematics in computer-based instruction* (University of Southern California). DAI-A 57(01), p. 179, Jul 1996. [AAC 9614040]

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)

Labouff, Olivia. (1996). *Teachers' conceptions of understanding mathematics: The challenge of implementing math reform* (University of California, Los Angeles). DAI-A 57(02), p. 613, Aug 1996. [AAC 9620746]

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.

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

Lafferty, Joseph Francis. (1994). *The links among mathematics text, students' achievement, and students' mathematics anxiety: A comparison of the incremental development and traditional texts* (Widener University). DAI-A 56(08), p. 3041, Feb 1996. [AAC 9537085] 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)

Lapp, Douglas Andrew. (1995). *Student perception of the authority of the computer/calculator in the curve fitting of data* (The Ohio State University). DAI-A 56(09), p. 3490, Mar 1996. [AAC 9544612]

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)

Larmon, Marilyn Mcelveen. (1995). *Effect of heuristic set of third graders' word problem solving skills* (University of Southern Mississippi). DAI-A 56(11), p. 4264, May 1996. [AAC 9606310]

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)

Lataille, Louise Marie. (1996). *A new paradigm for the preparation of elementary mathematics teachers under the National Council of Teachers of Mathematics standards* (Walden University). DAI-A 57(06), p. 2403, Dec 1996. [AAC 9633589]

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)

Lattimore, Randy. (1996). *Assessing the mathematical competence of African-American tenth graders in preparation for a mathematics proficiency test: A qualitative study* (The Ohio State University). DAI-A 57(05), p. 1986, Nov 1996. [AAC 9630918]

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)

Lavigne, Nancy C. (1994). *Authentic assessment: A library of exemplars for enhancing statistics performance* (McGill University). MAI 34(02), p. 503, Apr 1996. [AAC MM99913]

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)

Lavoie, Paul. (1994). *Contribution a une histoire des mathematiques scolaires au Quebec: L'arithmetique dans les ecoles primaires* (Universite Laval). DAI-A 56(08), p. 3026, Feb 1996. Language: French. [AAC NN97968] [Title in English: *A contribution to the history of school mathematics in Quebec: Arithmetic in the primary schools.*]

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

Arth, Curr (EC)

Leboff, Barbara Ann. (1995). *The effectiveness of a six-week summer school program on the achievement of urban, inner-city third-grade children* (Texas Southern University). DAI-A 56(10), p. 3928, Apr 1996. [AAC 9544976]

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)

Lee, Joong Kwoen. (1996). *An investigation of pre-service teachers' procedural and conceptual knowledge of mathematics in computer explorations* (University of Georgia). DAI-A 57(03), p. 1065, Sep 1996. [AAC 9624059]

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)

Lee, Rebecca. (1995). *Learning effects of integrated mathematics and English language instruction in limited English proficient students* (University of California, Berkley). DAI-A 57(03), p. 1109, Sep 1996. [AAC 9621239]

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)

Lee, Yi-Ren. (1995). *L'influence de certaines composantes de la motivation sur les probabilites de reussite scolaire en mathematiques chez des enfants immigrants chinois provenant de diverses regions* (Universite de Sherbrooke). MAI 34/06, p. 2139, Dec 1996. Language: French. [AAC MM09492] [Title in English: *The influence of certain motivating factors on the probability of academic success in mathematics among immigrant children from various regions of China*]

Abstract not available.

CC, Ethn, Soc, Ach (Not given)

Lemoine, Claudine. (1995). *Modeliser a l'aide d'une fonction: Competences et conceptions des eleves qui entreprennent le premier cours de calcul differentiel et integral au collegial* (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)

Lester, Margaret Lynn. (1996). *The effects of the Geometer's Sketchpad software on achievement of geometric knowledge of high school geometry students* (University of San Francisco). DAI-A 57(06), p. 2343, Dec 1996. [AAC 9633545]

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)

Lewis, Ellen Clancy. (1995). *A comparative study of achievement of students in a self-paced, computer learning program and of students in a traditional textbook learning program* (University of South Carolina). DAI-A 56(08), p. 2986, Feb 1996. [AAC 9541235]

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 was found for gender, ethnicity and socio-economic background.

CAI, Alg, Ach, Gend, Ethn, Soc (HS)

Lewis, Raynold Michael. (1996). *The knowledge of equivalent fractions that children in grades 1, 2, and 3 bring to formal instruction* (Illinois State University). DAI-A 57(06), p. 2403, Dec 1996. [AAC 9633409]

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)

Linn, Laraine F. (1996). *A comparison of hands-on and written assessment methods for elementary grade mathematics* (Erasmus Universiteit Rotterdam - The Netherlands). DAI-A 57(04), p. 1493, Oct 1996. [AAC 9628755]

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)

Lynch, Deirdre C. (1994). *Teaching fraction comprehension via stimulus equivalence* (Southern Illinois University). DAI-A 56(07), p. 2597, Jan 1996. [AAC 9536563]

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)

Lynch, Grace Carol. (1994). *The efficacy of an elementary mathematics methods course in changing preservice elementary teachers' mathematics anxiety* (Dalhousie University, Canada). DAI-A 57(02), p. 645, Aug 1996. [AAC NN05166]

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)

Ma, Liping. (1996). *Profound understanding of fundamental mathematics: What is it, why is it important, and how is it attained?* (Stanford University). DAI-A 57(02), p. 613, Aug 1996. [AAC 9620514]

The apparent difference between Chinese and U.S. teachers' knowledge is paradoxical. Chinese teachers have much less formal education, yet seem to have more comprehensive understanding of school mathematics than their American counterparts.

TKnw, CC, Ethn (TE)

Mack, Barbara Ann. (1996). *Algebra is fun* (California State University, Dominguez Hills). MAI 34(06), p. 2139, Dec 1996. [AAC 1380032]

The computer-assisted instructional program called "Algebra is Fun" helps students overcome difficulty in defining variables, translating realistic word problems into algebraic expressions and evaluating algebraic expressions including exponents. A class of 29 algebra students made statistically significant gains from pretest to posttest.

CAI, Alg (HS)

Macleod, Susan H. (1996). *Views of mathematics of women restarting their education: Looking for safety in numbers* (University of Massachusetts). DAI-A 57(02), p. 550, Aug 1996. [AAC 9619419]

This study investigates women's attitudes toward mathematics upon entering a community college or technical college program. Students (n=6) varied in their attitudes and perceived little change in their own attitudes during the program, but the instructors and researcher observed positive change in the group.

Att, Gend (PS)

Malloy, Carol Elaine. (1995). *African-American eighth grade students' mathematics problem solving: Characteristics, strategies, and success* (University of North Carolina at Chapel Hill). DAI-A 56(07), p. 2597, Jan 1996. [AAC 9538448]

Students' (n=24) problem-solving approaches showed characteristics of holistic reasoning, expressive creativity, and harmony. The use of strategies was highly related to problem-solving success. Students' attitudes tended toward a social/affective emphasis.

PS, Ethn, Att, Styl, Aff (MS)

Malpass, John Richard. (1994). *A structural model of self-efficacy, goal orientation, worry, self-regulated learning, and high-stakes mathematics achievement* (University of Southern California). DAI-A 56(09), p. 3511, Mar 1996. [AAC 9601023]

High school students (n=144) in advanced placement mathematics were studied. Conclusions included (1) self-efficacy and achievement are moderately and positively correlated and (2) worry had a significant

negative affect on both self-regulated learning and achievement.

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

Marable, Linda June Hester. (1994). *A study comparing a prealgebra approach versus a basic math approach of presenting fundamental arithmetic and algebra skills to remedial mathematics college students* (Tennessee State University). DAI-A 56(11), p. 4308, May 1996. [AAC 9608779]

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)

Martinez, Joseph Patrick. (1995). *Computer-based personalization as facilitator of mathematics self-efficacy and mental computation performance of middle school students* (University of Colorado at Denver). DAI-A 57(03), p. 1002, Sep 1996. [AAC 9622846]

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)

Martz, Stacy Ann. (1995). *The effects of choice and preference for instructional arrangements on the academic performance and off-task behavior of students with learning and behavior problems* (The Ohio State University). DAI-A 56/09, p. 3543, Mar 1996. [AAC 9544633]

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)

Mastin, Marla. (1995). *Teacher attitude and curricular change: The journey of three elementary teachers* (University of North Dakota). DAI-A 56(10), p. 3872, Apr 1996. [AAC 9605478]

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, TBlf, Insv, Tchg (EC,TE)

Mayo, Jacqueline Celestine. (1995). *A quasi-experimental study comparing the achievement of primary grade students using Math Their Way with primary grade students using traditional instructional methods* (University of South Carolina). DAI-A 56(12), p. 4689, Jun 1996. [AAC 9611230]

The achievement of first graders using manipulatives (n=590) and utilizing a traditional approach (n=3[illegible]) 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)

McBee, Maridyth Montgomery. *Sampling variability of selected performance assessments measuring an eighth grade mathematics domain* (Oklahoma State University). DAI-A 56(09), p. 3556, Mar 1996. [AAC 9601676]

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)

McBride, Bethe Anne. (1996). *A convergent and discriminant validity study of several instruments used to measure and predict performance in formal geometry* (University of Lowell). DAI-A 57(03), p. 1066, Sep 1996. [AAC 9621878]

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)

McClain, Kay Johnson. (199[illegible]). *An analysis of the teacher's proactive role in supporting students' mathematical development* (Vanderbilt University). DAI-A 57(02), p. 614, Aug 1996. [AAC 9616852]

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)

McCoy, Rocio. (1996). *A study on an integrated mathematics and art curriculum for fifth grade second language learners* (San Jose State University). MAI 34(05), p. 1739, Oct 1996. [AAC 1379357]

Fractions and art were integrated during the planning, designing, and painting of a mural. The data collected from discussions and students' work showed evidence that students not only improve their knowledge of fractions and art but became more self-confident.

IC, Frac, Att, Ethn (MS)

McGinn, Michelle Katherine. (1995). *Teachers' mathematical practices inside and outside their classrooms* (Simon Fraser University). MAI 34(04), p. 1354, Aug 1996. [AAC MM06721]

Two elementary teachers were studied in an effort to reconcile the apparent contradictions between research on situated cognition and recent proposals which have encouraged connecting mathematics instruction with students' out-of-school experiences.

Tchr, Tchg, Lrng (EL, TE)

McGraw, Colleen Karin. (1996). *Exploring the mathematical paths students follow in high school and college* (Syracuse University). DAI-A 57(06), p. 2404, Dec 1996. [AAC 9633042]

A logistic regression model for each gender was developed to examine the probability of participation in calculus. The goal was to determine which, of several variables from each student's high school experience played a role in the student's participation in a calculus sequence in college.

Calc, Gend (PS)

McKenna, Hazel J. (1995). *Detection of mathematics application items in the Stanford Achievement Test that are differentially difficult for students with different levels of reading ability* (Brigham Young University). DAI-A 56(09), p. 3557, Mar 1996. [AAC 9601214]

Mathematics application scores on the Stanford Achievement Test were analyzed to determine if there were any items that functioned differentially with respect to reading ability, with mathematics ability and gender taken into account. It was found that 42.5% of the Mathematics Application Test items had significant DIF due to reading ability.

Assm, Lang, Gend, Ach (SE)

Meel, David Edward. (1995). *A comparative study of honor students' understandings of central calculus concepts as a result of completing a Calculus and Mathematica or a traditional calculus curriculum* (University of Pittsburgh). DAI-A 57(01), p. 142, Jul 1996. [AAC 9614207]

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.

Calc, Tech, PS (PS)

Middleton, David W. (1996). *The relationship of parent and teacher perceptions of parent involvement and third grade reading and mathematics achievement* (Illinois State University). DAI-A 57(06), p. 2301, Dec 1996. [AAC 9633422]

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

Ach, Arth, Soc (EL)

Miles, John. (1995). *Can students decide? Math methods for choice* (Pacific Lutheran University). MAI 34(01), p. 39, Feb 1996. [AAC 1375756]

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

Tchg, Lrng (HS)

Miloudi, Brahim. (1995). *Premieres construction des concepts de fonctions logarithmique et exponentielle chez des eleves ages de 16-17 ans* (Universite de Montreal). DAI-A 57(04), p. 1531, Oct 1996. Language: French. [AAC NN08534] [Title in English: *Beginning constructions of the concepts of logarithmic and exponential functions in students aged 16-17 years*]

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.

Calc (SE)

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.

Alg, Cltr, GCal, Ach, Att (PS)

Morris. Anne Krislov. (1995). *Development of algebraic reasoning in children and adolescents: Cultural, curricular, and age-related effects* (The Ohio State University). DAI-A 56(09), p. 3491, Mar 1996. [AAC 9544648]

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)

Morrow, Kathleen. (1994). *Effects of cooperative learning groups versus whole class instruction on achievement scores in high school geometry classrooms* (Southern Connecticut State University). MAI 34(04), p. 1354, Aug 1996. [AAC 1377835]

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)

Mower, Patricia A. (1995). *Writing to learn college algebra* (University of North Dakota). DAI-A 57(03), p. 1066, Sep 1996. [AAC 9623670]

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)

Muchlinski, Thomas E. (1995). *Using cognitive coaching to model metacognition during instruction* (University of North Carolina at Chapel Hill). DAI-A 56(07), p. 2597, Jan 1996. [AAC 9538459]

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)

Naka, Deborah Anne. (1994). *Nurturing mathematical disposition: A collaborative research project* (University of Victoria). MAI 34(03), p. 955, Jun 1996. [AAC MM03546]

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)

Neagoy, Monica Maria Martha. (1995). *Teachers' pedagogical content knowledge of recursion* (University of Maryland). DAI-A 57(03), p. 1066, Sep 1996. [AAC 9622118]

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)

Nesbit, Tom. (1995). *An analysis of teaching processes in mathematics education for adults* (University of British Columbia , Canada). DAI-A 57(03), p. 976, Sep 1996. [AAC NN06029]

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 repetitious activities, problems, and tests.

