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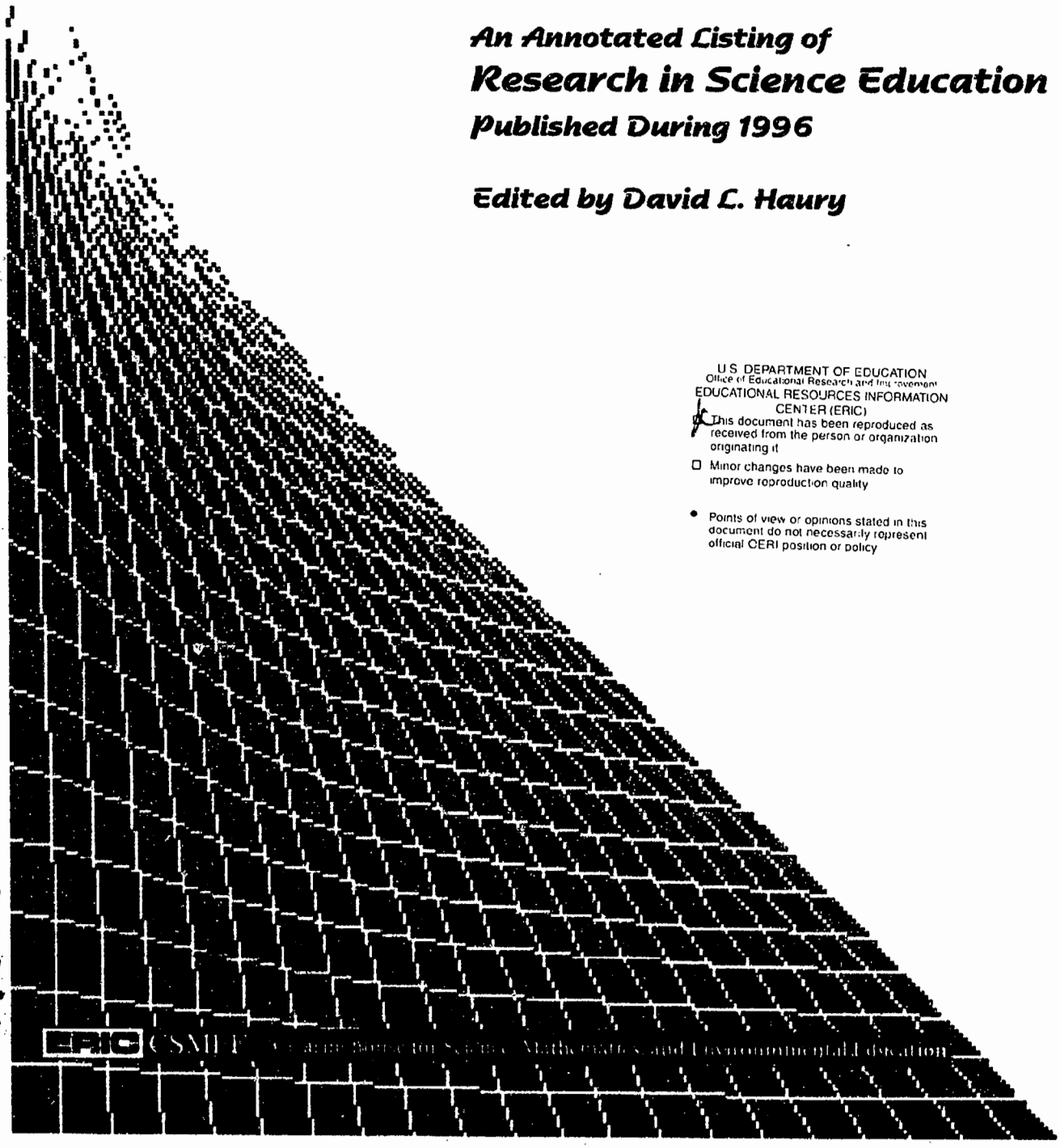
ABSTRACT

Research presented in this "progress report" is identified and categorized as doctoral dissertations, journal articles, conference papers, and other documents. This one-year "snapshot" provides an overview of the field for experienced researchers, doctoral students, and practitioners who use research findings. A listing of the institutions where the research was completed is included for dissertations. A listing of journals searched and the number of articles found in each is also included. (DDR)

RISE 96

An Annotated Listing of
Research in Science Education
Published During 1996

Edited by David L. Haury



Research in Science Education 1996

Edited by

David L. Haury

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Contents

Preface

For many years, the Clearinghouse for Science, Mathematics, and Environmental Education published an annual *Summary of Research in Science Education*, a document that appeared annually as a special issue of *Science Education*. The annual *Summary* was intended to facilitate access to research findings and provide a critique of research efforts in science education at one-year intervals. Sort of a "progress report." A variety of factors led to the demise of that annual *Summary*, but many individuals have continued to express interest in some sort of annual overview of research in science education. This publication has been developed in response to those expressions of interest; it presents an annotated listing of research in science education that was reported during 1996. No effort has been made to provide a critical analysis of research reports or areas of research, but we have attempted to identify and accurately describe the science education research reported through doctoral dissertations, journal articles, conference papers, and other documents. In the case of dissertations, we have included a listing of the institutions where science education doctoral research was completed, and in the case of journals, we have identified the journals we searched and the number of science education research articles we found.

Though this may not be a comprehensive listing of the science education research reported during 1996, we believe it is the most complete listing available and represents the major trends in science education research. Our hope is that this one-year "snapshot" of research will provide an overview of the field for experienced researchers, doctoral students, and practitioners who use research findings. We will not know if our hope is realized unless those who find this report useful tell us. Though ERIC/CSMEE has the capacity to produce this listing, it is not clear the extent to which a single annotated listing of science education research is valued by the science education community. We earnestly desire feedback, either in writing or by e-mail at the addresses listed below. This listing will also be available through the ERIC/CSMEE World Wide Web site.

Please forward feedback by mail to: Science Education Research Listing, ERIC/CSMEE, 1929 Kenny Road, Columbus, OH 43210-1080; or send e-mail to ericse@osu.edu.

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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 maximum of three minor codes. Within the index at the end of the volume, major codes have been used to categorize each publication.

The grade level or educational level of each study is indicated in parentheses after the topic codes. The level codes for teacher education studies reflect the grade level(s) at which the interns or teacher participants teach.

Topic Codes

ach	achievement	ene	environmental education	nas	nature of science
alf	alternative frameworks	eqt	equity issues	nfd	nonformal & informal education
asm	assessment	esg	earth & space science/ geology	ntw	networks/ collaboration/ partnerships
ats	student attitudes				
att	teacher attitudes	eth	ethnicity		
bfs	student beliefs	evo	evolution	pbs	problem solving/ science reasoning
bft	teacher beliefs	fsd	field studies/ outdoor education		
bio	biology			ped	pedagogy
bkg	background factors/ context, social factors	gen	gender	phe	philosophy/ epistemology
		his	history/ historical implications		
car	science-related study/ career choice			phy	physics
		hos	hands-on science	ref	reform/ educational change/ standards
cbi	computer-based instruction	inq	inquiry		
ccg	conceptual change	int	integration, interdisciplinary		
che	chemistry	kns	student knowledge	rem	representation/ modeling
chs	student characteristics	knt	teacher knowledge		
cht	teacher characteristics	lab	laboratory	res	research/ review of research/ conference proceedings
cid	classroom interactions/ discourse interaction	lit	science literacy		
		lrg	learning/ comprehension		
cns	constructivism			sks	student skills
cpl	cooperative learning/ group work	lsy	learning style/ cognitive style	skt	teacher skills
				sts	science, technology, & society
cul	cross-cultural studies	lth	learning theory	tec	technology
cur	curriculum	mat	materials, equipment	tpd	teacher professional development
edt	educational technology	mce	multicultural education/ bilingual education		

Level Codes

AD	adult
EC	early childhood, K-4
EL	elementary, K-8
MS	middle school
SE	secondary, 5-12
HS	high school, 9-12
PS	post secondary, 13-
K-12	all school level
ALL	all student levels
TE	teacher education, teachers
GEN	general interest

Further Elaboration of Selected Codes

In some cases, the codes we have used to group items may not correspond to the more precise terminology often used within the science education discourse community. To aid readers in making a match between the codes we have used and some common areas of research, we offer a further elaboration of codes on the next page. The codes we have used are indicated on the left, and the categories they represent include the topics listed on the right.