Tchg, Tchr, Curr, Soc (PS)

Newberg, Mary Katherine. (1996). *An ethnographic study of a first-year algebra class* (Texas A&M University). DAI-A 57(06), p. 2404, Dec 1996. [AAC 9634816]

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)

Newell, James Craig. (1994). *Student experiences in a first semester university calculus course: A study using ethnographic methods* (Simon Fraser University). MAI 34(02), p. 496, Apr 1996. [AAC MM01100]

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)

Newman, Tina Michelle. (1994). *The effectiveness of a multisensory approach for teaching addition to children with Down syndrome* (McGill University). MAI 34(02), p. 504, Apr 1996. [AAC MM99917]

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

LD, A/S, Manp (EC)

Nguyen. Kim Sat. (1996). *Leaking out of the math/ science pipeline: Causal effects for second and third year college students* (Indiana University). DAI-A 57(04), p. 1519, Oct 1996. [AAC 9626615]

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)

O'Brien, James Francis. (1996). *A field test of CAI software: The Road Trip* (California State University, Dominguez Hills). MAI 34(06), p. 2152, Dec 1996. [AAC 1380019]

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)

O'Brien, Virginia. (1996). *Relationships of mathematics self-efficacy, gender, and ethnic identity to adolescents' math/science career interests* (Fordham University). DAI-A 57(05), p. 1964, Nov 1996. [AAC 9631046]

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)

O'Conner, Wendy Elizabeth. (1994). *An evaluation of a remedial mathematics programme* (Memorial University of Newfoundland). MAI 34(02), p. 504, Apr 1996. [AAC MM01899]

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)

O'Neal, Erica Nicole. (1995). *An evaluation of an interdisciplinary science course designed to help at-risk students* (University of Pennsylvania). DAI-A 56(08), p. 3071, Feb 1996. [AAC 9543130]

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)

Oberg, Marian Jean. (1996). *Computer graphing in high school mathematics classrooms: Responses of teachers and students* (University of Alberta - Canada). MAI 34(06), p. 2139, Dec 1996. [AAC MM10789]

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)

Payne, Lori K. (1996). *The effect of mathematical subject matter knowledge on mathematical beliefs and opinions of calculator use in elementary school* (University of Northern Colorado). DAI-A 57(04), p. 1581, Oct 1996. [AAC 9628691]

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, Cltr, TKnw (PS, TE)

Peressini, Dominic Daniel. (1996). *Parents and the reform of high school mathematics* (University of Wisconsin - Madison). DAI-A 57(02), p. 614, Aug 1996. [AAC 9609474]

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)

Petock, Michael A. (1996). *Computer assisted instruction and the Pythagorean theorem* (California State University, Dominguez Hills). MAI 34(06), p. 2139, Dec 1996. [AAC 1380040]

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)

Phillips, Susan J. Adams. (1995). *Two elementary student teachers' understanding of mathematical power and related pedagogy* (Montana State University). DAI-A 56(12), p. 4690, Jun 1996. [AAC 9611316]

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)

Pobre, Eleanor Andres. (1996). *Paradigm development among practicing school mathematics teachers* (University of Illinois at Urbana-Champaign). DAI-A 57(04), p. 1572, Oct 1996. [AAC 9625180]

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, TBlf (TE)

Poole, Dawn Marie. (1996). *Authenticity and technology: Constructing meaning from an e-mail activity* (Iowa State University). DAI-A 57(06), p. 2449, Dec 1996. [AAC 9635344]

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)

Poth, Katalin N. (1995). *An analysis of the strategies used by intellectually disabled children when learning to add small numbers* (McGill University) MAI 34(04), p. 1364, Aug 1996. [AAC MM05418]

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)

Presseau, Annie. (1994). *Etude de l'activite de reformulation en contexte de resolution de problemes arithmetiques complexes par des enfants du primaire* (Universite de Sherbrooke). MAI 34(01), p. 32, Feb 1996. Language: French. [AAC MM98738] [Title in English: *A study of the act of reformulation in the context of complex arithmetic problem solving by students in primary grades*]

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)

Prus-Wisniowska, Ewa Anna. (1995). *Cognitive, metacognitive, and social aspects of mathematical proof with respect to calculus* (Syracuse University). DAI-A 57(02), p. 614, Aug 1996. [AAC 9616296]

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)

Pugalee, David Keith. (1995). *Using journal writing to characterize mathematical problem solving* (University of North Carolina at Chapel Hill). DAI-A 56(07), p. 2597, Jan 1996. [AAC 9538486]

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)

Pupo, Marie. (1994). *Teaching intellectually disabled students addition through a multisensory approach* (McGill University). MAI 34(02), p. 504, Apr 1996. [AAC MM99924]

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)

Quinteros, Alfredo Dario. (1996). *An evaluation of a computer assisted instruction program, architecture and mathematics* (California State University, Dominguez Hills). MAI 34(06), p. 2152, Dec 1996. [AAC 1380087]

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)

Randle, Dorothy Lynn. (1996). *The process of instructional design: A qualitative study of one effort* (New York University). DAI-A 56(11), p. 4368, May 1996. [AAC 9609409]

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)

Rando, Donna. (1995). *Implementing the NCTM Standards at the secondary level: Four teachers' perspectives* (Columbia University). DAI-A 56(07), p. 2548, Jan 1996. [AAC 9539851]

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, TBlf, 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)

Reid, Janice Rosemary. (1995). *Mathematical problem solving strategies: A study of how children make choices* (University of Western Ontario). MAI 34(03), p. 955, Jun 1996. [AAC MM03324]

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)

Reineke, James Weldon. (1995). *To home and back: The influence of students' conversations on their completion of school mathematics tasks* (Michigan State University). DAI-A 57(02), p. 615, Aug 1996. [AAC 9619895]

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)

Revak, Marie Agnes. (1996). *The effect of distributed practice homework on precalculus achievement at a military academy* (Florida Institute of Technology). DAI-A 57(04), p. 1531, Oct 1996. [AAC 9627514]

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)

Rich, Kerry A. (1995). *The effect of dynamic linked multiple representations on students' conceptions and communication of functions and derivatives* (State University of New York at Buffalo). DAI-A 57(01), p. 142, Jul 1996. [AAC 9617906]

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)

Roberts, Sally Kay. (1995). *A study of the relationship between demographic variables and Van Hiele level of thinking for preservice elementary school teachers* (Wayne State University). DAI-A 57(01), p. 176, Jul 1996. [AAC 9613522]

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)

Robinson, Stephanie O. (1994). *The effect of the availability of "The Geometer's Sketchpad" on locus-motion problem solving performance and strategies* (University of Florida). DAI-A 56(11), p. 4309, May 1996. [AAC 9607122]

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)

Rodgers. Cyrus Eugene. (1995). *An investigation of two instructional methods for teaching selected pre-algebra concepts to minority at-risk seventh-grade mathematics students* (University of Missouri - St. Louis). DAI-A 56(08), p. 3042, Feb 1996. [AAC 9539938]

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.

Alg, Ach, Ethn, Manp, Writ, Att (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.

Matl, Cltr, Soc, Curr, Assm, (HS)

Ryan, Michael Patrick. (1996). *Personal and cognitive variables affecting computer anxiety and teacher development* (Columbia University Teachers College). DAI-A 57(02), p. 647, Aug 1996. [AAC 9620166]

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.

Comp, TAnx, Insv, TAtt (TE)

Sarama, Julie. (1995). *Redesigning Logo: The turtle metaphor in mathematics education* (State University of New York at Buffalo). DAI-A 56(10), p. 3873, Apr 1996. [AAC 9603626]

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.

Tech, Geom, Att (EL)

Schael, Jocelyne G. (1994). *La nature et la fonction des graphismes produits lors de la resolution de problemes en mathematique au niveau intermediaire* (University of Ottawa). DAI-A 56(11), p. 4330, May 1996. Language: French. [AAC NN00554] [Title in English: *The nature and function of graphics produced during mathematical problem solving at the intermediate level*]

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.

Rep, PS (SE)

Scholz, Janet Maria. (1996). *Relationships among preservice teachers' conceptions of geometry, conceptions of teaching geometry and classroom practices* (Oregon State University). DAI-A 57(06), p. 2404, Dec 1996. [AAC 9634075]

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.

Prsv, Geom, TBlf, Tchg, (TE, SE)

Schorr, Roberta Yola. (1996). *Does dealing with mathematics as a thoughtful subject influence the mathematical achievement of urban students* (Rutgers the State University of New Jersey - New Brunswick). DAI-A 57(05), p. 1986, Nov 1996. [AAC 9630726]

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.

Insv, Tchg, Tchr, PS, Lrng, Assm (TE, EL)

Sciutto, Mark James. (1996). *Effects of behavioral instruction on affective outcomes in introductory statistics courses* (Hofstra University). DAI-B 57(06), p. 4020, Dec 1996. [AAC 9632516]

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).

Stat, Anx, Att (PS)

Scott, Albert L. (1995). *A study of the effects of computer assisted instruction on proficiency test performance of high school students enrolled in mandatory proficiency intervention courses* (University of Toledo). DAI-A 56(07), p. 2598, Jan 1996. [AAC 9540379]

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, Gend, Ethn (HS)

Seaman, Charles Rickey. (1995). *Effects of understanding and heuristics on problem solving in mathematics* (University of Regina). DAI-A 57(04), p. 1472, Oct 1996. [AAC NN08476]

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)

Seman, Mary B. (1994). *The effect of direct instruction on teacher effectiveness and student performance in integrated elementary math classes* (West Virginia University). DAI-A 56(08), p. 3082, Feb 1996. [AAC 9543435]

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, Tchg, Curr (EL)

Senfeld, Leonore. (1995). *Math anxiety and its relationship to selected student attitudes and beliefs* (University of Miami). DAI-A 56(07), p. 2598, Jan 1996. [AAC 9536891]

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, Gend, Ethn, Mscn (PS)

Senne-Dibble, Charlotte M. (1995). *An analysis of an authentic assessment technique: Comparing the spoken and the written mathematical communicative abilities of grade 4 students* (State University of New York at Buffalo). DAI-A 56(10), p. 3873, Apr 1996. [AAC 9603653]

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)

Serrano, Ana Maria. (1996). *Opportunities for on-line assessment during mathematics classroom instruction* (University of California, Los Angeles). DAI-A 57(06), p. 2404, Dec 1996. [AAC 9632891]

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)

Shafer, Mary Catherine. (1996). *Assessment of student growth in a mathematical domain over time* (University of Wisconsin - Madison). DAI-A 57(06), p. 2347, Dec 1996. [AAC 9631840]

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)

Shaffer, James Keith. (1996). *A study of the relationship between learning modality strength and mathematics achievement of ninth-grade students from a rural Mississippi delta school* (Delta State University). DAI-A 57(03), p. 1005, Sep 1996. [AAC 9623220]

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)

Sheldrick, Wayne. (1995). *Effects of videotaped solutions on the transfer of problem-solving skills in mathematics at the grade seven level* (University of Ottawa). DAI-A 57(02), p. 615, Aug 1996. [AAC NN04916]

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)

Shouse, Nathan Richard. (1996). *Middle level math placement: A process analysis* (Pacific Lutheran University). MAI 34(06), p. 2139, Dec 1996. [AAC 1380853]

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

Assm, Grpg, Curr (MS)

Siegle, Delbert Lee. (1995). *Effects of teacher training in student self-efficacy on student mathematics self-efficacy and student mathematics achievement* (University of Connecticut). DAI-A 56(07), p. 2645, Jan 1996. [AAC 9539528]

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)

Smith, Jeffrey Phillip. (1995). *The effects of a computer microworld on middle school students' use and understanding of integers* (The Ohio State University). DAI-A 56(09), p. 3492, Mar 1996. [AAC 9544692]

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)

Smith, Joseph Garratt. (1996). *An evaluation of an algebra placement procedure consisting of reinforcement examples and measures of mathematics anxiety and locus of control* (University of Southern California). DAI-A 57(03), p. 1110, Sep 1996. [AAC 9621728]

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)

Smith, Margaret Schwan. (1995). *The road to change: A case study of the dilemmas encountered by a sixth-grade teacher during the first year of implementing mathematics instruction reform* (University of Pittsburgh). DAI-A 57(01), p. 143, Jul 1996. [AAC 9614231]

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)

Smith, Nancy L. (1994). *A study of sixth-grade students' metacognitions and choices concerning the use of the calculator, mental computation, and written computation* (University of Missouri - Columbia). DAI-A 57(02), p. 615, Aug 1996. [AAC 9620232]

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)

Smith, Peggie Adkins. (1996). *Problem-solving through writing: A course for preservice teachers of secondary school mathematics* (George Mason University). DAI-A 56(12), p. 4691, Jun 1996. [AAC 9610563]

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)

Soash, Don Eugene. (1996). *Analysis of errors involving fractions made by middle school, high school, and college students for purposes of developing elements of diagnostic modules for intelligent tutoring systems* (University of South Florida). DAI-A 57(03), p. 1067, Sep 1996. [AAC 9622265]

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)

Soto-Johnson, Hortensia. (1996). *Technological vs. traditional approach in conceptual understanding of series* (University of Northern Colorado). DAI-A 57(04), p. 1531, Oct 1996. [AAC 9628700]

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)

Spanias, Photini Andreou. (1996). *A study on the effects of teacher personality types on student math anxiety* (Arizona State University). DAI-A 57(03), p. 1027, Sep 1996. [AAC 9622838]

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)

Stallworth-Stevens, Harriette. (1995). *Varying high school mathematics students' verbal interactions to test Vygotsky's theory of concept formation* (University of San Francisco). DAI-A 57(03), p. 1067, Sep 1996. [AAC 9623458]

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, ClIn, Lrng, Alg, Comm (HS)

Stansberry, Shirley Ruth P. (1996). *Students' achievement and attitudes in traditional and nontraditional teaching of geometry* (University of Denver). DAI-A 57(03), p. 963, Sep 1996. [AAC 9621003]

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)

Stauber-Johnson, Elizabeth. (1996). *Linking practical argument, practical knowledge and practical actions: A case study in elementary mathematics education* (University of Minnesota). DAI-A 57(03), p. 1068, Sep 1996. [AAC 9621916]

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.

Tchr, Phil, Impl, TBlf, TKnw (EL, TE)

Strand, Jo Lynn. (1995). *Perceptions of middle school mathematics, school science, and technology education teachers regarding selected aspects of interdisciplinary teaming* (Virginia Polytechnic Institute and State University). DAI-A 56(07), p. 2646, Jan 1996. [AAC 9538612]

Informants (n=41) in the study participated in a one day interdisciplinary education workshop. Results of telephone interviews and a qualitative inquiry indicated that the teachers held similar perceptions regarding selected aspects of interdisciplinary teaming.

Insv, IC, TBlf, Tech (MS, TE)

Stride, Cindy Flanagan. (1996). *The historical development of the Texas Academy of Mathematics and Science, 1987-1992* (University of North Texas). DAI-A 57(04), p. 1564, Oct 1996. [Not available]

This is an historical analysis of the significant events that led to the evolution of the Texas Academy of Mathematics and Science (TAMS) and of individuals contributing to program development. From 1987 through 1992, TAMS became an award winning, nationally acclaimed accelerative model for mathematically and scientifically gifted high-school-aged youth.

Curr, Impl, Gift (HS)

Suparno, Paulus. (1996). *Conceptual change in probability and randomness of high school students using computer simulations* (Boston University). DAI-A 57(01), p. 162, Jul 1996. [AAC 9613193]

This study investigated high school students' (n=36) conceptual change on probability and randomness after the students used computer simulation programs. The research found that students improved their knowledge of probability and randomness.

Prob, Comp, Lrng, PS (HS)

Szydlik, Jennifer Earles. (1995). *University calculus students' conceptual understanding of the limit of a function* (University of Wisconsin). DAI-A 56(08), p. 3042, Feb 1996. [AAC 9536165]

The axiomatic beliefs that students hold about the content underlying limit, the nature of students' sources of conviction, and the connections between axiomatic beliefs, sources of conviction, and conceptual understanding of limit were studied.

Calc, Lrng, Blf (PS)

Tambellini, David John. (1995). *A case study of a new mathematics curriculum for alternate school students* (Simon Fraser University). MAI 34(04), p. 1354, Aug 1996. [AAC MM06828]

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)

Tang, Suk-Fong Sophie. (1996). *Variety and structure in concrete representation of numerals* (University of Chicago). DAI-A 57(02), p. 616, Aug 1996. [AAC 9618496]

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)

Taylor, Ann Rosemary. (1995). *Theorizing my teaching journey in a college math methods class I felt unprepared to teach* (Washington University). DAI-A 56/11, p. 4362, May 1996. [AAC 9606116]

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)

Terry, Marilyn Kay. (1995). *An investigation of differences in cognition when utilizing math manipulatives and math manipulative software* (University of Missouri - St. Louis). DAI-A 56(07), p. 2650, Jan 1996. [AAC 9536433]

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)

Terwilliger, Gwen Huber. (1995) *Predicting success of developmental algebra students: Test format and test items* (University of Toledo). DAI-A 56(09), p. 3492, Mar 1996. [AAC 9601634]

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)

Thatcher, Muriel Burger. (1995). *A case study of the development of a first-grade teacher as a result of a teacher development project in mathematics: A ten year study* (Rutgers University). DAI-A 56(09), p. 3492, Mar 1996. [AAC 9602028]

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, TBlf, Lrng (EC, TE)

Thomas, Carrie Christine Bow. (1994). *Memory performance and addition strategy choice in mathematically disabled children* (University of Missouri - Columbia). DAI-B 57(02), p. 1481, Aug 1996. [AAC 9620237]

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)

Thomas, Glen Wayne. (1995). *A cross-state analysis of state curriculum frameworks for mathematics* (University of Southern California). DAI-A 57(03), p. 1007, Sep 1996. [AAC 9625036]

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)

Thomas, Karen Sue Cook. (1995). *The fundamental theorem of calculus: An investigation into students' constructions* (Purdue University). DAI-A 57(03), p. 1068, Sep 1996. [AAC 9622774]

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)

Thornton. Geesje Joke. (1995). *Algebra tiles and learning styles* (Simon Fraser University). MAI 34(04), p. 1355. Aug 1996. [AAC MM06833]

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.

Manp, Alg, Styl, Ach, Att (Not given)

Thurlow, Deborah Lee. (1995). *The effects of journal writing on fifth-grade subjects' mathematics attitudes and achievement* (University of Memphis). DAI-A 57(01), p. 143, Jul 1996. [AAC 9615385]

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.

Writ, Ach, Att, Gend (MS)

Treacy, Annabelle Lee. (1996). *Learning styles, feelings and beliefs about technology and mathematics achievement* (Claremont Graduate School). DAI-A 56(12), p. 4691, Jun 1996. [AAC 9612320]

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).

Styl, Ach, Tech, Att, Cltr, Comp (SE)

Turgoose, Larry Everett. (1996). *The relationship of teacher efficacy, mathematics anxiety, achievement, preparation, and years of experience* (University of Idaho). DAI-A 57(05), p. 1986, Nov 1996. [AAC 9629162]

Sixth grade public school teachers(n=80) participated. Results indicated that as teachers' mathematics efficacy increased, mathematics anxiety decreased. Positive teacher efficacy was correlated with high achievement. Teacher mathematics preparation had an impact on students' mathematics achievement. Teacher preparation in mathematics was found to be the key:

TAtt, TAnx, Ach, Tchr (MS, TE)

Tyner, Cynthia Ann. (1996). *Effects of developmental instruction on the whole number computational abilities and mathematical attitudes of kindergarten children* (Ball State University). DAI-A 57(06), p. 2366, Dec 1996. [AAC 9632837]

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.

Whol, Att, Ach, Gend (EC)

Unglaub, Kathye Wasson. (1995). *Mathematics anxiety in preservice elementary school teachers* (State University of New York at Buffalo). DAI-A 56(07), p. 2599, Jan 1996. [AAC 9538142]

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.

Prsv, TAnx, Tchg (TE,EL)

Van Dresar, Vickie Janette. (1996). *Relationships of a mathematics content course for elementary/middle school teachers with pre-service teachers' attitudes/ beliefs about mathematics and the teaching of mathematics* (University of Northern Colorado). DAI-A 57(04), p. 1531, Oct 1996. [ACC 9628703]

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.

TAtt, TBlf, Tchg, Prsv, Lrng, Manp (TE, EL)

Walker, Howard Lawrence. (1996). *A study of departmentalized and self-contained classroom instruction in mathematics in elementary schools* (Rutgers The State University of New Jersey - New Brunswick). DAI-A 57(05), p. 1953, Nov 1996. [AAC 9630733]

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.

Ach, Curr, TBlf (EL)

Waller, James E. (1995). *A study of selected characteristics of tenth-grade high-school students and their relationship to students' perceptions of the degree of teacher emphasis on selected mathematics objectives* (Morgan State University). DAI-A 56(08), p. 3043, Feb 1996. [AAC 9544811]

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)

Waltman, Kristie Kay. (1995). *An investigation of the use of performance standards to link statewide achievement test results with results from the National Assessment of Educational Progress* (University of Iowa). DAI-A 56(10), p. 3929, Apr 1996. [AAC 9603094]

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)

Wang, Zhiping. (1996). *Using computer graphics to teach fraction concepts* (University of Toledo). DAI-A 57(05), p. 1966, Nov 1996. [Not given]

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)

Warfield, Janet. (1996). *Kindergarten teachers' knowledge of their children's mathematical thinking: Two case studies* (University of Wisconsin - Madison). DAI-A 57(05), p. 1953, Nov 1996. [AAC 9620802]

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.

TBlf, TKnw, Tchg, Tchr (EC)

Waxman, Barbara Lois. (1995). *Place value and children's tacit theories of arithmetic: The role of key concepts in theory restructuring* (University of Rochester). DAI-A 56(10), p. 3874, Apr 1996. [AAC 9603780]

The study utilized clinical interviews to investigate 30 third-graders' tacit theories of arithmetic before and after constructing a fuller understanding of place value. In 18 of 27 cases there was some evidence of restructuring.

PlcV, Knw, Lrng, Arth (EC)

Wells, Barbara Griggs. (1996). *Overcoming the odds: African-American students who thrive in secondary school mathematics* (University of California, Los Angeles). DAI-A 57(02), p. 616, Aug 1996. [AAC 9616421]

This study investigates the individual, family, teacher and school factors associated with successful African American study of secondary college-preparatory mathematics. For eighth grade African Americans (n=1422), ten factors appeared to be associated with their tenth grade mathematics success.

Ethn, Tchr, Gend, Soc (HS)

Werner, Jean Smith. (1995). *A study of the effects on statistical reasoning, skill and conceptual development, and attitude of students in an elementary statistics class which is taught in a contextually and technologically rich environment* (Pennsylvania State University). DAI-A 57(01), p. 144, Jul 1996. [AAC 9612858]

The study compared a statistics class taught using a formal, rule-driven approach to a class designed as a statistics working group using technology. Data from the study suggest that it is possible to identify and categorize statistical reasoning used by elementary statistics students.

Stat, Tech, PS, Att (PS)

West, Richard Douglas. (1995). *Evaluating the effects of changing an undergraduate mathematics core curriculum which supports mathematics-based programs* (New York University). DAI-A 56(11), p. 4310, May 1996. [AAC 9609418]

A revised curriculum at West Point was found to adhere to national reform efforts and to be successfully implemented. Students who experienced the revised curriculum performed as well as, or better than, students who experienced the traditional curriculum and had increased positive attitudes toward mathematics.

Curr, Ach, Att, Lrng (PS)

Whitenack, Joy Wright. (1995). *Modeling, mathematizing, and mathematical learning as it is situated in the classroom microculture* (Vanderbilt University). DAI-A 57(02), p. 616, Aug 1996. [AAC 9616855]

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)

Willard, Teri Lee. (1996). *Mathematics portfolios, NCTM goals, and students' perceptions: A complex analysis* (Montana State University). DAI-A 57(06), p. 2405, Dec 1996. [AAC 9633832]

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)

Willhite, Kathy J. Thomas. (1995). *Changes in elementary science teachers during their participation in a science, mathematics, and technology teacher preparation project* (Kansas State University). DAI-A 56(09), p. 3526, Mar 1996. [AAC 9544229]

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.

Insv, TAtt, TBlf, Tchr (EL, TE)

Williams, Catherine Westbrook. (1995). *Relationship between learning style preferences, mathematical attitudes, calculator usage, and achievement in calculus* (University of Tennessee). DAI-A 57(02), p. 616, Aug 1996. [AAC 9619665]

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)

Witherspoon, Margie Covington. (1996). *Should oral assessment be incorporated into the mathematics classroom* (University of South Carolina). DAI-A 57(03), p. 1089, Sep 1996. [AAC 9623134]

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)

Wolfersheim, Frederick Owen. (1994). *An exploratory study of interactive teaching and alternative assessment practices used to teach early childhood mathematics in West Virginia* (West Virginia University). DAI-A 56(08), p. 2966, Feb 1996. [AAC 9543443]

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, IC, Manp, TBlf (EC)

Wu, Mingchang. (1995). *The effects of a generalizable mathematics skills instructional intervention on the mathematics achievement of learners in secondary vocational programs* (Purdue University). DAI-A 57(06), p. 2405, Dec 1996. [AAC 9633447]

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)

Yang, Hui-Mei Grace. (1996). *Curriculum alignment in elementary mathematics* (University of Texas at Austin). DAI-A 57(06), p. 2348, Dec 1996. [AAC 9633333]

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)

Yarema, Connie Hicks. (1995). *Effects of use of a context approach to calculus on students' critical thinking abilities, content acquisition, and attitudes toward mathematics* (East Texas State University). DAI-A 56(09), p. 3493, Mar 1996. [AAC 9600133]

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)

Yoshino, Alan Tsuyoshi. (1994). *Learning place value: Instruction using a comparison of physical and computer generated blocks* (University of Manitoba). MAI 34(01), p. 40, Feb 1996. [AAC MM99079]

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
Lynch

Memorial University of Newfoundland
O'Conner

Universite de Montreal
Miloudi

Universite de Sherbrooke
El Moutaouakil; Lee; Lemoine; Presseau

Universite Laval
Bensbaa; De Kee; Lavoie

University of Alberta
BJarnason; Enon; Oberg

University of British Columbia
Koirala; Nesbit

University of Manitoba
Yoshino

University of Ottawa
Schael; Sheldrick

University of Saskatchewan
Horsman

University of Toronto
Doctorow; Fast

University of Victoria
Naka

University of Western Ontario
Reid

Spain

Universitat Autonoma de Barcelona
Gorgorio Sola

The Netherlands

Erasmus Universiteit Rotterdam
Linn

United Kingdom

University of New South Wales
Arnold

United States

Arizona State University
Spanias

Ball State University
Tyner

Baylor University
Williams; Burchett

Boston University
Suparno

Brandeis University
Amabile

Brigham Young University
McKenna

California State University, Dominguez Hills
Gessesse; Mack; O'Brien; Petock; Quinteros

California State University, Fullerton
Keig

Central Missouri State University
Cook; Frost; Kenney

Christopher Newport University
Dolezel; Gordon; Hamilton; Hicks

City University of New York
Alvarez

Claremont Graduate School
Froebe; Treacy

Columbia University Teachers College
Kaplan; Gould; Rando; Ryan

Dalhousie University
Lynch

Delta State University
Shaffer

Drake University
Day

East Tennessee State University
Hodge-Hardin

East Texas State University
Yarema

Florida Institute of Technology
Revak

Fordham University
O'Brien

George Mason University
Smith

Georgia State University
Daniel

Grand Valley State University
Farrer; Grooters

Hofstra University
Sciutto

Ilinois State University
Lewis; Middleton

Indiana University
Nguyen

Iowa State University
Poole

Kansas State University
Kallam; Willhite

Louisiana State University
Dreher; Lavigne; Newman; Pupo

McGill University
Poth

MGH Institute of Health Professions
Albertson; Buchman; Ellis

Michigan State University
Akujobi; Cogan; Klein; Reineke

Montana State University
Brown; Kilday; Phillips; Willard

Morgan State University
Waller

New York University
Cooley; Randle; West

Northwestern University
Fraivillig; Koelpin

Ohio State University
Erchick; Herrera; Lapp; Lattimore; Martz; Morris; Smith

Oklahoma State University
Johnson; Harpole; McBee

Oregon State University
Barton; Scholz

Pacific Lutheran University
Miles; Shouse

Pennsylvania State University
Di Cintio; Drager-McCoy; Werner

Purdue University
Brickner; Thomas; Wu

Rice University
Anthony

Rutgers The State University of New Jersey - New Brunswick
Holst; Schorr; Walker

Rutgers University
Thatcher

San Jose State University
McCoy

Seton Hall University
Rosenberg

Simon Fraser University
Boissy; McGinn; Newell; Tambellini; Thornton

Southern Connecticut State University
Hitchcock; Morrow

Southern Illinois University
Faro-Schroeder; Ito-Hino; Lynch

Stanford University
Ma

State University of New York at Buffalo
Brown; Hannibal; Harding; Henry; Rich; Sarama; Senne-Dibble; Unglaub

Syracuse University
Agwu; Khoury; McGraw; Prus-Wisniowska

Temple University
Beirne; Bough; Monticelli

Tennessee State University
Jones; Marable

Texas A&M University
Childs; Newberg

Texas Southern University
Bourgeois; Leboff,

University of Alabama
Furner

University of California, Berkley
Lee

University of California, Los Angeles
Labouff; Serrano; Wells

University of Central Florida
Kerr

University of Chicago
Tang

University of Colorado at Denver
Martinez

University of Connecticut
Siegle

University of Delaware
Ebert; Grant

University of Denver
Stansberry

University of Florida
Allsopp; Harder; Jordan; Robinson

University of Georgia
Fernandez; Lee

University of Houston
Huckeba

University of Idaho
Turgoose

University of Illinois at Urbana-Champaign
Pobre

University of Iowa
Waltman

University of Kentucky
Duvall; Gibson

University of Lowell
Herrelko; McBride

University of Maryland
Baker; Benedetto; Neagoy

University of Massachusetts
Etheredge; Macleod

University of Memphis
Thurlow

University of Miami
Senfeld

University of Michigan
Boyk

University of Minnesota
Cotter; Dale; Foegen; Ingram; Stauber-Johnson

University of Missouri - Columbia
Smith; Thomas

University of Missouri - Saint Louis
Dyer; Rodgers; Terry

University of Nebraska - Lincoln
Abuloum; DeLoach; Johnson

University of New Hampshire
Curran

University of North Carolina at Chapel Hill
Chamblee; Malloy; Muchlinski; Pugalee

University of North Dakota
Mastin; Mower

University of North Texas
Chang; Stride

University of Northern Colorado
Payne; Soto-Johnson; Van Dresar

University of Pennsylvania
Hook; O'Neal

University of Pittsburgh
Meel; Smith

University of Rochester
Waxman

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; Guckenberg; 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

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 appropirate 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 leve "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).