Elaboration of Codes

ach	achievement, grades, academic success
ats	student attitudes, mental state, interest, motivation
bfs	student beliefs, perceptions, views
bkg	background, context, including social or economic factors, past experience, family interset or background, environment, rural vs. urban
chs	student characteristics, including creativity, locus of control, at-risk behaviors, physical disabilities, learning disabilities
cid	classromm interaction, discourse interaction (not necessarily classroom), conversational analysis studies
cul	comparison of cultural factors, not simply a study of another culture
edt	educational technology, design of software, instructional technology other than computers, distance education, multimedia education
eqt	equity issues, power issues
int	integration, interdisciplinary issues, including thematic education
kns	student knowlegde, cognitive structures, mental constructs, system of constructs
lrg	learning, comprehension
lth	learning theory in a more general sense than *lrg*
mce	multicultural education, including bilingual education
ntw	networks; collaborations between students, teachers, schools; partnerships; mentoring programs
res	research, review of research, including conference proceedings

Dissertation Research Reported in 1996

Wendy Sherman McCann, *The Ohio State University*
Bernard Durkin, *The Ohio State University*

This section lists 328 dissertations in science education research that were completed in 1996 and abstracted in *Dissertation Abstracts International* during 1996 through 1997. Each entry is coded (see Key to Codes) with one to three major codes (in bold type) and up to three minor codes, as well as the grade level (in parentheses). Studies related to preservice or inservice teacher education are indicated by the the code for "teacher professional development" (tpd). The level designation that accompanies the teacher professional development varies, depending on the focus of the research. A general code, "TE," is used if the research focuses strictly on issues related to teacher educatio, but a second level code is added when appropriate to indicate the grade level(s) at which the intern or teacher participants teach. All entries are indexed by major codes at the end of the volume (see page 149). An index of dissertations by institutions is included at the end of this section (see page 75).

Acker, Sharron Flynt. (1996). *Identifying and correcting misconceptions about the solar system through a constructivist teaching approach* (Texas Woman's University). MAI 35(03), p. 0639, 1997. [AAI1382829]

Fifth-grade students' alternative conceptions about the solar system were identified, and an instructional approach employed to enact conceptual change. The approach was shown to be effective in promoting conceptual change.

ccg, alf, cns, ped, esg (EL)

Adams, Paul Eugene. (1996). *Beginning teacher cognition: A case study of four secondary science teachers* (Purdue University). DAI-A 57(07), p. 2950, 1997. [AAI9638128]

Case study of four beginning science teachers found that teachers' system of constructs for teaching and learning were most significantly affected by being an undergraduate teaching assistant, taking science methods courses, and taking content courses.

knt, bkg, tpd (TE)

Aherne, Michael John. (1996). *Learning in professional engineering and earth science: An exploratory study* (University of Alberta). MAI 34(06), p. 2117, 1996. [AAIMM10777]

Survey of professional engineers and earth scientists in Alberta found that these individuals report informal learning in the workplace as most important for developing and maintaining competent professional performance, rather than pre-professional learning experiences.

car, nfd (PS, AD)

Alexandra, Sandra A. (1996). *Seven case studies of excellence in preservice elementary education science programs* (The University of Iowa). DAI-A 57(07), p. 2971, 1997. [AAI9639951]

This research investigated university programs in preparation of elementary teachers and how they meet the Search for Excellence in Science Education criteria. The ethnographic case study concluded that they were all exemplary programs.

tpd, skt (EL)

Almuqate, Humood Ahmed. (1996). *The influence of using analogies in instruction on students' learning* (Michigan State University). DAI-A 57(09), p. 3808, 1997. [AAI9706444]

This qualitative study investigated the use of analogies in instruction to helping students learn a scientific principle and learning in general. No significant difference was found between Analogy and No-Analogy groups. There appears to be a relationship between analogies and student recall but not students' comprehension.

ped, lrg (SE)

Alonso, Jorge Luis. (1996). *The effect of different instructional groupings on student achievement and attitudes from a computer-based interactive videodisc biology unit* (Florida International University). DAI-A 57(04), p. 1576, 1996. [AAI9625351]

Factorial ANOVA on overall achievement scores indicated that high school biology students in cooperative groups significantly outperformed those in traditional groups and also demonstrated more positive attitudes toward science laserdisc instruction. Some differences by class group and gender were also found.

cpl, cbi, ach, ats, bio, gen (HS)

Alters, Brian J. (1996). *Relationships between acceptance or rejection of evolution by college freshmen and selected non-religiously-oriented factors* (University of Southern California). DAI-A 57(07), p. 2950, 1997. [AAI9636316]

This study investigated the relationship between attitude toward evolution and agreement with statements of nonreligious rationales as well as exposure to science. No difference was found among attitude and exposure to science. Those accepting evolution were more objective in interpreting research.

evo, ats, bkg (PS)

Antony, Mary. (1996). *Race, gender and science education: An ethnographic analysis of middle school science* (The University of Michigan). DAI-A 57(03), p. 1081, 1996. [AAI9624565]

An examination of the educational processes that contribute to the underachievement of female and minority students in science. Three strategies were used: non-participant observation, interviewing and analysis of documents. Results indicate that a host of subtle social processes have a cumulative effect of disadvantaging students.

eqt, ach, bkg, gen, eth (MS)

Anukam, Anselm Amah. (1996). *An evaluation of the secondary biological science curriculum in Nigeria with reference to Imo State* (University of Southern California). DAI-A 58(01), p. 0069, 1997. [AAI9720177]

A comparison of the secondary biology curricula in Nigeria and the United States was used to determine the conditions and common practices that exist in high schools in Imo State of Nigeria.

cur, cul, bio (SE)

Anyanechi, Marie Emmanuela Carolyn. (1996). *Teaching science in Nigerian secondary schools using a constructivist model* (Fordham University). DAI-A 58(04), p. 1237, 1997. [AAI9729598]

The use of a constructivist model to teach science was shown to enhance understanding and broader thinking for Nigerian students (n=70) more than a traditional teaching method.

cns, ped, lrg (SE)

Armstrong, Kelli Jean. (1996). *Women in science and mathematics: First year perceptions of college learning experiences and the effect on persistence* (Boston College). DAI-A 57(09), p. 3838, 1997. [AAI9706656]

An examination of how women's perceptions of their experiences affects their persistence in mathematics and science. Students who did not persist chose pedagogical reasons as significant factors in their leaving.

gen, car, bkg, ped, bfs, ats (PS)

Back, Hyejoo. (1996). *Changing misconceptions in Newton's laws of motion through playing computer games and peer interaction* (State University of New York at Albany). DAI-A 57(06), p. 2340, 1996. [AAI9635163]

Physics students who played computer games set in a Newtonian microworld improved achievement on force and motion problems. Students who played the games in a cooperative setting improved more than students in an individual learning setting.

ccg, cpl, cbi, phy (HS)

Bailey, Penelope Anne. (1996). *Alternative meanings of curriculum implementation in elementary school science* (The University of Regina). MAI 35(03), p. 0624, 1997. [AAIMM14550]

Case study of a new elementary science curriculum used narrative inquiry and document analysis to interpret conceptions of the curriculum. Findings indicate the difficulty of conceiving of curriculum implementation in ways other than as an instrumental action.

cur, knt (EL)

Barnett, John. (1996). *Vision and voices: The curriculum implementation of Scienceplus in the Canadian Maritimes* (University of Toronto). DAI-A 57(08), p. 3373, 1997. [AAINN11668]

This study was an inquiry into teachers' support for curriculum projects and textual materials which purport to improve science teaching and learning. It is suggested that to increase the commitment of the teachers' voice to improving science education it is necessary to change the method of curriculum development by publishing materials outside the normal power structure.

cur, att, ref, eqt (TE)

Barrett, Evelyn Parks. (1996). *The impact of thematic science and other variables on eighth-grade students' Texas Assessment of Academic Skills science scores* (The University of Texas at Austin). DAI-A 57(09), p. 3877, 1997. [AAI9705783]

No significant difference was found for students' science scores on The Texas Assessment of Academic

Skills between students who participated in traditional courses and those whose courses were organized thematically. Some matching criteria showed significant effects on achievement.

ach, ped, int. bkg (MS)

Bauer, Karen Lyn. (1996). *An analysis of attitudes regarding scientific literacy among students and faculty in the department of biological sciences, Idaho State University* (Idaho State University). DAI-A 57(08), p. 3447, 1997. [AAI9701769]

A 58-item questionnaire was employed to determine student and faculty attitudes regarding science, science education, and important aspects of scientific literacy. Significant differences appeared when assessing the respondents' attitudes toward what science is and how science is conducted.

ats, nas, att. lit (PS)

Baxter, Louise Marie. (1996). *The effect of anticipating performance assessments on student laboratory learning* (University of Northern Colorado). DAI-A 57(08), p. 3468, 1997. [AAI9701950]

College biology students improved their laboratory learning strategies when they were led to anticipate weekly performance assessments.

asm, lrg, lab. bio (PS)

Belongia, Cynthia Medeiros. (1996). *A cross-site analysis of the extent of implementation of the California mathematics and science frameworks* (University of Southern California). DAI-A 57(09), p. 3755, 1997. [AAI9705072]

Study found that the strongest perceived implementation of the California mathematics and science curriculum reform frameworks was in content at the district level for both mathematics and science. Technology was perceived as needing further implementation.

ref, bft, cur. tec (ALL)