Adajian, Lisa Byrd. (1996, April). Connecting research to teaching: professional communities: Teachers supporting teachers. *Mathematics Teacher*, *89*(4), 321-24, 364.

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)

Ainley, Janet. (1996, December). Purposeful contexts for formal notation in a spreadsheet environment. *Journal of Mathematical Behavior, 15*(4), 405-22.

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)

Akpinar, Y., & Hartley, J.R. (1996, March). Designing interactive learning environments. *Journal of Computer Assisted Learning*, 12(1), 33-46.

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)

Allexsaht-Snider, Martha. (1996, November). Windows into diverse worlds: The telling and sharing of teachers' life histories. *Education & Urban Society*, 29(1), 103-19.

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, CIIn (TE)

Anderson, Dianne S., & Piazza, Jenny A. (1996, Summer). Changing beliefs: Teaching and learning mathematics in constructivist preservice classrooms. *Action in Teacher Education*, 18(2), 51-52.

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, TBlf, TAtt, Tchg (TE)

Anderson, John R, & others (1996, May). Situated learning and education. *Educational Researcher*, 25(4), 5-11.

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)

Anderson, Johnston. (1996, January). The legacy of school- attempts at justifying and proving among new undergraduates. *Teaching Mathematics and its Applications*, 15(3), 129-134.

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)

Anthony, Glenda. (1996, December). Active learning in a constructivist framework. *Educational Studies in Mathematics*, 31(4), 349-69.

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.

Mtcg, Styl, Lrng, Tchg (SE)

Anthony, Glenda. (1996, April). When mathematics students fail to use appropriate learning strategies. *Mathematics Education Research Journal*, 8(1),23-37.

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, Mtcg, Styl, Aff (HS)

Ball, Deborah Loewnberg. (1996, March). Teacher learning and the mathematics reforms: What we think we know and what we need to learn. *Phi Delta Kappan*, 77(7), 500-05.

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)

Barnes, Mary. (1996, Win, Spr, Sum). Gender and mathematics: Shifting the focus. *Focus on Learning Problems in Mathematics*, 18(1,2,3), 88-96.

The article discusses the present position in research on gender and mathematics. A change of priorities is suggested to place more emphasis on the development and careful evaluation of gender-inclusive mathematics curricula that can empower women.

Gend, Impl, Eqty, Rsch (ALL)

Barton, Bill. (1996, September). Making sense of ethnomathematics: Ethnomathematics is making sense. *Educational Studies in Mathematics*, 31(1-2); 201-33.

A framework to review the literature of the culture of mathematics, specifically in the use of the term ethnomathematics is proposed. A definition of ethnomathematics is derived and two examples are reviewed as a test of the power of the definition and the resultant description of ethnomathematics.

Impl, Enth, Soc, Lrnr (ALL)

Batanero, Carmen; and others. (1996, March). Intuitive strategies and preconceptions about associations in contingency tables. *Journal for Research in Mathematics Education*, 27(2), 151-69.

Written questionnaires were given to (n=213) pre-university students to assess their judgments of association and their solution strategies with contingency tables in statistics. Three misconceptions concerning statistical association were identified.

PS, Mscn, Stat, Lrng (HS)

Battista, Michael T.; Clements, Douglas H. (1996, May). Students' understanding of three-dimensional rectangular arrays of cubes. *Journal for Research in Mathematics Education*, 27 (3), 258-92.

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)

Baturo, Annette; Nason, Rod. (1996, October). Student teachers' subject matter knowledge within the domain of area measurement. *Educational Studies in Mathematics*, 31(3), 235-68.

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)

Becker, Joanne Rossi. (1996, Win, Spr, Sum). Research on gender & mathematics: One feminist perspective. *Focus on Learning Problems in Mathematics*, 18(1,2,3), 19-25.

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)

Begg, Andy. (1996, December). Mathematics curriculum decisions: Back to basics. *Journal of Mathematical Behavior*, 15(4), 479-87.

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)

BierHoff, Helvia. (1996, December). Laying the foundation of numeracy: A comparison of primary school textbooks in Britain, Germany, and Switzerland. *Teaching Mathematics and its Applications*, 15(4), 141-160.

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)

Blanton, Maria L.; and others. (1996, Winter). Calculus students' graphical constructions of a population growth model. *Mathematics Educator*, 7(1), 15-25.

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)

Borba, Marcelo C.; Confrey, Jere. (1996, October). A student's construction of transformations of functions in a multiple representational environment. *Educational Studies in Mathematics*, 31(3), 319-37.

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)

Bottino, Rosa Maria; Furinghetti, Fulvia. (1996, March). The emerging of teachers' conceptions of new subjects inserted in mathematics programs: The case of informatics. *Educational Studies in Mathematics*, 30(2), 109-34.

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)

Bouck, Mary; and others. (1996, December). Developing as a teacher of mathematics. *Mathematics Teacher*, 89 (9), 769-73.

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)

Boulton-Lewis, Gillian M.; and others. (1996, September). An analysis of young children's strategies and use of devices for length measurement. *Journal of Mathematical Behavior*, 15(3), 329-47.

This article describes an 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)

Boulton-Luis, Gillian M.; and others. (1996, November). Representations and strategies for subtraction used by primary school children. *Mathematics Education Research Journal*, 8(2), 137-52.

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)

Brosnan, Patricia A.; and others. (1996, Fall). An exploration of change in teachers' beliefs and practices during implementation of mathematics standards. *Focus on Learning Problems in Mathematics*, 18(4), 35-53.

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.

Insv, TBlf, Tchg, Curr, TAtt, TKnw (TE, K-12)

Brown, Catherine A.; and others. (1996, September). Assisting teachers and students to reform the mathematics classroom. *Educational Studies in Mathematics*, 31(1-2), 63-93.

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, Insv, Plan, Curr, TKnw (MS, TE)

Brown, Sue. (1996, Fall). Assessing individual performance on group projects. *Focus on Learning Problems in Mathematics*, 18(4), 1-7.

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)

Brown, Tony. (1996, September). The phenomenology of the mathematics classroom. *Educational Studies in Mathematics*, 31(1-2), 115-50.

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, ClIn (K-12)

Brown, Tony. (1996, January). Intention and significance in the teaching and learning of mathematics. *Journal for Research in Mathematics Education*, 27(1), 52-66.

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)

Buschman, Larry. (1996, November). Boy, do I have problems! *Teaching Children Mathematics*, 3(3), 148-54.

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)

Bussi, Maria G. Bartolini. (1996, September). Mathematical discussion and perspective drawing in primary school. *Educational Studies in Mathematics*, 31(1-2), 11-41.

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)

Campbell, Patricia F. (1996, January). Empowering children and teachers in the elementary mathematics classrooms of urban schools. *Urban Education*, 30(4), 449-75.

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.

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

Carpenter, Thomas P. et al. (1996, September). Cognitively guided instruction: A knowledge base for reform in primary mathematics instruction. *Elementary School Journal*, 97(1), 3-20.

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, Insv, Tchg (EC, TE)

Carr, Ken; Mannington, Carol. (1996, November). Making sense of number: What young children do. *Mathematics in School*, 25(5), 29-32.

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.

Lrnr, Comm, Nsns, Tchg, Lang, Arth, (EL)

Carroll, William M. (1996, October). Mental computation of students in a reform-based mathematics curriculum. *School Science and Mathematics*, 96(6), 305-11.

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.

Curr, Assm, Arth, A/S, M/D (EL)

Carroll, William M. (1996, June). Use of invented algorithms by second graders in a reform mathematics curriculum. *Journal of Mathematical Behavior*, 15(2), 137-50.

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.

PS, Curr, Arth, Lrnr (EC)

Chatterjee, Sangit; Hawkes, James. (1996, Summer). Statistics and intuition for the classroom. *Teaching Statistics*, 18(2), 34-38.

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.

Stat, PS, Patt, Lrng, (SE)

Chazan, Daniel. (1996, December). "Algebra for all students?" *Journal of Mathematical Behavior*, 15(4), 455-77.

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.

Alg, Curr, Eqty, Knw, Tchg (SE)

Childress, Vincent W. (1996, Fall). Does integrating technology, science, and mathematics improve technological problem solving? A quasi-experiment. *Journal of Technology Education*, 8(1), 16-26.

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

IC, Patt, PS, Att (MS)

Chinnappan, Mohan; Lawson, Michael. (1996, March). Knowledge extension and geometry problem solving performance. *Hiroshima Journal of Mathematics Education*, 4, 1-24.

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.

PS, Geom, Knw, Lrng, Ethn, PS (SE)

Chiu, Ming Ming. (1996, July). Exploring the origins, uses, and interactions of student intuitions: Comparing the lengths of paths. *Journal for Research in Mathematics Education*, 27(4), 478-504.

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.

PS, Meas, Lrnr, Patt, Mscn (SE)

Clariana, Roy B. (1996). Differential achievement gains for mathematics computation, concepts, and applications with an integrated learning system. *Journal of Computers in Mathematics and Science Teaching*, 15(3), 203-15.

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.

CAI, Lrng, Tchg, Knw, Arth (EL)

Clark, Faye B.; Kamii, Constance. (1996, January). Identification of multiplicative thinking in children in grades 1-5. *Journal for Research in Mathematics Education*, 27(1), 41-51.

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).

Lrng, Lrnr, A/S, M/D (EL)

Clements, Douglas H.; And Others. (1996, June). Development of turn and turn measurement concepts in a computer-based instructional unit. *Educational Studies in Mathematics*, 30(4), 313-37.

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)

Cobb, Paul; Whitenack, Joy W. (1996, April), A method for conducting longitudinal analyses of classroom videorecordings and transcripts. *Educational Studies in Mathematics*, 30(3), 213-28.

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 relationhip between psychological and social processes is clarified.

Impl, Rsch, Soc (K-12)

Cooper, Sandra B. (1996, March-Apr). Case studies of teacher education students in a field-based and a university-based elementary mathematics methods course. *Journal of Teacher Education*, 47(2), 139-46.

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, Tchg, TKnw, (TE, EL)

Cottrill, Jim, and others. (1996, June). Understanding the limit concept: beginning with a coordinated process scheme. *Journal of Mathematical Behavior*, 15(2), 167-92.

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, Tchg, Curr, Lrng, Calc (TE)

Crawford, Kathryn. (1996, September). Vygotskian approaches to human development in the information era. *Educational Studies in Mathematics*, 31(1-2), 43-62.

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 soci[illegible] and the challenge that this change presents to mat[illegible]atics educators at all levels.

Lrng, Tchg, Tech, Plan, (K-12)

Dagher, Antoine. (1996, June). Apprentissage dans un environnement informatique: possibilite, nature, transfert des acquis. *Educational Studies in Mathematics*, 30(4), 367-98.

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)

Day, Roger. (1996, April). Case studies of preservice secondary mathematics teachers' beliefs: emerging and evolving themes. *Mathematics Education Research Journal*, 8(1), 5-22.

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)

Diegmueller, Karen; Viadero, Debra. (1996, May-June). Research: Pedagogy, practice, findings. *Teacher Magazine*, 7(8), 20-24.

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)

Dowker, Ann, and others. Est[illegible]on strategies of four groups. *Mathematical Cogni[illegible]*, 2(2), 113-35.

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, Lrnr (PS)

Dowling, Paul. (1996, December). A sociological analysis of school mathematics texts. *Educational Studies in Mathematics*, 31(4), 389-415.

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)

Dreyfus, Tommy; Hadas, Nurit. (1996, February). Proof as answer to the question why. *Zentralblatt fur Didaktik der Mathematik/International Reviews on Mathematical Education*, 28(1), 1-5.

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)

Drijvers, Paul; Doorman, Michiel. (1996, December). The graphics calculator in mathematics education. *Journal of Mathematical Behavior*, 15(4), 425-40.

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)

Edwards, Thomas G. (1996, Summer). Implications of a model for conceptualizing change in mathematics teachers' instructional practices. *Action in Teacher Education*, 18(2), 19-30.

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)

English, Lyn D. (1996, March). Children's construction of mathematical knowledge in solving novel isomorphic problems in concrete and written form. *Journal of Mathematical Behavior*, 15(1), 81-112.

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)

English, Lyn D.; Sharry, Patrick V. (1996, March). Analogical reasoning and the development of algebraic abstraction. *Educational Studies in Mathematics*, 30(2), 135-57.

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)

Erickson, Dianne K.; Niess, Margaret L. (1996, Winter). Focusing on NCTM's standards: Teachers' choice and decisions related to students achievement in middle school mathematics. *Research in Middle Level Education Quarterly*, n19(2), 23-42.