Berman, Warren. (1996). *Science process skill competency and academic achievement in college biology: A correlational study* (Temple University). DAI-A 57(09), p. 3838, 1997. [AAI9706941]

This study examined the relationship between performance on measures of integrated process skills, previous science experience and performance in a course in human anatomy and physiology. Small but significant correlations were found for all variables except science experience.

sks, bkg, ach (PS)

Bischoff, Paul Joseph. (1996). *Science education and biological research in ecology with applications to secondary school science education* (Columbia University Teachers College). DAI-A 57(07), p. 2950, 1997. [AAI9635955]

This dual study attempts to identify ideational networks and cognitive operations of students as they study the effect of soil compactness on the amoebae population of swampy soil. Results were that participants developed complex ideational networks which correlated with higher order cognitive operations.

kns, lth. ene (SE)

Bissett, Deron Layne. (1996). *Relationships of creativity and achievement to performance of middle school students in solving real-world science problems* (The University of Texas at Austin). DAI-A 57(06), p. 2418, 1996. [AAI9633090]

The significant relationships of creativity and performance on an achievement test to solving real-world problems in cooperative groups were assessed through analysis of group products. The conclusion was that student creativity and performance criteria were most important in focusing middle school students on specific tasks.

chs, ach, pbs. cpl (MS)

Blough,Roger. (1996). *The effects of using student response keypads on student motivation and achievement in high school biology classes: A time series design* (The University of Tennessee). DAI-A 58(06), p. 2140, 1997. [AAI9735294]

Eighty-nine high school biology students were studied as they used student response keypads during instruction. Student motivation, grades, self-efficacy ratings and goal setting all increased as a result of the instructional strategy.

cbi, ped, ach. ats, cts, bio (HS)

Bolick, Margaret Ellen. (1996). *Socialization influences of the elementary school environment on a beginning teacher prepared as a constructivist educator: An interpretative study* (Kansas State University). DAI-A 57(11), p. 4701, 1997. [AAI9714476]

A case study of a beginning teacher and how she was affected by the socialization process of schools. The conclusion was that constructivist-based teacher education programs should be taught in restructured schools and the teachers need practice teaching in restructured schools.

bkg, cns, tpd. knt (EL)

Boyer, Steven Eugene. (1996). *Flow (optimal experience) in a middle school science classroom: Critically reflective inquiry as a guide to effective pedagogy* (Pacific Lutheran University). MAI 34(06), p. 2145, 1996. [AAI1380858]

Critically reflective inquiry was used to identify pathways and blockages to enjoyable experiences in the science classroom. Findings were that teacher's mental state was closely linked to students' mental state, and that optimal experience was enhanced when students had a sense of control over the learning process.

ats, att, ped, cid (MS)

Boylan, Christopher. (1996). *Attitudes toward teaching and taking science: A correlation between teachers and students* (The University of Michigan). DAI-A 57(11), p. 4691, 1997. [AAI9711908]

Teachers' attitudes toward teaching science were related to number of undergraduate science courses taken, gender, and years of teaching experience. Students' attitudes toward taking science courses were related to gender, parental influence, and teacher experience.

att, ats, bkg, gen (K-12, TE)

Brennan, Carol Ann. (1996). *Concept mapping: An effective instructional strategy in science with kindergarten students* (University of Hawaii). DAI-A 57(05), p. 1965, 1996. [AAI9629812]

Kindergarten students' individual and class concept maps exhibited several levels of categorization and showed connections between ideas. Concept mapping was shown to support multiple modes of learning and encourage a high rate of student participation.

ped, kns, lrg (EL)

Brewer, Steven D. (1996). *An account of expert phylogenetic tree construction from the problem-solving research tradition in science education* (Western Michigan University). DAI-A 57(07), p. 2951, 1997. [AAI9636862]

Content knowledge, strategic knowledge, and forms of knowledge organization used in phylogenetic tree construction are described to account for expert performance. Rationales are provided for the development of a computer-based problem-solving environment, model problems, and research problems and methodology.

kns, rem, pbs, evo (SE)

Bronson, Janet Ruth. (1996). *CAPA: Computer-Assisted Personalized Assignment system in the high school setting* (Michigan State University). MAI 35(03), p. 0641, 1997. [AAI1383331]

A Computer-Assisted Personalized Assignment system was tested on 100 high school chemistry students of differing abilities and was found to be well-accepted and liked by the students and teacher.

cbi, ats, att (HS)

Brophy, Geraldine A. (1996). *The effects of hypermedia on the comprehension of science text among sixth-grade students* (Syracuse University). DAI-A 58(07), p. 2509, 1998. [AAI9738759]

Study of 90 sixth-grade students from a suburban middle school found that hypermedia alone did not make a significant difference in the comprehension of a scientific principle. However, the inclusion of refutational text with hypermedia seemed to provide a more supportive environment for student comprehension.

edt, lrg (MS)

Brown, Joy Ellen Praet. (1996). *Writing in eighth-grade science and social studies classes* (University of Alabama at Birmingham). DAI-A 57(08), p. 3428, 1997. [AAI9700007]

This investigation focused on the practices and beliefs of eighth-grade teachers. Findings indicated that many teachers were using the recommended writing practices. Both groups identified specific, content-related activities and opportunities for teachers to discuss strategies with associates as beneficial.

bft, ped, tpd, ntw (SE)

Brown, Lillian Marcelle. (1996). *The effect of hands-on instruction on student learning about tropical rain forests* (Texas Woman's University). MAI 35(03), p. 0628, 1997. [AAI1382834]

ANCOVA showed no differences in student knowledge between groups who used hands-on activity-based study and traditional textbook instructional approach.

hos, kns (MS)

Burke, Sherry Ann. (1996). *Teacher preferences for teaching problem solving and science process skills* (Texas Woman's University). MAI 35(03), p. 0628, 1997. [AAI1382836]

Study found that a majority of teachers were found to prefer to teach integrated rather than separate units of

problem solving and science process skills. Teachers who preferred integration were also more confident in their skills to teach problem solving, science process skills, and integrated units.

att, skt, pbs, ped, int (K-12)

Byrd, Lanier Eldridge. (1996). *The impact of science and tutorial software designed to intervene and enhance minority and underrepresented students' performance and science attitudes in a community college human anatomy and physiology course* (The University of Texas at Austin). DAI-A 57(06), p. 2418, 1996. [AAI9633103]

Students participating in anatomy and physiology courses (n=619) who chose to use computer tutorials at home had higher final grades than those who did not use software or used it in the laboratory. Students who used the software had significantly more positive attitudes toward science than others.

edt, ach, ats, bio (PS)

Byrne, Christine M. (1996). *Water on tap: The use of virtual reality as an educational tool* (University of Washington). DAI-A 57(05), p. 2009, 1996. [AAI9630063]

This study explored virtual reality as an educational tool. Interactivity was found to be significant, while immersion was found to be insignificant.

edt, lrg, che (SE)

Caldwell, Jennifer Christine. (1996). *College students with a disability attempting science, engineering, or mathematics studies: Fourteen case studies* (University of Illinois at Urbana-Champaign). DAI-A 57(11), p. 4634, 1997. [AAI9712211]

Case studies of college science, engineering, or math students with physical disabilities were analyzed. Common backgrounds and motivations are presented.

chs, car, bkg, ats (PS)

Callaway, Judith Ann. (1996). *An interactive multimedia computer package on photosynthesis for high school students based on a matrix of cognitive and learning styles* (Columbia University Teachers College). DAI-A 57(07), p. 2951, 1997. [AAI9635961]

An interactive multimedia package was developed to accomodate cognitive and learning styles. Time on task and preferences on the Learning Style Inventory were compared. There was no correlation between score on the LSI and time spent on the IMP.

lsy, edt, bio (SE)

Carey, Dianne Lynn. (1996). *An interdisciplinary multisensory model: Using the experience of a research project in neuroendocrinology and case-based studies to enhance the teaching of precollege neuroscience* (The Union Institute). DAI-A 57(10), p. 4312, 1997. [AAI9709999]

A multi-sensory model is described. The model requires students to do research. The use of case studies as a tool for bringing research methods into the classroom is described. The theme is that comprehension and appreciation of scientific research prepares students to use concepts and technological information.

rem, res, ped, lrg (SE)

Carnes, G. Nathan. (1996). *An investigation of the effect of an intensive professional development program on three urban middle school teachers: A case study* (Miami University). DAI-A 57(07), p. 2798, 1997. [AAI9639406]

This research studies urban middle school teachers' epistemologies of science teaching and their attempts to change instructional practices. The researcher constructed meanings from observations and interviews of inquiry-teaching and teacher change within the context of mitigating factors against implementation of the desired methodology.

knt, tpd, inq, ped (MS)

Carty, Paula Christine. (1996). *Thinking environmentally: Environmental information and environmental education* (Carleton University). MAI 35(06), p. 1636, 1997. [AAIMM19421]

Study of public expressions of environmental understanding found that environmental information stems from many sources and influences the public and individuals in many ways which should be taken into account in environmental education development.

ene, lit, bkg (GEN)

Castle, Ann M. (1996). *Children's exposure to the natural environment as related to their environmental attitudes: An exploratory study* (Michigan State University). MAI 35(01), p. 0033, 1997. [AAI1381840]

Twenty-five second grade children and their parent(s) participated in an exploratory study that examined their attitudes about the natural environment. Children were willing to participate in activities in the natural environment, regardless of prior exposure.

ats, bkg, nfd, ene (EL)

Cavalier, Jamie Carolyn. (1996). *Effects of learning strategy and orienting activity during computer-based instruction* (Arizona State University). DAI-A 57(07), p. 2828, 1997. [AAI9637408]

Students who were presented with instructional objectives performed slightly better on instructional posttest items than students who received either advance organizers or no orienting activities. Orienting activities were also shown to significantly influence interaction behaviors. No significant effect on attitude was found.

ped, cbi, ach, ats, cid (SE)

Chang, Chun-Yen. (1996). *The effects of a problem solving based instructional model on the achievement and alternative frameworks of ninth grade earth science students in Taiwan* (The University of Texas at Austin). DAI-A 57(09), p. 3878, 1997. [AAI9705809]

A problem solving-based instructional model was shown to significantly improve the overall achievement of ninth grade earth science students in Taiwan. The same students also experienced more significant conceptual change than traditionally-taught students.

ped, pbs, ach, ccg, esg (SE)

Chekuri, Nageswar Rao. (1996). A physics problem-solving model for developing interpretation skills (University of Cincinnati). DAI-A 57(07), p. 2951, 1997. [AAI9639167]

A problem-solving model based on Greeno's was used to study the extent to which students developed a better understanding of physics. The model teaches students to work in the abstract while keeping in touch with the real world. Results suggest that students benefited from using the model.

pbs, rem, lth, phy (SE)

Chen, Chang-Cheng. (1996). *An investigation of the energy and transportation component for junior high school technology education programs in Taiwan* (University of Northern Iowa). DAI-A 57(06), p. 2418, 1996. [AAI9633448]

This study identified the content of the Energy and Transportation unit and provided practical information for use in designing and implementing preservice and inservice teacher preparation programs. Forty two items were rated as important, the most important was energy conservation. The need for inservice training of E&T content appeared to be high.

tec, tpd (MS)

Chen, Chin-Chang. (1996). *Using similarity ratings and the pathfinder algorithm for evaluating students' cognitive structures in Newtonian mechanics* (The Ohio State University). DAI-A 57(07), p. 2852, 1997. [AAI9639206]

An investigation of the relationship between mechanics misconceptions, achievement and the cognitive structures of high school students. No significant difference in cognitive structure was found between students with and without misconceptions.

kns, ach, alf, phy (SE)

Chen, Xiaoda. (1996). *Quality schooling with limited resources: An international comparison of mathematics and science education in China, Korea and Hungary* (Stockholms Universitet) DAI-C 58(01), p. 0016, 1997. [AAIC535037]

The purpose of the study was to examine patterns between achievement and background factors in countries with limited resources. A student questionnaire, a school questionnaire and a national questionnaire were administered. Chinese students scored higher in math and lower in science than Korean or Hungarian students.

cul, ach, bkg, chs (ALL)

Chiu, Chiung-Hui. (1996). *The effects of computer networks and collaboration on the development of science skills and attitudes among secondary science students in Taiwan, R.O.C.* (The University of Texas at Austin). DAI-A 57(06), p. 2419, 1996. [AAI9633125]

Students with computer network support demonstrated statistically significant more positive attitudes toward science and toward computers.

tec, ntw, ats, sks (SE)

Cipriani-Sklar, Rosemary. (1996). *A quantitative and qualitative examination of the influence of the normative and perceived school environments of a coeducational public school vs. a single-sex Catholic school on ninth-grade girls' science self-concept and anxiety in the area of science education* (St. John's University). DAI-A 57(10), p. 4312, 1997. [AAI9706808]

This study examined the effect of normative and perceived environments of single-sex and coeducational school settings on science self-concept and science anxiety. An ANOVA revealed significantly higher math and science self-concept in a single-sex

school environment. Anxiety was higher in the coeducational environment.

gen, bfs, ats, bkg (HS)

Cisneros, Baltazar. (1996). *A systematic development and evaluation of a coordinated thematic Science II inservice curriculum for eighth-grade teachers* (University of Houston). DAI-A 57(08), p. 3374, 1997. [AAI9701434]

The intent of this study was to design, implement and evaluate an inservice program that would meet the needs of teachers and a state mandated science-teaching concept. Results indicated a positive effect on participants' knowledge, skills and attitudes.

tpd, int, cur, att, skt, knt (TE)

Clark, Helen Cobb. (1996). *Design of performance-based assessments as contributors to student knowledge integration* (University of California, Berkeley). DAI-A 57(08), p. 3447, 1997. [AAI9703085]

New representations and measures of students' knowledge integration made visible middle school students' thinking about thermodynamics and light, and allowed evaluation of the degree to which students had connected new information to prior knowledge.

kns, asm, ccg, phy (MS)

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, 1996. [AAI9631251]

This study employed concepts associated with a general expectancy- value model of motivation to explore students' motivation within a developmental perspective and examined how specific aspects of motivation are related to students' achievement in mathematics and science.

ats, ach, chs (SE)

Colley, Kabba Ebou. (1996). *Does the acquisition of science process skills in a project-based science curriculum differ by gender? An exploratory study of middle and high school students' experience* (Harvard University). DAI-A 57(07), p. 2951, 1997. [AAI9638736]

Fixed-effects analysis showed that females and males differed in their acquisition of science process skills under a project-based science curriculum. Some difference by ethnicity was also found.

gen, sks, eth, cur (MS, HS)

Corlew, Michelle Marie. (1996). *Bacteria: friend or foe? A biology unit* (Michigan State University). MAI 34(05), p. 1748, 1996. [AAI1379712]

Student attitudes toward bacteria were affected by a five-week unit of study.

ats, cur, bio (HS)

Coulter, Robert W. (1996). *An analysis of computer-mediated learning in elementary school science* (Boston University). DAI-A 57(03), p. 0994, 1996. [AAI9622609]

Computers are shown to be essentially formal tools, incapable of processing tacit thought. It is argued that the current expansion of the use of computers serves to work against increasing the employment of tacit knowledge.

cbi, kns, phe, ref (EL)

Coverdale, Gregory Alan. (1996). *The use of instructional technology in pursuing scientific literacy: A case study of a fourth grade teacher* (Michigan State University). DAI-A 58(01), p. 0124, 1997. [AAI9718816]

Study provided insight into conceptions of scientific literacy within a technology-rich curriculum and one teacher's integration of technology and science. It concluded that engaging in technology activities and using the Internet allowed students to "extend 'real-world' learning to a global context."

tec, cur, lrg, lit (EL)

Cox, Julie C. (1996). *Here? There? Where is science? A study of students' perspectives of where science takes place* (Texas Woman's University). MAI 35(03), p. 0640, 1997. [AAI1382837]

Elementary students reacted to 15 science scenarios and drew pictures with descriptions about where science takes place. Students were able to picture science occurring anywhere instead of the stereotypical classroom or laboratory setting.

bfs, nas (EL)

Cozza, Barbara. (1996). *Concept mapping through logs and metacognitive reflection during third graders' scientific problem-solving* (Fordham University). DAI-A 57(10), p. 4266, 1997. [AAI9708248]

Six third-grade students' concept maps and science reflective logs were analyzed to identify learning processes of children engaged in science problem-solving tasks.

kns, pbs, lth, ped (EL)

Crawford, Barbara Ann. (1996). *Examining the essential elements of a community of learners in a middle grade science classroom* (The University of Michigan). DAI-A 57(03), p. 1081, 1996. [AAI9624591]

This study examined the essential elements that emerged when forming a community of learners in an eighth-grade science classroom. A project-based science curricular approach was used.

cid, lth, cur (MS)

Crowley, Paulette Thompson. (1996). *National Science Education Standards' teaching practices inherent in a distance education elementary science course and their relationship to site, teacher and student factors* (Gonzaga University). DAI-A 57(06), p. 2419, 1996. [AAI9634604]

Focused on an elementary science course taught by distance education, this work attempts to determine the relationships between teaching practices and several factors such as location, socioeconomic level, gender, ethnicity and grade level. Results indicate an equal opportunity to learn and appreciate science.

ped, bkg, gen, eth, eqt (EL)

Crowther, David T. (1996). *Science experiences and attitudes of elementary education majors as they experience Biology 295: A multiple case study* (The University of Nebraska - Lincoln). DAI-A 57(07), p. 2952, 1997. [AAI9637065]

This study is a qualitative multiple case study using cross-case analysis to analyze the effect of a biology course on elementary education majors. The findings were positive and their courses in science have been implemented.

cur, att, tpd, bio (TE)