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)

Estepa, Antonio; Batanero, Carmen. (1996, March). Judgments of correlation in scatter plots: Students' intuitive strategies and preconceptions. *Hiroshima Journal of Mathematics Education*, 4, 25-41.

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)

Farrell, Ann M. (1996, March). Roles and behaviors in technology-integrated precalculus classrooms. *Journal of Mathematical Behavior*, 15(1), 35-53.

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)

Faust, Michael W., and others. (1996). Mathematics anxiety effects in simple and complex addition. *Mathematical Cognition*, 2(1), 25-62.

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)

Fennema, Elizabeth, and others. (1996, July). A longitudinal study of learning to use children's thinking in mathematics instruction. *Journal for Research in Mathematics Education*, 27(4), 403-34.

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, TBlf, Tchg, Lrng (EL)

Fleener, M. Jayne. (1996, October). Scientific world building on the edge of chaos: High school students' beliefs about mathematics and science. *School Science and Mathematics*, 96(6), 312-20.

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)

Forgasz, Helen J.; Leder, Gilah C. (1996, Win, Spr, Sum). Mathematics and English: Stereotyped domains? *Focus on Learning Problems in Mathematics*, 18(1,2,3), 129-37.

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)

Forgasz, Helen J.; Leder, Gilah C. (1996, November). Mathematics classrooms, gender and affect. *Mathematics Education Research Journal*, 8(2), 153-73.

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

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

Foss, Donna H. and Kleinsasser, Robert C. (1996). Preservice elementary teachers' views of pedagogical and mathematical content knowledge. *Teaching & Teacher Education*, 12(4), 429-42.

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,TBlf, Tknw, Tchg, (TE, EL)

Franks, Douglas R. (1996, October). A situational study of the meanings of personal excellence for secondary mathematics teachers and students. *Educational Studies in Mathematics*, 31(3), 295-317.

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)

Friedman, Lynn. (1996, Win, Spr, Sum). Meta-analysis and quantitative gender differences: Reconciliation. *Focus on Learning Problems in Mathematics*, 18(1,2,3), 123-28.

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

Gend, Ach, Impl, (ALL)

Froumin, Isak. (1996, Fall). The challenge of Russian mathematics education: Does it still exist? *Focus on Learning Problems in Mathematics*, 18(4), 8-34.

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, TBlf, TAtt (K-12)

Geary, David C. (1996). The problem-size effect in mental addition: Developmental and cross-national trends. *Mathematical Cognition*, 2(1), 63-93.

Examined effects of problem size in mental addition among elementary children in China (n=104) and

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.

CC, A/S, Lrng, Arth (EL, PS)

Goos, Merrilyn; Galbraith, Peter. (1996, April). Do it this way! Metacognitive strategies in collaborative mathematical problem solving. *Educational Studies in Mathematics*, 30(3), 229-60.

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.

Mtcg, PS, Grpg, Styl (SE)

Graue, M. Elizabeth; Smith, Stephanie Z. (1996, June). Shaping assessment through instructional innovation. *Journal of Mathematical Behavior*, 15(2), 113-36.

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.

Assm, Tblf, Curr, Tatt, Att, Soc (ALL)

Hart, Janis M. (1996, April). Promising research, programs, and projects: The effect of personalized word problems *Teaching Children Mathematics*. 2(8), 504-05.

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.

PS, Att, Ach, Patt (MS)

Hatano, Giyoo; And Others. (1996, September). "Buggy algorithms" as attractive variants. *Journal of Mathematical Behavior*, 15(3), 285-302.

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).

Arth, A/S, Mscn, PS (K-12)

Hatfield, Mary M. (1996, May-Jun). Using multimedia in preservice education. *Journal of Teacher Education*, 47(3), 223-28.

This article describes a project that combines technology, teacher education, and the use of manipulatives to enhance the professional development of prospective teachers. The multimedia are a means of bringing the classroom environment to the university to facilitate discussions on teachers' beliefs about mathematics teaching.

Prsv, MMed, Manp, TBlf (TE)

Hazzan, Orit; Leron, Uri. (1996, February). Students' use and misuse of mathematical theorems: The case of Lagrange's theorem. *For the Learning of Mathematics*, 16(1), 23-26.

Explores (n=113) computer science majors' understanding of Lagrange's Theorem (the order of a subgroup divides the order of a finite group), its converse, and its applications.

Mscn, Prf, Calc (PS)

Hendricks, Rachel, and others. (1996, May). A gender equity study of differences among instructors in a multi-age classroom. *New England Mathematics Journal*, 28(2), 41-51.

Gender-related issues among adults and children in a small-group discovery activity are analyzed focusing on gender bias in verbal interactions. Findings indicate that the parent volunteers exhibited the most gender bias in their verbal interactions with children while the teachers exhibited no gender bias.

Gend, Eqty, ClIn, Soc, Comm, Oral (EL)

Hershkovitz, Sara; Nesher, Pearla. (1996, June). The role of schemes in designing computerized environments. *Educational Studies in Mathematics*, 30(4), 339-65.

A comparison of the effectiveness of two computerized environments, Schemes for Problem Analysis (SPA) and Algebraic Proposer (AP), with two 6th-grade classes found that in solving easy word problems, both software systems were equally helpful, but in harder word problems, those who learned with SPA had more success.

PS, Comp, Curr (SE)

Hodgson, Ted. (1996, March). Students' ability to visualize set expressions: An initial investigation. *Educational Studies in Mathematics*, 30(2), 159-78.

Analysis of (n=92) university students' construction of visual representations (Venn diagrams) of eight set expressions found: (1) competent and error-prone

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)

Hunting, Robert P., and others. (1996, May). Engaging whole-number knowledge for rational-number learning using a computer-based tool. *Journal for Research in Mathematics Education*, 27(3), 354-79.

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)

Irwin, Kathryn C. (1996, January). Children's understanding of the principles of covariation and compensation in part-whole relationships. *Journal for Research in Mathematics Education*, 27(1), 25-40.

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)

Jacobs, Donald L. et al. (1996, Summer). Effects of a cooperative learning method on mathematics achievement and affective outcomes of students in a private elementary school. *Journal of Research & Development in Education*, 29(4), 195-202.

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)

Jennings, Sue; Dunne, Richard. (1996, June). A critical appraisal of the national curriculum by comparison with french experience. *Teaching Mathematics and its Applications*, 15(2), 49-55.

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)

Jones, Graham A., and others. (1996, May). Multidigit number sense: A framework for instruction and assessment. *Journal for Research in Mathematics Education*, 27(3), 310-36.

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)

Jones, Jennifer, and others. (1996). Perceptions of the relevance of mathematics and science: Further analysis of an australian longitudinal study. *Research in Science Education*, 26(4), 481-94.

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)

Koch, Laura Coffin; Li, Xiaoming. (1996, June). Students' understanding of computation-related rational number skills. *Journal of Mathematical Behavior*, 15(2), 193-205.

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)

Koontz, Kristine L.; Berch, Daniel B. (1996). Identifying simple numerical stimuli: Processing inefficiencies exhibited by arithmetic learning disabled children. *Mathematical Cognition*, 2(1), 1-23.

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)

Kramer, Steven L. (1996, December). Block scheduling and high school mathematics instruction. *Mathematics Teacher*, 89 (9), 758-68.

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)

Lamon, Susan J. (1996, March). The development of unitizing: Its role in children's partitioning strategies. *Journal for Research in Mathematics Education*, 27(2), 170-93.

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)

Lawler, Robert W. (1996, September). Thinkable models. *Journal of Mathematical Behavior*, 15(3), 241-59.

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)

Leigh-Lancaster, David. (1996). Mathematica at the secondary-tertiary interface. *Australian Senior Mathematics Journal*, 10(1), 21-34.

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)

Lerman, Stephen. (1996, March). Intersubjectivity in mathematics learning: A challenge to the radical constructivist paradigm? *Journal for Research in Mathematics Education*, 27(2), 133-50.

The article discusses intersubjectivity and examines limitations of radical constructivism. It compares Piaget's positioning of the individual in relation to social life with that of Vygotsky in support of the claim that radical constructivism does not offer enough as an explanation of learning of mathematics.

Lrng, Soc, Lang, Phil (ALL)

Lerman, Stephen. (1996, September). Guest editorial. *Educational Studies in Mathematics*, 31(1-2), 1-9.

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, Ethn, Tchg (ALL)

Linchevski, Liora; Herscovics, Nicolas. (1996, January). Crossing the cognitive gap between arithmetic and algebra: Operating on the unknown in the context of equations. *Educational Studies in Mathematics*, 30(1), 39-65.

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)

Lopez-Real, Francis. (1996). An investigative approach to congruence. *Australian Mathematics Teacher*, 52(4), 8-12.

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, Ethn, CC (SE)

Ma, Xin. (1996, December). The effects of cooperative homework on mathematics achievement of Chinese high school students. *Educational Studies in Mathematics*, 31(4), 379-87.

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, Ethn, Phil (SE)

Maher, Carolyn A.; Martino, Amy M. (1996, March). The development of the idea of mathematical proof: A 5-year case study. *Journal for Research in Mathematics Education*, 27(2), 194-214.

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)

Masingila, Joanna O., and others. (1996, September). Mathematics learning and practice in and out of school: A framework for connecting these experiences. *Educational Studies in Mathematics*, 31(1-2), 175-200.

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)

Mower, Pat. (1996, December). Fat men in pink leotards or students writing to learn algebra. *Primus*, 6(4), 308-24.

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)

Mukhopadhyay, Swapna. (1996, November). Self-portrait: A tool for understanding the teaching of mathematics. *Mathematics Education Research Journal*, 8(2), 101-18.

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, TBlf (TE)

Myren, Christina L. (1996, October). Encouraging young children to solve problems independently. *Teaching Children Mathematics*, 3(2), 72-76.

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)

Nesbit, Tom. (1996, Summer). What counts? Mathematics education for adults. *Adult Basic Education*, 6(2), 69-83.

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, Blf, TBlf, Knw (PS)

Oldknow, Adrian. (1996, December). Micromaths: Tea cups, t cubed, discharge and the elimination of drips. *Teaching Mathematics and Its Applications*, 15(4), 179-85.

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)

Owens, Emiel W.; Waxman, Hersholt C. (1996). Differences among urban, suburban, and rural schools on technology access and use in eighth-grade mathematics classrooms. *Journal of Educational Technology Systems*, 24(1), 83-92.

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)

Padula, Janice. (1996). The zero product principle error. *Australian Mathematics Teacher*, 52(4), 14-15.

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)

Penglase, Marina; Arnold, Stephen. (1996, April). The graphics calculator in mathematics education: A critical review of recent research. *Mathematics Education Research Journal*, 8(1), 58-90.

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)

Peterson, Penelope L.; Barnes, Carol. (1996, March). Learning together: The challenge of mathematics, equity, and leadership. *Phi Delta Kappan*, 77(7), 485-91.

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)

Pitkethly, Anne; Hunting, Robert. (1996, January). A review of recent research in the area of initial fraction concepts. *Educational Studies in Mathematics*, 30(1), 5-38.

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)

Powell, Beth. (1996, August). Children taking the lead. *Australian Primary Mathematics Classroom*, 1 (1), 4-7.

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)

Quinn, Anne Larson; Larson, Karen R. (1996, December). When does a dog become older than its owner?. *Mathematics Teacher*, 89 (9), 734-37.

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)

Ralston, Anthony and others. (1996, March). Calculators and the changing role of computation in elementary school mathematics. *Hiroshima Journal of Mathematics Education*, 4, 63-71.

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)

Reeve, Robert A.; Pattison, Philippa E. (1996). The referential adequacy of students' visual analogies of fractions. *Mathematical Cognition*, 2(2), 137-69.

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)

Relich, Joe. (1996, March). Gender, self-concept and teachers of mathematics: Effects on attitudes to teaching and learning. *Educational Studies in Mathematics*, 30(2), 179-95.

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)

Rickard, Anthony. (1996, September). Connections and confusion: Teaching perimeter and area with a problem-solving oriented unit. *Journal of Mathematical Behavior*, 15(3), 303-27.

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)

Roberts, Douglas A. (1996, June). What counts as quality in qualitative research? (guest editorial). *Science Education*, 80(3), 243-48.

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

Rsch, Impl (ALL)

Roberts, Tamsin. (1996). Whose mathematics do we teach? *Australian Mathematics Teacher*, 52(4), 42-46.

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:

Various perceptions. *Journal of Computers in Mathematics and Science Teaching*, 15(4), 423-35.

The article report s 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)

Russell, Susan Jo; Mokros, Jan. (1996, February). Research into practice: What do children understand about average? *Teaching Children Mathematics*, 2(6), 360-64.

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)

Santos-Trigo, Manuel. (1996, September). An exploration of strategies used by students to solve problems with multiple ways of solution. *Journal of Mathematical Behavior*, 15(3), 263-84.

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)

Schmittau, Jean. (1996, Win, Spr, Sum). Mathematics and gender: A case for relational understanding. *Focus on Learning Problems in Mathematics*, 18(1,2,3), 41-51.

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)

Seegers, Gerard; Boekaerts, Monique. (1996, March). Gender-related differences in self-referenced cognitions in relation to mathematics. *Journal for Research in Mathematics Education*, 27(2), 215-40.

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)

Sensevy, Gerard. (1996, April). Fabrication de problemes de fraction par des eleves a la fin de l'enseignement elementaire. *Educational Studies in Mathematics*, 30(3), 261-88.

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, CIIn, 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)

Silver, Edward A., and others. (1996, May). Posing mathematical problems: An exploratory study. *Journal for Research in Mathematics Education*, 27(3), 293-309.

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 occured before solving a sample problem. Problems posed were not always solvable.

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

Simon, Martin A. (1996, March). Beyond inductive and deductive reasoning: The search for a sense of knowing. *Educational Studies in Mathematics*, 30(2), 197-210.

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)

Simon, Martin A.; Blume, Glendon W. (1996, March). Justification in the mathematics classroom: A study of prospective elementary teachers. *Journal of Mathematical Behavior*, 15(1), 3-31.

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)

Smith, John P., III. (1996, July). Efficacy and teaching mathematics by telling: A challenge for reform. *Journal for Research in Mathematics Education*, 27(4), 387-402.

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)

Stillman, Gloria. (1996, November). Mathematical processing and cognitive demand in problem solving. *Mathematics Education Research Journal*, 8(2), 174-97.

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)

Streefland, Leen. (1996, March). Negative numbers: Reflections of a learning researcher. *Journal of Mathematical Behavior*, 15(1), 57-77.