Cuthbert, Paul David. (1996). *The biology curriculum for senior high schools in Manitoba* (The University of Manitoba). MAI 35(02), p. 0401, 1997. [AAIMM13055]

A conceptual framework, a curriculum design, introductory materials, and a field validation curriculum implementation document were developed for a new high school biology course in Canada.

cur, bio (HS)

Dailey, Joseph G. (1996). *A laboratory based strategy for teaching microbiology to at-risk secondary students* (Michigan State University). MAI 35(03), p. 0640, 1997. [AAI1383350]

At-risk students improved knowledge of how microbial techniques are used in business and research after completing specially-developed laboratories and units on food microbiology and plant pathology.

lab, chs, ped, bio (SE)

Damnjanovic, Arta. (1996). *Ohio-SSI factors associated with urban middle school science achievement: Differences by student sex and race* (Miami University). DAI-A 57(07), p. 2952, 1997. [AAI9639418]

Study determined differences in science achievement by gender and race following professional development with Ohio's SSI. The findings supported the evocativeness of the Ohio SSI reform efforts and described variations in predictors of achievement between male and female middle school students.

ach, gen, eth, tpd, ref (MS)

Daniel, Lucille H. (1996). *Field testing science curriculum* (East Carolina University). DAI-A 57(03), p. 0995, 1996. [AAI9623873]

Purposes of the study included: to develop and evaluate a model for field testing a new ninth-grade curriculum; to assess the results of the actual implementation of the model, and to revise the model using the results of the implementation. The curriculum was deemed appropriate for its intended users.

cur, asm (SE)

Davidge-Johnston, Nancy Lee. (1996). *The nature of learning in cooperative education in the applied sciences* (Simon Fraser University). MAI 35(05), p. 1104, 1997.

Qualitative case study of three kinesiology students in a work-placement experience uses works of Schon, Lave and Wenger and Vygotsky to analyze the students' situated, cooperative learning.

lth, kns, cpl, lrg (PS)

Davis, Kathleen Sue. (1996). *Science support groups for women and girls: Capturing capital, challenging the boundaries, and defining the limits of the science community* (University of Colorado at Boulder). DAI-A 57(10), p. 4313, 1997. [AAI9709480]

Examines two support groups for women and girls aimed to increase participation in the science community. Despite ability to capture capital valued by the community, the study still found exclusion from the science community.

gen, ntw, car (ALL)

Dawkins, Karen Robbins. (1996). *Fostering teachers' understandings of the nature of science: A professional development model* (East Carolina University). DAI-A 57(03), p. 1082, 1996. [AAI9623729]

A professional development model for fostering teachers' understandings of the nature of science was developed and evaluated. Participant teachers exhibited a better understanding of the nature of science, incorporated nature of science issues into their instructional plans, and emphasized nature of science issues in their teaching.

nas, tpd, knt, cur (TE)

De Miranda, Michael Anthony. (1996). *The effects of traditional and cognitively-based approaches to high school physics instruction on learning outcomes* (University of California, Riverside). DAI-A 57(06), p. 2419, 1996. [AAI9634118]

This study compared student learning outcomes of the Principles of Technology Physics instructional approach with outcomes from traditional physics instruction and analyzed this instructional model in light of current cognitive science theories of learning and instruction.

ped, lrg, lth, phy (HS)

DeCoste, Donald J. (1996). *Students' perceptions of the roles of the teacher and the student and the effect on classroom interaction* (University of Illinois at Urbana-Champaign). DAI-A 57(11), p. 4635, 1997. [AAI9712249]

Study explored issues of student learning as they developed in a university classroom. Results indicated that students need to encounter explicit and consistent lessons stressing conceptual understanding and teachers need to be careful about making problem solving too easy.

cid, ped, lrg, bfs, pbs (TE)

Delay, Randolph Brent. (1996). *Constructing the uninhabited home: Participant experience of nature during and following a wilderness program* (University of Alberta). MAI 34(06), p. 2146, 1996. [AAIMM10669]

The experience of eight teenage participants on a twelve-day wilderness trip was investigated through participant observation and semi-structured interviewing. The wilderness trip was ineffectual in promoting care for the earth.

ene, fsd, ats (SE)

Deru, David Bola. (1996). *A case study of a Nigerian science curriculum development project* (University of Georgia). DAI-A 57(09), p. 3y794, 1997. [AAI9705401]

Case study found that communication, inclusion, valuation and empowerment were critical to successful participation in curriculum development.

cur, eqt, bkg (GEN, PS)

Diduck, Alan Paul. (1996). *Critical education for environmental assessment* (The University of Manitoba). MAI 35(02), p. 0504, 1997. [AyAIMM13078]

Study concluded that critical environmental assessment education has potential to clarify the role of education in the complex of public involvement, and to increase the effectiveness of environmental assessment by helping participants present credible arguments.

ene, sts, lit (ALL)

Ditty, Thomas P. (1996). *Assessing the impact of the West Virginia K-12 RuralNet Project on teachers' views* (West Virginia University). DAI-A 57(07), p. 2830, 1997. [AAI9639722]

The West Virginia K-12 RuralNet Project impacted teachers' views concerning the influence of society on science and technology. Teachers held positive views concerning the changes made in their classrooms when the Internet was used to enhance classroom learning.

sts, tec, att, tpd (TE)

Donnelly, Anne Elizabeth. (1996). *The effects of metacognitive skills training on hands-on learning from science objects* (University of Florida). DAI-A 58(07), p. 2512, 1998. [AAI9800091]

A metacognitive training program designed to assist students in learning from science objects was found to be effective for students who scored lower on induction assessments and was found to be counterproductive for high-ability students.

lrg, chs, sks (PS)

Doolittle, Martha Stewart. (1996). *Predicting the decision to go to graduate school among college seniors in engineering: A study at one university* (North Carolina State University). DAI-A 57(07), p. 2852, 1997. [AAI9638339]

The focus of this work is to determine what specific factors affect the decision to pursue graduate educa-

tion and persist to the doctorate. Logistic regression model results indicated that grade performance, research experience and high job expectations were significant predictors.

car, chs, ach, bfs, bkg (PS)

Downing, Charles Robert. (1996). *The effectiveness of the California Scope, Sequence, and Coordination project in reforming science education in California high schools* (Walden University). DAI-A 57(06), p. 2419, 1996. [AAI9633563]

No significant differences were found when comparing the performance of traditional biology students and scope, sequence and coordination (CSSCP) students on several biology achievement measures. Significant differences were found between CSSCP and traditional schools regarding sections of science, student enrollment, and lab time.

cur, ref, ach, ats, lab (HS)

Dreschel, Thomas Walter. (1996). *NASA educator workshops: Exploring their impact on teacher attitudes and concerns* (Florida Institute of Technology). DAI-A 57(12), p. 5102, 1997. [AAI9717110]

The Beliefs about Science and Science Education survey and the Stages of Concern Questionnaire were used to determine teacher beliefs about science and science teaching and concerns about educational change. The length of the workshops and the grade level targeted were found to be important in affecting the beliefs of teachers.

bft, nas, ref, tpd, phe (TE)

Duff, Larry Albert. (1996). *An analysis of physical science safety conditions in Nebraska* (The University of Nebraska - Lincoln). DAI-A 57(07), p. 2760, 1996. [AAI9637066]

Survey of physical science teachers (n=334) found that general science courses, science methods courses, and inservice training did not prepare physical science teachers for lab safety. Frequency of student injury was linked to several variables.

lab, tpd, skt (SE, TE)

Duffy, Marycllen. (1996). *The effects of grouping and instructional strategies on conceptual understanding and critical thinking skills in the secondary biology classroom* (University of Lowell). DAI-A 57(06), p. 2420, 1996. [AAI9635180]

Study investigated and described traditional vs. constructivist instructional strategies and homogeneous vs. heterogeneous ability-grouping practices on conceptual understanding and critical thinking skills in the secondary biology classroom.

cns, ped, cpl, lrg, sks (SE)

Eddy, Larry. (1996). *Factors influencing attitudes towards science in primary and elementary teachers* (Memorial University of Newfoundland). MAI 35(05), p. 1130, 1997. [AAIMM17591]

Canadian primary and elementary school teachers (n=127) were surveyed to determine attitudes toward science. Problem areas reported by teachers were lack of background and inservices in science, and poor school facilities and equipment. Fear of science was also found to affect teaching technique.

att, tpd, ped, lab (EL, TE)

Eddy, Roberta Myers. (1996). *Chemophobia in the college classroom: Extent, sources, and student characteristics* (University of Pittsburgh). DAI-A 58(01), p. 0124, 1997. [AAI9718635]

A three-factor, 36-item Derived Chemistry Anxiety Rating Scale (DCARS), with Cronbach's alpha.94, was used to measure students' (n=64) anxiety stimulated by learning chemistry, being evaluated in chemistry, and by handling chemicals. Some significant differences by gender occurred.

ats, che, gen (PS)

Edington, Evelyn B. (1996). *Elementary science: The neglected subject* (Texas Woman's University). MAI 35(06), p. 1594, 1997. [AAI1385463]

Survey of elementary teachers found they had positive attitudes toward teaching science but concerns about lack of knowledge. Other curriculum priorities and lack of time were frequently-given reasons for neglect of science in elementary classrooms.

att, cur (EL, TE)

Eggers-Pierola, Costanza Maria. (1996). *"We haven't still explored that": Science learning in a bilingual classroom* (Harvard University). DAI-A 57(07), p. 2814, 1997. [AAI9638741]

This qualitative study focused on how Latino students and teacher developed a critical practice of science learning. The development of learning was found to be non-linear since students were drawn in different directions by challenges and multiple perspectives.

mce, lrg, cid (SE)

Eicher, Robert D. (1996). *Developing biotechnology and plant technology laboratory skills and attitudes in*

high school students (Michigan State University). MAI 35(05), p. 1130, 1997. [AAI1385033]

High school students made significant gains in confidence about targeted lab skills and positive attitudes toward biotechnology after completing specifically-developed lab activities.

lab, ats, cur, bio (HS)

Eide, Kathleen Yvonne Lane. (1996). *Content analysis: Multicultural teaching aids in middle school science teachers' resource manuals* (Utah State University). DAI-A 57(12), p. 5103, 1996. [AAI9717033]

A content analysis of 21 teachers' editions of middle school science textbooks determined the extent of multicultural content, the distribution of foundational knowledge categories of the multicultural content, and the extent the multicultural content relates to science concepts.

mce, mat (MS)

Erdosne Toth, Eva. (1996). *Scientific inquiry in high school science learning: Collaborative research activities applying scientific visualizations* (University of Illinois at Urbana-Champaign). DAI-A 57(04), p. 1466, 1996. [AAI9625129]

This research examined the characteristics of scientific inquiry development, the application of scientific visualization during scientific inquiry and the effects of collaborations. It was demonstrated that authentic research assisted by cognitive apprenticeships can provide a powerful method to prepare students for the work force.

inq, lrg, sks, res (SE)

Eryilmaz, Ali. (1996). *The effects of conceptual assignments, conceptual change discussions, and a CAI program emphasizing cognitive conflict on student's achievement and misconceptions in physics* (Florida Institute of Technology). DAI-A 57(04), p. 1546. 1996. [AAI9627518]

A conceptual change discussion was found to be an effective means of reducing the number of misconceptions students had about force and motion and improving students' physics achievement in force and motion. Some difference by gender was observed.

ped, ccg, phy, cbi, gen (HS)

Espinoza, Fernando. (1996). *An analysis of high school students' use of momentum and force in interpreting physical phenomena and its implications for teaching* (Columbia University Teachers College). DAI-A 57(07), p. 2952, 1997. [AAI9635969]

The results of several activities were compared to an analysis of the mathematical structure of mechanics, and to the historical development of physics. The author argues that the teaching of mechanics should begin with momentum and conservation laws.

cur, kns, his, alf, phy, ped (HS)

Fan, Tai-Sheng. (1996). *Prediction of academic achievement for college computer science majors in the Republic of China* (Taiwan) (Oregon State University). DAI-A 57(06), p. 2420, 1996. [AAI9634040]

This research investigates the value of US predictors of academic achievement on students in China. Performance in introductory computer courses had the most predictive power. Significant gender differences were not found for the College Entrance Exam but females outperformed males in high school and college.

ach, cul, asm, gen (PS)

Filkins, Kathleen Morgan. (1996). *American secondary school science coursework curriculum for "The Duration," 1939-1945* (The University of Texas at Austin). DAI-A 57(06), p. 2420, 1996. [AAI9633157]

Detailed account of the American secondary science curriculum during World War II. Success of wartime curriculum directly related to the work of individual teachers. Classroom teachers connected the rhetoric of wartime science curriculum with the reality of student knowledge and practical understanding.

cur, his (SE)

Fisher, Jodie Lynn. (1996). *Teaching the structure and function of plants to seventh grade students* (Michigan State University). MAI 35(01), p. 0047, 1997. [AAI1381855]

Seventh-grade students showed significant improvement in their understanding of the structure and function of plants after participating in hands-on activities.

hos, lrg, bio (MS)

Fontana, Rose Marie Garcia. (1996). *English language learners, teacher networks and the teaching of science* (Stanford University). DAI-A 57(05), p. 1944, 1996. [AAI9630309]

Case studies of nine elementary teachers seeking to implement the California Science Framework with students who are English Language Learners revealed the importance of in-depth professional development for teachers in science content and pedagogy, and in instructional strategies to help ELLs access the core

science curriculum.

mce, tpd, ped (EL, TE)

Forawi, Safian A. Said. (1996). *The effects of the interaction of teachers' understanding of the nature of science, instructional strategy, and textbook on students' understanding of the nature of science* (University of Lowell). DAI-A 57(03), p. 1082, 1996. [AAI9621877]

Study examined the effects of the interaction of teachers' understanding of the nature of science, their instructional strategies, and textbooks on students' understandings of the nature of science, and the instructional strategies that enhance students' understanding of the nature of science.

nas, ped, kns, knt, mat (HS)

Forsythe, Claire Therese. (1996). *Ill-structured problem-solving in chemistry* (Acadia University). MAI 34(06), p. 2146, 1996. [AAIMM10396]

Study of students working cooperatively to solve an ill-structured problem showed that in group discussions, students develop general and specific strategies for effecting solutions, and that they use text and other resources to understand parameters of the problem not outlined in class.

cpl, pbs, cid (HS)

Franson, Bruce Allan. (1996). *A design for an instructional device to rectify student misconceptions regarding projectile motion* (Illinois State University). DAI-A 58(02), p. 0417, 1997. [AAI9721396]

A computer simulation used in conjunction with a specially-developed guide produced statistically significant gains in physics students' qualitative understanding of projectile motion.

cbi, ccg, phy (HS, PS)

Frazier, Richard Alan. (1996). *Ways of working, ways of being: A study of four children working in a setting for learning science* (University of Illinois at Urbana-Champaign). DAI-A 57(11), p. 4691, 1997. [AAI9712271]

The experience of a science summer camp challenged the teacher's ideas on how students notice phenomena and how they might be drawn more deeply into investigation and inquiry.

nfd, fsd, ped, inq (EL)

Fritz, Richard Allan . (1996). *An inferential study comparing science achievement in single-sex and mixed-sex schools: Testing for interactions between gender and instructional environment* (University of Hartford). DAI-A 57(03), p. 1082, 1996. [AAI9625081]

An instrument from the Association for the Evaluation of Educational Achievement was used to measure the achievement of students in three mixed and two single-sex schools. No significant difference in achievement related to gender was found. Attitudes toward science for both genders correlated strongly.

gen, ach, ats (SE)

Froebe, Jamie Smith. (1996). *Voices of high school girls and boys reflecting on math and science education* (The Claremont Graduate School). DAI-A 57(01), p. 0141, 1996. [AAI9617439]

This qualitative study was intended to explain lower achievement and participation of women in math and science. Very few gender differences were found but several factors about student interest in math and science were identified. The teacher was identified as the most important factor influencing students' attitudes.

gen, ach, ats, bkg (SE)

Gallaher, Janna Blair. (1996). *Perceptions of the climate for women in undergraduate engineering technology programs* (Ohio University). DAI-A 57(10), p. 4283, 1997. [AAI9707700]

Two survey instruments were used to investigate the perceptions of women in 17 two-year and 7 four-year institutions. They agreed that they were receiving adequate faculty and peer support but not the level of support and inclusion they wanted.

gen, bfs, eqt, car (PS)

Gama, Joao Pereira. (1996). *An analysis of teachers' environmental concerns: Use of a conceptual change model* (Boston University). DAI-A 56(12), p. 4714, 1996. [AAI9609828]

Analysis of environmental education teachers' semantic networks before and after a training program showed reconstructed and reorganized conceptual knowledge, according to the principles of the training.

knt, ccg, lth, ene (TE)

George, Glenda Poston. (1996). *A comparison of academic achievement by right hemispheric mode processors versus left hemispheric mode processors in college preparatory chemistry classes* (University of South Carolina). DAI-A 57(03), p. 0997, 1996. [AAI9623079]

Right mode preference students were found to drop out of college preparatory chemistry classes at significantly higher rates and attain significantly lower achievement scores than left mode preference students.

lsy, ach, che (HS)

Gerber, Brian Lynn. (1996). *Relationships among informal learning environments, teaching procedures and scientific reasoning ability* (The University of Oklahoma). DAI-A 57(03), p. 1083, 1996. [AAI9623675]

Scientific reasoning ability is studied as a function of informal learning and classroom teaching procedure. The results of two-way ANOVAs indicated that both informal and classroom procedures had significant main effects on scientific reasoning.

nfd, pbs, ped (SE)

Gilmore, Patricia Jones. (1996). *Evaluation of the science component of the K-3 partnership for reform initiatives in science and mathematics in Kentucky* (University of Kentucky). DAI-A 57(05), p. 1927, 1996. [AAI9630674]