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)

Tate, William F., IV. (1996, January). Introduction: Urban schools and mathematics reform: Implementing new standards. *Urban Education*, 30(4), 371-78.

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)

Taylor, Peter Charles. (1996, September). Mythmaking and mythbreaking in the mathematics classroom. *Educational Studies in Mathematics*, 31(1-2), 151-73.

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)

Thomas, Michael, and others. (1995, April). Using computers in the mathematics classroom: The role of the teacher. *Mathematics Education Research Journal*, 8(1), 38-57.

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)

Thompson, Alba G.; Thompson, Patrick W. (1996, January). Talking about rates conceptually, part II: Mathematical knowledge for teaching. *Journal for Research in Mathematics Education*, 27(1), 2-24.

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)

Thompson, Denisse R. (1996, September). Learning and teaching indirect proof. *Mathematics Teacher*, 89(6), 474-82.

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)

Triadafillidis, T.A. (1996, June). "Math and the human body": Sharing the experiences of an activity-based learning situation. *Journal of Mathematical Behavior*, 15(2), 155-59.

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)

Triadafillidis, T.A. (1996, June). The effectiveness of practical work in lower secondary school mathematics: A cultural approach. *Journal of Mathematical Behavior*, 15(2), 161-66.

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)

Tsai, Chin-Chung. (1996, October). The "qualitative" differences in problem-solving procedures and thinking structures between science and nonscience majors. *School Science and Mathematics*, 96(6), 283-89.

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)

Vidakovic, Draga. (1996). Learning the concept of inverse function. *Journal of Computers in Mathematics and Science Teaching*, 15(3), 295-318.

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)

Waits, Bert K.; Demana, Franklin. (1996, December). A computer for all students-revisited. *Mathematics Teacher*, 89 (9), 712-14.

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)

Watanabe, Tad. (1996, April). Ben's understanding of one-half. *Teaching Children Mathematics*, 2(8), 460-64.

Ben, a good mathematics student, participated in a seven-week study. The article describes three tasks that reflect impact of textbooks, real-life connections, and mathematical symbols. It shows that Ben's notion of one-half was task-dependent, concrete, and based on physical actions.

Frac, Patt, Manp, Matl (EL)

Watanabe, Tad. (1996, March). Coordination of units: A theoretical model. *Hiroshima Journal of Mathematics Education*, 4, 73-87.

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)

Watson, Rex. (1996, March). Students' combinatorial srategies. *Teaching Mathematics and Its Applications*, 15(1), 27-32.

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)

Waugh, Michael. (1996). Group interaction and student questioning patterns in an instructional telecommunications course for teachers. *Journal of Computers in Mathematics and Science Teaching*, 15(4), 353-82.

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)

Whang, Woo-Hyung. (1996, April). The influence of English-Korean bilingualism in solving mathematics word problems. *Educational Studies in Mathematics*, 30(3), 289-312.

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-12)

Wheatley, Grayson H.; Reynolds, Anne. (1996, January). The construction of abstract units in geometric and numeric settings. *Educational Studies in Mathematics*, 30(1), 67-83.

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)

White, Paul; Mitchelmore, Michael. (1996, January). Conceptual knowledge in introductory calculus. *Journal for Research in Mathematics Education*, 27(1), 79-95.

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)

Wiebe, Arthur. (1996, April). Advantages of a pattern-based math/science curriculum: A proportional reasoning road map. *AIMS*, 10(9), 6-10.

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)

Willis, Sue. (1996, August). Professional judgement and the mathematics profile. *Australian Primary Mathematics Classroom*, 1(1), 11-15.

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)

Wong, Ngai-Ying. (1996, March). Students' perceptions of the mathematics classroom in Hong Kong. *Hiroshima Journal of Mathematics Education*, 4, 89-107.

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)

Wood, Terry. (1996, January). Events in learning mathematics: Insights from research in classrooms. *Educational Studies in Mathematics*, 30(1), 85-105.

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)

Wood, Terry; Sellers, Patricia. (1996, May). Assessment of a problem-centered mathematics program: Third grade. *Journal for Research in Mathematics Education*, 27(3), 337-53.

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)

Yackel, Erna; Cobb, Paul. (1996, July). Sociomathematical norms, argumentation, and autonomy in mathematics. *Journal for Research in Mathematics Education*, 27(4), 458-77.

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)

Zaslavsky, Orit; Peled, Irit. (1996, January). Inhibiting factors in generating examples by mathematics teachers and student teachers: The case of binary operation. *Journal for Research in Mathematics Education*, 27(1), 67-78.

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)

Zazkis, Rina; And Others. (1996, July). Coordinating visual and analytic strategies: A study of students' understanding of the group D4. *Journal for Research in Mathematics Education*, 27(4), 435-57.

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)

Zazkis, Rina; Campbell, Stephen. (1996, June). Prime decomposition: Understanding uniqueness. *Journal of Mathematical Behavior*, 15(2), 207-18.

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)

Zevenbergen, Robyn. (1996, September). Constructivism as a liberal bourgeois discourse. *Educational Studies in Mathematics*, 31(1-2), 95-113.

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)

Zoller, Uri; Ben-Chaim, David. (1996). Computer inclination of students and their teachers in the context of computer literacy education. *Journal of Computers in Mathematics and Science Teaching*, 15(4), 401-21.

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 Jounal 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 Mathematic 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).

Achievements of secondary 1 and secondary 2 pupils in mathematics and science: Third International Mathematics and Science Study (TIMSS). (1996). Edinburgh, Scotland: Scottish Council for Research in Education. [SE 059 471]

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)

Alberta program of studies for K-9 mathematics. (1996). Edmonton, Alberta, Canada: Alberta Education, Curriculum Standard Branch. [SE 059 006]

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)

Assessment of Achievement Programme: Fourth Survey of Mathematics, 1994. (1996). Edinburgh, Scotland: Scottish Council for Research in Education. [SE 058 398]

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)

Atweh, Bill; and others. (1996). *Research in mathematics education in Australasia 1992-1995.* Campbelltown, Australia: University of Western Sydney. [SE 058 603]

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)

Bartch, Marian R. (1996). *Math & stories (Grades K-3).* Glenview, IL: GoodYear Books. [SE 058 181]

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)

Benken, Babette; Wilson, Melvin. (1996). *Developing problem-solving conceptions of mathematics: A preservice teacher's experiences.* Paper presented at the Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education, Panama City, FL, October, 1996. [SE 059 202]

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, Tknw, Tchg, Tchr (TE, SE)

Borasi, Raffaella. (1996). *Reconceiving mathematics instruction: A focus on errors.* Norwood, NJ: Ablex Publishing Corporation. [SE 058 760]

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

Tchg, Lrng, Mscn, Curr (ALL)

Brown, David W. and others. (1996). *Systematic change and the role of school boards.* Paper presented at the Annual Meeting of the American Educational Research Association, New York, NY, April 8-12, 1996. [ED 399 105]

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.

Curr, Plan (K-12)

Bulla, Dale. (1996). *Think math! Interactive loops for groups.* Tucson, AZ: Zephyr Press. [SE 058 016]

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

Arth, NSns, PAtt, Manp, Alg, Geom (EL)

Burz, Helen L.; Marshall, Kit. (1996). *Performance-based curriculum for mathematics: From knowing to showing.* Thousand Oaks, CA: Corwin Press, Inc. [SE 059 077]

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.

Curr, Tech, PS, Patt, NSns, Geom (K-12)

Calinger, Ronald. (1996). *Vita mathematica: Historical research and integration with teaching.* Washington, DC: Mathematical Association of America. [SE 058 464]

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, Tchg, Alg, Calc (ALL)

Carr, Martha (Ed.). (1996). *Motivation in mathematics.* Cresskill, NJ: Hampton Press, Inc. [SE 058 362]

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.

Att, Ethn, Rsch, Blf, Curr, Ach (K-12)

Civian, Janet. Schley, Sara. (1996). *Pathways for women in the sciences II: Retention in math and science at the college level.* Paper presented at the Annual Meeting of the American Educational Research Association, New York, NY, April 8-12, 1996. [ED 394 439]

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.

Att, Ach, Gend, AdvM (PS)

Clarkson, Philip C.(Ed.). (1996). *Technology in mathematics education: Proceedings of the 19th Annual Conference of the Mathematics Education Research Group of Australasia (MERGA).* Campbelltown, NSW, Australia: Mathematics Education Research Group of Australasia. [SE 059 440]

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

Lrng, Tech, PS, TAtt, Curr, Mscn (K-12)

Corwin, Rebecca B.; and others. (1996). *Talking mathematics: Supporting children's voices.* Portsmouth, NH: Heinemann. [SE 057 770]

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.

Comm, Matl, TKnw, Tchg, Insv, Rsch (TE)

Coutts, Linda; and others. (1996). *Missouri's framework for curriculum development in mathematics K-12.* Jefferson, MO: Missouri Dept. of Elementary and Secondary Education. [SE 060 263]

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.

Matl, Curr, IC, Tech, PS, Tchg (K-12)

Croft, Cedric; and others. (1996). *Assessment resource banks in mathematics and science. Transition-point assessment - part 2: Implementation trial.* Wellington, New Zealand: New Zealand Council for Educational Research. [SE 059 605]

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

Assm, Ach, Comp, Matl (EL)

Crow, Tracy (Ed.). (1996). *Active learning with hands-on resources.* Columbus, OH: Eisenhower National Clearinghouse. [SE 057 923]

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)

Davis, Cinda-Sue, and others. (1996). *The equity education: Fostering the advancement of women in the sciences, mathematics, and engineering.* San Francisco, CA: Jossey-Bass Inc. [ED 394 488]

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

Eqty, Gend, Impl, Curr (ALL)

Dugdale, Sharon; Kibbey, David. (1996). *Green globs and graphing equations teacher's guide, Macintosh version 2.2.* Pleasantville, NY: Sunburst Communications, Inc. [SE 059 225]

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)

Ediger, Marlow. (1996). *Reading achievement in mathematics.* [SE 058 399]

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)

Ediger, Marlow. (1996). *Psychology in teaching mathematics.* [SE 058 741]

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

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

Ediger, Marlow. (1996). *Philosophy of teaching mathematics.* [SE 059 186]

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)

Elliott, Portia C., (Ed.) and Kenney, Margaret J., (Ed.). (1996). *1996 Yearbook: Communication in mathematics. K-12 and beyond.* Reston, VA: National Council of Teachers of Mathematics. [SE 058 730]

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)

Fagan, Patsy J. (1996). *1995 Implementation status of mathematics and science reform in Iowa: Based on teachers' concerns, professional activity, and philosophical beliefs.* Cedar Falls, IA: University of Northern Iowa, Iowa Mathematics and Science Coalition. [SE 058 962]

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)

Fenwick, Leslie T. (1996). *A perspective on race equity and science and math education: Toward making science and math for all.* Paper presented at the Annual Conference of the Georgia Inititative in Mathematics and Science (GIMS), Atlanta, GA, 1996. [SE 059 503]

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)

Flint, Amy Seely; Karlsson, Mary Riordan. (1996). *Math standards in action: Professional's guide.* Westminster, CA: Teacher Created Materials. [SE 059 212]

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)

For good measure: Principles and goals for mathematics assessment. Report of the national summit on mathematics assessment. (1996). Washington, DC: National Academy of Sciences, National Research Council, Mathematical Sciences Education Board. [SE 060 098]

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)

Freedman, Suzette D. (1996). *25 activities to connect writing and math, grades 1-3.* New York, NY: Scholastic Professional Books. [SE 059 498]

This book is designed to provide teachers with numerous ideas about how to infuse mathematics and writing into their classroom. Each activity also includes a teaching tip or an activity extension.

Writ, Comm, Patt, PS, Tchg, Matl (EL)

FY 96 Awards. Teacher preparation and NSF collaboratives for excellence in teacher preparation. (1996). Arlington, VA: National Science Foundation, Directorate for Education and Human Resources. [SE 060 144]

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-level 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, Ethn, Lrng (TE, EC)

Givvin, Karen B.; and others. (1996). *Teachers' understanding of their students' motivation.* Paper presented at the Annual Meeting of the American Educational Research Association, New York, NY, April 8-12, 1996. [ED 397 054]

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)

Graduate education and postdoctoral training in the mathematical and physical sciences workshop. (1996). Summary report (June 5-6, 1996). Arlington, VA: National Science Foundation [ED 394 446]

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)

Grant, Theresa J. (1996). *Preservice teacher planning: A study of the journey from learner to teacher in mathematics and social studies.* Paper presented at the Annual Meeting of the American Educational Research Association, New York, NY, April 8-12, 1996. [ED 398 202]

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)

Hands-on image processing for educators user's guide. (1996). Washington, DC: Annenberg/CPB Projects. [SE 058 847]

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.