This research studied the Kentucky K-3 Science Specialist, Partnership for Reform Initiative in Science and Mathematics (PRISM). The study was designed to provide evaluation data regarding the extent to which the K-3 Science Initiative has been implemented.

ref, cur (EC)

Good, Beverly A. (1996). *Characteristics of science and mathematics integration: Activities recommended in teachers' manuals for four elementary science textbooks series* (The Ohio State University). DAI-A 57(10), p. 4202, 1997. [AAI9710567]

An analysis of four current elementary science textbook series showed that activities recommended to integrate science and mathematics are optional and occur infrequently. Only two process-oriented characteristics of science/math integration are adequately represented.

mat, int (EL)

Gork, Martha Ann. (1996). *The effects of using an experimental constructivist science curriculum in an after-school setting* (Walden University). DAI-A 57(11), p. 4636, 1997. [AAI9713641]

Study found that a constructivist-type science curriculum can be effective when administered to minority students in an after-school environment, and can overcome language barriers.

cns, mce, nfd, cur (EL, MS)

Green, Barbara Jo. (1996). *Family science night* (Texas Woman's University). MAI 35(03), p. 0640, 1997. [AAI1382843]

Parents' responses and attitudes toward an organized Family Science Night event were examined. Results showed that parents enjoyed the hands-on activities and wanted the program to continue.

nfd, hos, bkg (GEN)

Greene, Kathleen Reber. (1996). *The women of Chamberlin: An ethnographic study of undergraduate women succeeding in science* (The University of Wisconsin-Madison). DAI-A 57(03), p. 1083, 1996. [AAI9616504]

This research asked whether students interact with the systems of college life to construct identities as students, women and scientists and whether gender played a role in this construction. The conclusion was that many systems and persons contribute to the culture of success for women.

gen, bkg, car (PS)

Grener, Doreen Elaine. (1996). *A content analysis of elementary science textbook series from 1930 through 1990 for the presentation of the principle of humans as a component of the ecosystem* (The Ohio State University). DAI-A 57(05), p. 1995, 1996. [AAI9630894]

Analysis of elementary science textbooks (n=269) from 1930 to 1990 showed a lack of representation of an ecocentric viewpoint when compared to an anthropomorphic viewpoint of humans as a component of the ecosystem.

ene, mat (EL)

Grim, Nancy Carol Lee. (1996). *The development of two general chemistry inquiry-based scenario investigations: Aspirin and freezing point depression* (Miami University). MAI 34(06), p. 2370, 1996. [AAI1380845]

This study documents the development, classroom testing, and revision process employed in a project to produce scenario investigations for use in General Chemistry laboratory programs and a supporting instructor manual.

inq, lab, cur, che (HS,PS)

Guruswamy, Chitra. (1996). *Students' understanding of the interaction between charged conductors* (The Louisiana State University and Agricultural and Mechanical College). DAI-A 58(02), p. 0417, 1997. [AAI9720389]

Student conceptions of the interaction between charged conductors were elicited by surveying students in a physics course. The evolution of student ideas was traced in interviews of students from fifth graders through graduate students. Findings indicate that the main ideas about electrostatics occur through the various populations in varying degrees.

phy, alf (ALL)

Gutwill, Joshua Paul. (1996). *Coordinated causal model design: Building on linked conceptual primitives* (University of California, Berkeley). DAI-A 57(09), p. 3878, 1997. [AAI9703141]

High school students given Non-Coordinated models of electricity outperformed their control group on post-tests, while students given Coordinated models did not.

rem, lrg, ecg, phy (HS)

Habib, Deborah Leta. (1996). *A new spirit rising among us: Urban youth environmental activists* (University of Massachusetts). DAI-A 57(02), p. 0556, 1996. [AAI9619392]

An interview-based methodology explored influences shaping perceptions and involvement in environmentalism. The research led to recommendations for curriculum reform and teacher education from a multicultural environmental perspective.

mce, ene, bfs, tpd, cur (TE)

Hakerem, Gita Dvora. (1996). *The effects of computer simulations in high school chemistry* (Boston University). DAI-A 56(11), p. 4338, 1996. [AAI9607950]

Weak chemistry students who used a computer simulation (WASSER) had a more scientific understanding of how electromagnetic forces cause water molecules to pry salt molecules apart, compared to other weak students who did not use WASSER.

cbi, lrg, che (HS)

Hale, Patricia Lauren. (1996). *Building conceptions and repairing misconceptions in student understanding of kinematic graphs: Using student discourse in calculator-based laboratories* (Oregon State University). DAI-A 57(08), p. 3434, 1997. [AAI9700653]

Student-student discourse was shown to have a significant impact on students' conceptions of graphs of kinematic variables.

cbi, cpl, cid, ecg, phy (PS)

Hao, Le Van. (1996). *An integration of history and demonstrations of physics into the introductory physics course* (Simon Fraser University). MAI 35(05), p. 1131, 1997. [AAIMM16911]

Vietnamese university students (n=60) showed increased interest and motivation toward physics when an introductory-level course included some history and physics demonstrations.

ats, his, phy, nas, sts (PS)

Harding, Patricia Alice. (1996). *The role science plays in science education* (Dalhousie University). DAI-A 58(04), p. 1237, 1997. [AAINN15788]

Study examining the role of science in science education found that within science, knowledge is valued more than methods, but within education, the processes and attitudes of science are valued more than the knowledge itself.

nas, phe (GEN)

Hardwick, Ellen. (1996). *Use of aerospace activities in the classroom by teachers who have access to NASA Spacelink* (Oklahoma State University). DAI-A 58(08), p. 3097, 1998. [AAI9806546]

Study found that a majority of Spacelink Educator account holders (n=96) access Spacelink by the NASA toll-free number, use the service primarily for e-mail and internet access, and that there is some increase in the use of Aerospace topics in the curricula of account holders.

ntw, tec, cur, esg (TE)

Harry, Vickie Diane. (1996). *Volitional change in elementary teachers' conceptions of science pedagogy via a generative learning model of teaching* (The Pennsylvania State University). DAI-A 57(04), p. 1467, 1996. [AAI9628099]

The purpose of this research project was to study the changes in the meanings, thoughts and beliefs of elementary teachers via a generative learning model of teaching. Teachers changed their conception of science pedagogy through newly constructed knowledge.

knt, bft, ped, ens, tpd, phe (TE)

Hazelwood, Constanza Chiappe. (1996). *Shaping identities in school science: A narrative study of girls of Mexican origin* (Michigan State University). DAI-A 57(09), p. 3878, 1997. [AAI9706493]

A narrative study about the social identities of seven Mexican girls and the meaning of science in their lives. The researcher believes that the results will encourage teachers to ask questions to gain understanding of the forces that shape our lives.

gen, bkg, ped, mce (SE)

Heath, Debra Lee. (1996). *Fifth-grade students' attitudes toward the environment* (Texas Woman's University). MAI 35(03), p. 0628, 1997. [AAI1383297]

Students who experienced a hands-on outdoor environmental education curriculum showed more positive attitudes toward the environment after one year than students who experienced a traditional textbook environmental education course.

ats, ene, hos, fsd, nfd (EL)

Helms, Jenifer Victoria. (1996). *Speaking of the subject: Science teachers reflect on the nature of science, science teaching and themselves* (Stanford University). DAI-A 57(02), p. 0628, 1996. [AAI9620489]

Describes a study of relationships among understandings of the nature of science, beliefs about what is worth teaching and personal and professional identity. Teachers' perceptions of the things that make science special, what is warranted in the curriculum and purpose in teaching as related to sense of self are discussed.

nas, knt, bft, cht, cur, phe (TE)

Henry, George Ellis. (1996). *A study investigating student and teacher attitudes toward science and science education* (The University of Dayton). DAI-A 57(10), p. 4313, 1997. [AAI9709901]

An attempt to determine whether the attitudes of students in inquiry-oriented instruction were significantly different than students in traditional classrooms. Results do not support the use of inquiry-oriented instruction as more valuable than traditional classroom in affecting attitudes about science and science education.

ats, inq, att (EL)

Hensley, Carol Ann. (1996). *Analysis of the interrelationships between science anxiety and the variables of gender, course of study, parent background, achievement, test anxiety, and attitude toward science* (The Ohio State University). DAI-A 57(05), p. 1996, 1996. [AAI9630898]

Science anxiety in students (n=166) was found to be related to high test anxiety, negative attitudes toward science, parents' negative attitudes toward science, and female gender.

ats, bkg, gen (PS)

Heric, Matthew. (1996). *The professional geographer experience: Issues for advancing collegiate geography education* (Virginia Polytechnic Institute and State University). DAI-A 57(03), p. 1044, 1996. [AAI9624192]

The aim of this study was to determine how collegiate geography graduates view their program experiences. Academics and non-academics agreed that communication, education and computers had the highest utility and relevance. Recommendations for future research and application are included.