Matl, Tech, Curr, Comp (ALL)

Harnadek, Anita. (1996). *Math mind benders warm up: Deductive reasoning mathematics.* Pacific Grove, CA: Critical Thinking Press and Software. [SE 059 405]

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, Nsns, PS, Tchg (EL)

Haslam, M. Bruce; and others. (1996). *Evaluation of the Dwight D. Eisenhower Mathematics and Science Regional Consortiums Program: First Interim Report, 1996.* Washington, DC: Policy Studies Associates. [SE 058 712]

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)

Haug, Carolyn A.; Marion, Scott F. (1996). *Professional networks for educational change: An evaluation of the mathematician and education reform forum.* Washington, DC: American Educational Research Association. [ED 396 370]

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)

Humphrey, Daniel C.; and others. (1996). *Evaluation of the Dwight D. Eisenhower Mathematics and Science State Curriculum Frameworks Projects: First Interim Report, 1996.* Menlo Park, CA: SRI International. [SE 058 711]

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)

Hynes, Michael C., (Ed.). (1996). *Ideas: NCTM standards-based instruction, grades 5-8.* Reston, VA: National Council of Teachers of Mathematics. [SE 058 689]

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)

Hynes, Michael C., (Ed.). (1996). *Ideas: NCTM standards-based instruction, grades K-4.* Reston, VA: National Council of Teachers of Mathematics. [SE 058 690]

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)

Illingworth, Mark. (1996). *Real-life math problem solving: 40 exciting, classroom-tested problems with annotated solutions.* New York, NY: Scholastic, Inc. [SE 059 027]

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, Styl, Matl, Assm (EL)

Jakubowski, Elizabeth(Ed.); and others. (1996). *Proceedings of the 18th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education, Volumes 1 and 2.* Columbus, OH: ERIC/CSMEE. [SE 059 001]

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)

Jasmine, Grace; Jasmine, Julia. (1996). *Activities for math: Cooperative learning lessons.* Huntington Beach, CA: Teacher Created Materials, Inc. [SE 058 216]

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

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

Jorgensen, Margaret. (1996). *Rethinking portfolio assessment: Documenting the intellectual work of learners in science and mathematics.* Columbus, OH: ERIC Clearinghouse for Science, Mathematics, and Environmental Education. [SE 058 842]

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)

Kimmins. Dovie.and Bouldin. Elaine. (1996). *Making mathematics come alive with technology.* Proceedings of the Mid-South Instructional Technology Conference, Murfreesboro TN, March 31-April 2, 1996. [ED 400 796]

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

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

Kinslow, John. (1996). *Internet Jones: An educator's guide to traveling on the information superhighway!* [ED 400 784]

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)

Konhauser, Joseph D.E.; and others. (1996). *Which way did the bicycle go? and other intriguing mathematical mysteries.* Washington, DC: Mathematical Association of America. [SE 059 173]

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)

Lambdin, Diana V., (Ed.); and others. (1996). *Emphasis on assessment: Readings from NCTM's school-based journals.* Reston, VA: National Council of Teachers of Mathematics. [SE 058 691]

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)

Leinenbach, Marilyn; Raymond, Anne M. (1996). *A two-year collaborative action research study on the effects of a "hands-on" approach to learning algebra.* Paper presented at the Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education, Panama City, FL, October, 1996. [SE 058 808]

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)

Leonard, John D. (1996). *Creating item signatures from California's mathematics framework: The first step to individual result reporting.* Paper presented at the Annual Meeting of the American Educational Research Association, New York, NY, April 8-12, 1996. [ED 397 134]

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)

Lipke, Barbara. (1996). *Figures, facts, and fables: Telling tales in science and math.* Portsmouth, NH: Heinemann. [SE 059 093]

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)

Lokan, Jan; and others. (1996). *Maths and science on the line: Australian junior secondary students' performance in the Third International Mathematics and Science Study.* Camberwell, Melbourne, Victoria, Australia: Australian Council for Educational Research Ltd. [SE 059 714]

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)

Maloy, Kate. (1996). *QUASAR: Unlocking the mathematical talent.* Pittsburgh, PA: University of Pittsburgh, Learning Research and Development Center. [SE 060 303]

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)

Martin, Hope. (1996). *Integrating mathematics across the curriculum.* Arlington Heights, IL: IRI/Skylight Training and Publishing, Inc. [SE 059 531]

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)

Mathematics: An introduction to the NCTM standards. (1996). Reston, VA: National Council of Teachers of Mathematics. [SE 059 740]

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)

Mathematics and science education around the world: What can we learn? (1996). Washington, DC: National Research Council, Mathematical Sciences Education Board or Committee on Science Education K-12, Center for Science, Mathematics, and Engineering Education. [SE 059 261]

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 TIMS may answer are listed.

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

Mathematics for a successful transition to college: The content foundations of the ACT assessment. (1996). Iowa City, IA: American College Testing Program. [SE 060 094]

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)

Mathematics framework for the 1996 national assessment of educational progress. (1996). Washington, DC: National Assessment Governing Board. [SE 059 727]

This document presents a framework and recommendations for the 1996 NAEP mathematics assessment. Chapters include: Overview of Recommendations, Framework for the Assessment, 1996 NAEP Mathematics Objectives, Cognitive Abilities, and Item Types. It contains 12 references.

Assm, Ach, Impl (K-12)

Mathematics: Making a living, Making a life. (1996). Reston, VA: National Council of Teachers of Mathematics. [SE 059 580]

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, ClIn (K-12)

Mighty math: Zoo zillions [CD-ROM]. (1996). Redmond, WA: Edmark Corporation. [SE 059 534]

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)

Mills, Heidi; and others. (1996). *Mathematics in the making: Authoring ideas in primary classrooms.* Portsmouth, NH: Heinemann. [SE 058 465]

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)

Minicucci, Catherine. (1996). *Learning science and english: How school reform advances scientific learning for limited english proficient middle school students. Educational practice report 17.* Washington, DC: National Center for Research on Cultural Diversity and Second Language Learning. [ED 397 684]

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)

Minnesota TIMSS report: A preliminary summary of results. Third International Mathematics and Science Study. (1996). St. Paul, MN: SciMath(MN). [SE 060 140]

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)

Mulligan, Joanne; Mitchelmore, Michael. (1996). *Children's number learning.* Adelaide, SA, Australia: Australian Association of Mathematics Teachers, Inc. [SE 059 532]

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)

NSTA awareness kit for the National Science Education Standards teachers workshop manual. (1996). Washington, DC: Annenberg/CPB Projects. [SE 058 845]

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)

Posamentier, Alfred S. (1996). *Students! Get ready for the mathematics for Sat*I: Problem-solving strategies and practice tests.* Thousand Oaks, CA: Corwin Press, Inc. [SE 058 609]

This book is designed to prepare students for taking the SAT I - Reasoning Test using a problem solving focus by providing meaningful instructional material and explanations.

PS, Matl, Assm, Ach (HS)

Posamentier, Alfred S. and Krulik, Stephen. (1996). *Teachers! Prepare your students for the mathematics for SAT*I: Methods and problem-solving strategies.* Thousand Oaks, CA: Corwin Press, Inc. [SE 058 608]

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)

Posamentier, Alfred S. and Schulz, Wolfgang. (1996). *Art of problem solving: A resource for the mathematics teacher.* Thousand Oaks, CA: Corwin Press, Inc. [SE 057 767]

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)

Position statements of the National Council of Teachers of Mathematics (NCTM). (1996). Reston, VA: National Council of Teachers of Mathematics. [SE 059 572]

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

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

Puig, Luis; Gutierrez, Angel (Eds.). (1996). *Aritmetica para los Ninos: Proceedings of the 20th Conference of the International Group for the Psychology of Mathematics Education PME 20, Volume 1-4.* Apartado, Valencia, Spain: Unviversitat de Valencia, c/o Angel Gutierrez, Dept. de Didactica de la Matematica, E.U. de Magisteri "Ausias March" [SE 059 518]

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)

Puig, Luis; Gutierrez, Angel (Eds.). (1996). *Aritmetica para los Ninos: Proceedings of the 20th Conference of the International Group for the Psychology of Mathematics Education PME 20, Addenda.* Apartado, Valencia, Spain: Unviversitat de Valencia, c/o Angel Gutierrez, Dept. de Didactica de la Matematica, E.U. de Magisteri "Ausias March". [SE 059 519]

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)

Raymond, Anne M. (1996). *The development of preservice elementary teachers' beliefs about and knowledge of alternative mathematics assessment.* Paper presented at the Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education, Panama City, FL, October, 1996. [SE 058 809]

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)

Report on Project Kaleidoscope: 1992-1996. (1996). Washington, DC: Project Kaleidoscope. [SE 058 725]

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)

Roberts, A. Wayne (Ed.). (1996). *Calculus: The dynamics of change.* Washington, DC: Mathematical Association of America. [SE 057 975]

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)

Sanders, Jo. (1996). *Institutionalizing gender equity in teacher education.* Paper presented at the Annual Meeting of the American Association of Colleges for Teacher Education, Chicago, IL, February 21-24, 1996. [ED 392 779]

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)

Schifter, Deborah (Ed.). (1996). *What's happening in math class, vol. 1: Envisioning new practices through teacher narratives.* New York, NY: Teachers College Press. [SE 058 641]

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)

Schifter, Deborah (Ed.). (1996). *What's happening in math class, vol. 2: Reconstructing professional identities.* New York, NY: Teachers College Press. [SE 058 642]

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 posted by the new mathematics pedagogy are included.

Lrng, TKnw, TBlf, Tchg (TE)

Shaping the future: New expectations for undergraduate education in science, mathematics, engineering, and technology. Executive summary. (1996). Arlington, VA: National Science Foundation. [SE 059 215]

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)

Shaping the future: New expectations for undergraduate education in science, mathematics, engineering, and technology. (1996). Arlington, VA: National Science Foundation. [SE 059 680]

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)

Shinohara, Mayumi, Ed; and others. (1996). *Tales from the electronic frontier: First-Hand experiences of teachers and students using the internet in K-12 math and science.* New York, NY: Teachers College Press. [ED 400 776]

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)

Span, Mary Beth. (1996). *Instant math storymats with hands-on activities for building essential primary math skills. grades K-2.* New York, NY: Scholastic, Inc. [SE 059 205]

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)

Statement on the use of calculators and computers for mathematics in Australian schools 1996. (1996). Adelaide, South Australia: Australian Association of Mathematics Teachers, Inc. [SE 058 765]

Recommendations for using technology in mathematics classrooms are discussed from various aspects.

Tech, Comp, Cltr, Tchg, Lrng, Ethn (ALL)

Sterrett, Andrew (Ed.). (1996). *101 careers in mathematics.* Washington, DC: Mathematical Association of America. [SE 058 854]

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)

Stickels, Terry H. (1996). *Brain Stretchers, Book 3 - Advanced.* Pacific Grove, CA: Critical Thinking Press and Software. [SE 059 439]

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)

The guidebook of federal resources for K-12 mathematics and science 1996. (1996). Columbus, OH: Eisenhower National Clearinghouse, The Ohio State University. [SE 059 602]

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)

The University of Chicago School Mathematics Project, Autumn 1996. (1996). Chicago, IL: University of Chicago School Mathematics Project. [SE 059 454]

This document discusses a variety of aspects of the University of Chicago School Mathematics Project (UCSMP) : Extensive historical background of the project and key personnel and funding sources. Resources are noted throughout the report that are appropriate for elementary and secondary mathematics instruction.

Curr, Matl, Assm, TKnw (K-12, TE)

Third International Mathematics and Science Study. (1996). Washington, DC: National Center for Education Statistics. [SE 059 191]

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)

Treagust, David F. (Ed.); and others. (1996). *Improving teaching and learning in science and mathematics.* New York, NY: Teachers College Press. [SE 058 736]

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)

Tutt, Betty. and Newbold, Susan. (1996). *Collaborating for quality: Partnerships for excellence through education reform.* Paper presented at the Annual Meeting of the American Association of Colleges for Teacher Education, Chicago, IL, February 21-24, 1996. [ED 395 912]

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)

van den Heuvel-Panhuizen, Marja. (1996). *Assessment and Realistic Mathematics Education.* Utrecht, The Netherlands: Freudenthal Institute, Mathematics and Computer Science Education. [SE 059 724]

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)

Vernon, P.E.; and others. (1996). *Mathematics competency test: User's manual.* Victoria, Australia: Australian Council for Educational Research Ltd. [SE 058 717]

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)

Vondrak, Maripatricia. (1996). *The effect of preschool education on math achievement.* [ED 399 017]

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)

Working together in mathematics education. (1996). Edmonton, Alberta, Canada: Alberta Education, Curriculum Standards Branch. [SE 060 227]

This booklet provides information to parents, students, teachers, and community members about the new mathematics curriculum in western Canada that developed as a result of the Common Curriculum Framework for K-12.

Curr, Soc, Att, Knw, PS (K-12)

Zaslavsky, Claudia. (1996). *Multicultural math classroom: Bringing in the world.* Portsmouth, NH: Heinemann. [SE 057 912]

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)

Zhang, Dianzhou; and others. (1996). *Proceedings of the China-Japan-U.S. Seminar on Mathematical Education.* Carbondale, IL: Southern Illinois University at Carbondale. [SE 058 209]

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)

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Every dissertatin, journal article, paper, and monograph listed in the preceeding 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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Drijvers	GCal. PS, Patt
Dreyfus	Prf. Geom. Comp
Farrell	GCal, Calc,Tchg
Hatfield	Prsv, MMed, Manp
Hershkovitz	PS, Comp
Hunting	Whol, Frac, CAI
Leigh-Lancaster	GCal, Tech
Oldknow	GCal, Tchg, Isrv
Owens	Tech, Eqty
Penglase	Impl, GCal, Revw
Powell	Cltr, Mtcg, Lrng
Ralston	Cltr, Curr, Arth
Rochowicz	Tech, Calc, TAtt
Thomas	Comp, Tchg, TBlf
Waits	GCal, Tech, Rep
Waugh	Tech. Comm, CIIn
Zoller	Att, TAtt, Comp

Papers

Burz	Curr, Tech, PS
Clarkson	Lrng, Tech, PS
Dugdale	Alg, Comp, Matl
"Hands-on"	Matl, Tech
Heidari	LD, CAI
Kimmins	Tech, Tchg, Prsv
Kinslow	Tech, Comp, Matl
"Mighty math"	Comp, Vis, Arth
"NSTA awareness kit"	Insv. Matl, Tech
Shinohara	Tech, Matl. Tchg
"Statement...calculators"	Tech, Comp, Cltr

Grouping for instruction, cooperative learning (Grpg);
Planning, descision making (Plan);
Teaching (role, style, methods) (Tchg)

Dissertations and Theses

Alvarez	Curr, Impl, Plan
Bensbaa	Phil, Tchg
Boissy	Grpg, Assm, Tchg
Daniel	Prsv, MMed, Tchg
Di Cintio	Aff, Lrng, Tchg
Fraivillig	Curr, Tchg
Frost	Grpg, Aff
Frykholm	Tchg, Curr, Prsv
Gordon	Manp, Tchg
Grant	Prsv, TKnw. Plan

Owens	Tech, Eqty
Peterson	Eqty, Impl
Sensevy	Frac, Soc, ClIn
Tate	Eqty, Impl, Curr
Taylor	Phil, Lrng, Soc
Triadafillidis	CC, Ach, IC
Tsai	PS, Lrng, Ethn
Whang	Ethn, PS, Lang
Wong	Att, Blf, Ethn
Yackel	Blf, Soc, ClIn

Papers

"Achievements of"	CC, Ach, Assm
"Asessment of Achiev"	Ach, Assm, Ethn
Atweh	Revw, Ethn, Impl
Calinger	CC, Tchg
Carr	Att, Ethn, Rsch
Davis	Eqty, Gend, Impl
Fenwick	Eqty, Ethn, Gend
"Graduate education"	Impl, Eqty
Lokan	Ach, Assm, CC
"Mathematics and" (broc)	Assm, CC, Curr
"Mathematics: Making"	Curr, Tchg, Soc
Mills	Patt, Soc
Minicucci	Lang, Ethn
"Minnesota TIMSS"	Assm, Ach, CC
Sanders	Eqty, Gend, Prsv
Sterrett	CC, Ethn, Tchg
"Third International"	Assm, CC, Ach
van den Heuvel-Panhuizen	Assm, Tchg, Ethn
Vondrak	Ach, Ethn
"What schools can do"	Eqty, Ethn, Gend
"Working together"	Curr, Soc
Zaslavsky	Ethn, Eqty, Matl
Zhang	CC, PS, Tchg

Curriculum, programs (Curr); Diagnosis, remedial mathematics (D/R); Integrated curriculum (IC); Manipulatives (Manp); Materials (texts, other resources) (Matl)

Dissertations and Theses

Alvarez	Curr, Impl, Plan
Anthony	Calc, Curr
BJarnason	CAI, Curr
Boehm	Lrng, Manp, Rep
Bough	Curr, PS
Bourgeois	D/R, Att, Ach
Cleare	Assm, D/R, Ach
Cockburn	Vis, Manp, Gend
Cotter	A/S, PlcV, Manp
Dale	Curr
Drager-McCoy	Curr, PS, Assm
Dyer	Manp, Alg
Faro-Schroeder	D/R, Ach
Farrer	Alg, Curr
Fraivillig	Curr, Tchg
Frykholm	Tchg, Curr, Prsv
Gordon	Manp, Tchg
Harding	CC, Matl, PS
Henry	Curr, TBlf, Lrng
Hicks	CAI, D/R
Ingram	Curr, Ach
Jordan	Frac, Ach, Manp
Koelpin	Ach, Curr, Gend
Lafferty	Ach, Anx, Matl
Larmon	PS, Curr
Lataille	Curr, Tchg
Lavoie	Arth, Curr
Lee	IC, M/D
Marable	D/R, Alg, Arth
Mastin	Curr, TAtt, TBlf
Mayo	Curr, Manp, Ach
McCoy	IC, Frac
Morris	CC, Alg, Curr
Newman	LD, A/S, Manp
O'Conner	D/R, Ach
O'Neal	IC, D/R, Ach
Peressini	Curr, Tchr
Phillips	Prsv, TKnw, Curr
Pupo	LD, A/S, Manp
Randle	Rep, Curr, MMed
Rando	Curr, Tchr, TBlf
Rosenberg	Matl, Cltr, Soc
Smith	Int, Comp, Manp
Soash	Frac, Mscn, D/R
Strand	Insv, IC, TBlf
Stride	Curr, Impl
Tambellini	LD, Curr
Terry	Comp, Manp, Lrng
Terwilliger	D/R, Assm
Thomas	Curr
Thomas	Calc, Curr, Lrng
Thornton	Manp, Alg, Styl
Walker	Ach, Curr
West	Curr, Ach, Att
Willard	Assm, Curr, IC
Williams	CAI, Anx, D/R
Wu	Ach, Curr
Yang	Curr, Matl, Assm
Yoshino	PlcV, Manp, Comp

Articles

Begg	Curr, Plan
BierHoff	Ethn, CC, Matl
Carpenter	Curr, Lrng, PS
Carroll	Curr, Assm, Arth
Carroll	PS, Curr, Arth
Chazan	Alg, Curr, Eqty
Childress	IC, Patt, PS
Dowling	Assm, Soc, Matl
Erickson	Plan, Ach, Curr
Froumin	Curr, CC, TBlf
Graue	Assm, TBlf, Curr
Hatfield	Prsv, MMed, Manp
Jennings	Curr, Ethn, CC
Lamon	Styl, NSns, Manp
Lopez-Real	PS, Curr, Ethn
Mower	Writ, Curr, Alg
Nesbit	Tchg, D/R
Ralston	Cltr, Curr, Arth
Rickard	PS, Curr, Meas
Roberts	TBlf, Phil, Curr
Tate	Eqty, Impl, Curr
Triadafillidis	Att, Ach, IC
Triadafillidis	CC, Ach, IC
Watanabe	Frac, Patt, Manp
Wiebe	Rep, RaPc, IC
Willis	Assm, Curr
Wood	Curr, Tchg, PS

Papers

"Alberta program"	Curr, Blf, Ach
Bartch	IC, Lang, Patt
Brown	Curr
Burz	Curr, Tech, PS
Corwin	Comm, Matl, TKnw
Coutts	Matl, Curr, IC
Crow	Matl, Manp, Tchg
Dugdale	Alg, Comp, Matl
Ediger	Phil, Curr, Tchg
Fagan	Curr, TBlf, TAtt
Flint	Curr, Assm, Lrng
"Hands-on"	Matl, Tech
Harnadek	Matl, Nsns
Haug	Curr, Impl
Humphrey	Curr, TKnw
Hynes	Matl, PS, Frac
Hynes	Matl, PS, Arth
Illingworth	PS, Curr, Patt
Jasmine	Grpg, Matl, Lrng
Jorgensen	Assm, Lrng, Matl
Kinslow	Tech, Comp, Matl
Konhauser	Matl, PS, Patt
Martin	IC, Matl, Patt

Khoury	Ethn, Lrnr, Blf
King	LD, Ach
Klein	Calc, Knw, Rep
Linn	Assm, Knw
Martz	LD, Ach, Arth
Naka	Writ, Lrnr, Tchg
Newman	LD, A/S, Manp
Payne	Knw, Blf, Cltr
Poth	A/S, LD
Pupo	LD, A/S, Manp
Seman	IC, LD, Tchg
Shaffer	Ach, Styl
Soash	Frac, Mscn, D/R
Tambellini	LD, Curr
Thomas	LD, Knw, Lrng
Thornton	Manp, Alg, Styl
Treacy	Styl, Ach, Tech
Waxman	PlcV, Knw, Lrng
Williams	Styl, Att, Ach

Articles

Akpinar	CAI, Styl
Anthony	Mtcg, Styl, Lrng
Batanero	PS, Mscn, Stat
Blanton	Calc, Mscn, Rep
Boulton-Luis	A/S, Knw, Rep
Buschman	PS, Knw, Patt
Carr	Lrnr, Comm, NSns
Chinnappan	PS, Geom, Knw
Clark	Lrng, Lrnr
English	PS, Lrng, Lrnr
Estepa	Mscn, Stat
Hatano	Arth, A/S, Mscn
Hazzan	Mscn, Prf
Hodgson	Mscn, Rep, Vis
Koontz	LD, Lrng
Lamon	Styl, NSns, Manp
Linchevski	Arth, Alg, Knw
Masingila	Lrng, Lrnr
Padula	Alg, Mscn, Knw
Russell	Blf, Knw
Santos-Trigo	PS, Knw
Schmittau	Styl, Lrng, Gend

Papers

Borasi	Tchg, Lrng, Mscn
Heidari	LD, CAI
Maloy	Tchg, Lrnr, Lrng

Implications of research, interpretations of research (Impl); Research issues, methods (Rsch); Reviews of research (Revw)

Dissertations and Theses

Alvarez	Curr, Impl, Plan
Dreher	Phil, Comm, Rsch
Stauber-Johnson	Tchr, Phil, Impl
Stride	Curr, Impl

Articles

Adajian	Impl, Insv, Tchg
Anderson	Impl, Phil, Lrng
Barnes	Gend, Impl, Eqty
Barton	Impl, Ethn, Soc
Brown	Lang, Impl, Lrng
Cobb	Impl, Rsch
Cottrill	Rsch, Impl, Tchg
Friedman	Gend, Ach, Impl
Kramer	Ach, Revw
Lerman	Rsch, Soc, Ethn
Mukhopadhyay	Prsv, Tchg, Rsch
Penglase	Impl, GCal, Revw
Peterson	Eqty, Impl
Pitkethly	Impl, Frac, Revw
Roberts	Rsch
Smith	Rsch, Tchg, TBlf
Streefland	Impl, Tchg, Int
Tate	Eqty, Impl, Curr
Thompson	TKnw, Tchg, Impl
Thompson	Prf, Impl

Papers

Atweh	Revw, Ethn, Impl
Atweh	Revw, Ethn, Impl
Carr	Att, Ethn, Rsch
Gimenez	Prsv, Tknw, Rsch
Davis	Eqty, Gend, Impl
"Graduate education"	Impl, Eqty
Haug	Curr, Impl
Jakubowski	Rsch, Lrng, Phil
Lambdin	Assm, Revw
Puig	Rsch, Phil, Lrng
Puig	Rsch, Lrng, Rep
"Report . . . Kaleidoscope"	Impl,Curr, Matl
Treagust	Lrng, Tchg, Rsch

Inservice teacher education, professional development (Insv); Preservice teacher education (Prsv)

Dissertations and Theses

Adajian	Tchr, Insv
Alsup	Prsv, Lrng, Anx
Arnold	Comp, Alg, Prsv
Azim	Frac, Prsv, M/D
Brickner	Comp, Insv, TBlf
Bullock	Att, Prsv
Daniel	Prsv, MMed, Tchg
Ebert	TKnw, TBlf, Prsv
Fernandez	Prsv, TKnw
Fiksal	PS, Prsv
Frykholm	Tchg, Curr, Prsv
Grant	Prsv, TKnw, Plan
Herrera	Insv, TKnw
Hutchinson	Prsv, TKnw, TBlf
Johnson	TKnw, Prsv, Lrng
Koirala	Prsv, Prob
Lee	Prsv, Comp, Lrng
Lynch	TAnx, TAtt, Prsv
Neagoy	DscM, TKnw, Insv
Phillips	Prsv, TKnw, Curr
Pobre	Tchr, Insv, Aff
Poole	Tech, PS, Prsv
Redden	Prsv, Att
Roberts	Prsv, Geom, Soc
Ryan	Comp, TAnx, Insv
Scholz	Prsv, Geom, TBlf
Schorr	Insv, Tchg, Tchr
Siegle	Att, Ach, Insv
Smith	Insv, Tchg
Smith	PS, Writ, Prsv
Strand	Insv, IC, TBlf
Taylor	Insv, Tchg
Thatcher	Insv, Tchg, TBlf
Unglaub	Prsv, TAnx, Tchg
Willhite	Insv, TAtt, TBlf

Articles

Adajian	Impl, Insv, Tchg
Allexsaht-Snider	Insv, Ethn, Gend
Anderson	Prsv, Lrng, TBlf
Brown	Lrng, Tchg, Insv
Campbell	Insv, Ach, Ethn
Cooper	Prsv, Tchg, TKnw
Day	Prsv, TBlf

Posamentier	PS, Lrng, Matl
Puig	Rsch, Phil, Lrng
Puig	Rsch, Lrng, Rep
Schifter	Lrng, TKnw, TBlf
Schifter	Lrng, TKnw, TBlf
Stickels	PS, Matl, Lrng
Treagust	Lrng, Tchg, Rsch

Metacognition, reflection (Mtcg); Patterns, relationships, math connections (Patt); Problem solving, reasoning (PS); Proof, justification (Prf)

Dissertations and Theses

Allsopp	Ach, Alg, PS
Ansell	PS, Lrng
Baker	PS, M/D
Bough	Curr, PS
Childs	Patt, Alg
Drager-McCoy	Curr, PS, Assm
Dwyer	PS, Blf, Vis
El Moutaouakil	Mtcg
Etheredge	PS, Lrng, Knw
Fiksal	PS, Prsv
Gessesse	Alg, PS, CAI
Herrelko	PS, Gend
Harding	CC, Matl, PS
Hung	Rep, Knw, PS
Kallam	Gend, PS
Keig	Patt, NSns
Kerr	Assm, PS
Larmon	PS, Curr
Malloy	PS, Ethn, Att
McBee	Assm, Ach, PS
McBride	Geom, Ach, Prf, PS
McClain	Tchg, Oral, PS
Muchlinski	Mtcg, PS, Geom
Poole	Tech, PS, Prsv
Presseau	PS, Arth
Prus-Wisniowska	Prf, Phil, Mtcg
Pugalee	Writ, PS, Alg
Reid	PS
Robinson	Geom, Comp, PS
Schael	Rep, PS
Seaman	PS, Rep
Sheldrick	PS, Tech
Smith	Alg, PS, Anx
Smith	PS, Writ, Prsv
Smith	Cltr, Mtcg
Stallworth-Stevens	PS, ClIn, Lrng

Articles

Anderson	Prf, AdvM
Anthony	Mtcg, Styl, Lrng
Anthony	Lrng, Mtcg
Batanero	PS, Mscn, Stat
Boulton-Lewis	PS, Meas
Buschman	PS, Knw, Patt
Carpenter	Curr, Lrng, PS
Carroll	PS, Curr, Arth
Chatterjee	Stat, PS, Patt
Childress	IC, Patt, PS
Chinnappan	PS, Geom, Knw
Chiu	PS, Meas
Dreyfus	Prf, Geom, Comp
Drijvers	GCal, PS, Patt
English	PS, Lrng, Lrnr
Goos	Mtcg, PS, Grpg
Hart	PS, Att, Ach
Hazzan	Mscn, Prf
Hershkovitz	PS, Comp
Irwin	Mtcg, Lrng, NSns
Lopez-Real	PS, Curr, Ethn
Maher	Lrng, Prf
Myren	PS, ClIn, Grpg
Powell	Cltr, Mtcg, Lrng
Quinn	PS, Alg, Arth
Reeve	Frac, PS
Rickard	PS, Curr, Meas
Santos-Trigo	PS, Knw
Shoenfeld	Lrng, PS
Silver	Insv, Prsv, PS
Simon	Prsv, TKnw, Prf
Simon	Lrng, PS, Phil
Stillman	PS, Writ, Lrng
Thompson	Prf, Impl
Tsai	PS, Lrng, Ethn
Watanabe	Frac, Patt, Manp
Watson	Prob, PS
Whang	Ethn, PS, Lang
White	Calc, PS
Wood	Curr, Tchg, PS
Zazkis	Prsv, TKnw, Prf

Papers

Bartch	IC, Lang, Patt
Bulla	Arth, NSns, Patt
Burz	Curr, Tech, PS
Clarkson	Lrng, Tech, PS
Freedman	Writ, Comm, Patt
Hynes	Matl, PS, Frac
Hynes	Matl, PS, Arth
Illingworth	PS, Curr, Patt
Jaramillo	Lang, Lrng, Patt
Konhauser	Matl, PS, Patt
Martin	IC, Matl, Patt
Mills	Patt, Soc
Posamentier	PS, Matl
Posamentier	Assm, PS
Posamentier	PS, Lrng, Matl
Stickels	PS, Matl, Lrng
Zhang	CC, PS, Tchg

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