car, cur, tec, esg (PS)

Herman, Carolyn Ann. (1996). *Reform practices in chemistry education in introductory college and university courses* (Oklahoma State University). DAI-A 57(12), p. 5075, 1997. [AAI9717953]

This study investigated whether reform directions are actually being translated into changes in undergraduate education. The conclusion is that colleges are more likely to display reform and that reform is most often visible in the laboratory.

ref, che, cur, lab (PS)

Hidy, Patrick Keith. (1996). *The use of generative analogies by community college physiology students* (Texas A&M University). DAI-A 57(08), p. 3376, 1997. [AAI9701582]

This ethnographic inquiry investigated the methodology of human thinking. Results indicated that cognitive constructs are influenced by interpersonal relationships, cultural background and primary language.

kns, lth, bkg (PS)

Hildinger, Carolyn Elson. (1996). *A qualitative study: Student production of multimedia projects in high school biology, using technology in a small, rural school* (Oklahoma State University). DAI-A 58(04), p. 1238, 1997. [AAI9730440]

Naturalistic study of students completing a computer project in biology class found that students had less

anxiety over grades, increased motivation, involvement, and self-reliance, and a greater sense of community during the production of the projects.

tec, ats, cid, bio (HS)

Hillison, Susan Elaine Tracy. (1996). *A professional development needs analysis of Illinois teachers of science related to recommendations of Project 2061 and the National Science Education Standards* (Northern Illinois University). DAI-A 57(07), p. 2952, 1997. [AAI9639919]

The purpose was to determine the professional development needs of Illinois science teachers. A survey was sent to 1000 teachers across the state. The results showed strong deficits in historical perspectives and the history and nature of science. Several recommendations are made including using the inquiry method in professional development, aligning the program with the Standards, and providing adequate time.

tpd, ref, his, nas, inq (TE)

Hines, S. Maxwell. (1996). *Factors influencing persistence among African-American upperclassmen in natural science and science-related majors at a major research university* (State University of New York at Buffalo). DAI-A 57(06), p. 2421, 1996. [AAI9634441]

Persistence in science or science-related majors among African-American students was found to be related to internal locus of control, ability to employ passive resistance to uncomfortable environments, and emphasis on product of science education rather than the process.

eth, ats, car, chs (PS)

Hinojos, Kristine Kay. (1996). *The effect of video-assisted instruction on students' understanding of properties of matter* (Texas Woman's University). MAI 35(03), p. 0640, 1997. [AAI1382848]

Fourth-grade students who received video-assisted instruction on properties of matter scored significantly higher on multiple-choice assessment than students who did not receive such instruction. There was no significant difference between the groups on an open-ended questions exam.

edt, lr, , cur (EL)

Hinojosa, Susan Anne. (1996). *A survey of the barriers to teaching hands-on science in elementary classrooms* (Texas Woman's University). MAI 35(03), p. 0640, 1997. [AAI1382849]

Time constraints were found to be a more significant barrier to hands-on science instruction in elementary schools than teacher attitude and anxiety or lack of equipment and facilities.

hos, att, ped (EL, TE)

Hoban, Garry Francis. (1996). *A professional development model based on interrelated principles of teacher learning* (The University of British Columbia). DAI-A 57(12), p. 5119, 1997. [AAINN14765]

The model explored was the professional development program for three science teachers for a period of two and a half years. The objective was to determine how teachers understood their practice and in what ways it changed as a result of the model. The results indicated that interaction of each principle of teacher learning must be considered in organizing professional development.

tpd, knt, lrg (TE)

Hoekwater, Michael Scott. (1996). *Teaching flowering plant anatomy and physiology using a student-conducted research investigation of the Wisconsin fast plants* (Michigan State University). MAI 35(05), p. 1131, 1997. [AAI1385050]

Student interest and achievement was increased (n=90) after students acted as researchers and conducted controlled experiments on Wisconsin fast plants.

lrg, ped, ats, inq (HS)

Holden, Trudy Georgene. 1996). *Relationships among learning styles, metacognition, prior knowledge, attitude and science achievement of grade 6 and 7 students in a guided inquiry explicit strategy instruction context* (University of Victoria). DAI-A 58(05), p. 1580, 1997. [AAINN17935]

Study found that field-independent subjects made greater gains in conceptual knowledge than field-dependent subjects, and that there were significant differences in conceptual growth between groups of students with low and high scores on overall metacognition for grade 6 and 7 students taught biology concepts using a guided inquiry approach with embedded explicit strategy instruction.

lsy, inq, lrg, chs, ach, ped (MS)

Hua, Hsiao-Peng. (1996). *Effects of the implementation of selected activities from Project WILD on fifth-grade children's knowledge about, and attitudes and behaviors toward, wildlife and the environment in Taiwan* (The University of Texas at Austin). DAI-A 57(09), p. 3817, 1997. [AAI9705863]

Selected Project WILD activities were shown to positively affect fifth-grade children's short-term knowledge about and attitude toward wildlife and the environment in Taiwan. Students exhibited responsible behaviors toward wildlife and the environment in Taiwan after participating in Project WILD activities.

ats, kns, ene, cur (EL)

Hunt, Randy Francis Scott. (1996). *A contextual, visual and written analysis of ninth-grade physical science textbooks and the representation of African-American males in Oklahoma from 1954 to 1994* (Oklahoma State University). DAI-A 58(04), p. 1238, 1997. [AAI9730441]

Content analysis of twenty physical science textbooks published from 1954 to 1994 found European Caucasian males to be the dominant scientist stereotype.

mat, eth, mce, his (SE)

Hur, Chinhyu. (1996). *Development of demonstration-enhanced courses throughout the chemistry curriculum and a comparative study of student response* (Drexel University). DAI-A 57(03), p. 1083, 1996. [AAI9620807]

A demonstration-enhanced chemistry lecture course was developed and tested. College students' attitudes toward the class were positive, and increasing the use of demonstrations was strongly recommended.

ped, ats, cur (PS)

Jay, Eileen S. (1996). *The nature of problem finding in students' scientific inquiry* (Harvard University). DAI-A 57(07), p. 2953, 1997. [AAI9638752]

An exploratory study of problem-finding ability. Students were randomly assigned to control and treatment groups. A written instrument measured various factors such as prior knowledge, interest in science and creativity. The control group, no scaffolding, showed little or no spontaneous disposition to problem-find.

pbs, kns, ats, sks, lth (SE)

Johnson, Mark Andrew. (1996). *Faculty perception of constructivist change in teaching of introductory college chemistry courses* (The University of North Dakota). DAI-A 57(08), p. 3447, 1997. [AAI9701195]

Qualitative, naturalistic investigation of the perceptions of seven college chemistry professors of constructivist innovations in introductory college chemistry. Perceived barriers to implementation of novel teaching methods were lack of knowledge of educational theory, large class size, heavy course content, shortage of time, and cost.

cns, ped, bft, clc (PS)

Johnson, Susan Kristine. (1996). *Student as scientist: What strategies are used by high school students as they participate in the scientific process of model-revising problem-solving?* (The University of Wisconsin - Madison). DAI-A 57(09), p. 3798, 1997. [AAI9634896]

Model-revising problem solving is used to analyze strategies that students use when encountering anomalies that their genetic models do not explain. The students brought a repertoire of strategies, including many gleaned from early geneticists.

pbs, rem, kns, bio, his (SE)

Johnstone, Rebecca. (1996). *Exploring the academic choices of undergraduates: Factors influencing the decision to major in science* (University of Calgary). MAI 35(06), p. 1680, 1997. [AAIMM18685]

Study found that gender may not be a significant influence on the decision to pursue a science career and that factors influencing this decision can be better understood by taking seriously the temporal and contextual elements of the science pipeline.

car, gen, bkg (PS)

Johow, Veronica. (1996). *Interactive science communication: Producing "The Dance of Chance" multimedia exhibit for the Boston Museum of Science* (Boston University). DAI-A 57(02), p. 0629, 1996. [AAI9619938]

This work describes the development, implementation and evaluation of a novel approach for communicating scientific information to the public. The exhibit encouraged visitors to view science as a problem-solving activity and contributed to the development of alternative strategies for process-oriented communication in science.

nfd, edt, pbs (GEN)

Jones, Melody Gelane. (1996). *Teaching science in a multiage classroom* (Texas Woman's University). MAI 35(03), p. 0640, 1997. [AAI1382852]

Eight teachers of elementary multiage classrooms reported that they felt math and language arts instruction were more important than science instruction and that equipment and supplies for teaching science were inadequate.

att, cur, lab (EL)

Jones, Roberta Lynn. (1996). *The effects of gender equity strategies training on the perceptions of gender bias in middle school science students* (The University of Alabama). DAI-A 57(06), p. 2421, 1996. [AAI9633954]

Students whose teachers received Gender Equity Strategies Training (GEST) significantly increased scores for positive attitudes toward science. Male students perceived gender bias less often than female students.

ats, gen, tpd, eqt (MS)

Karmazin, Karen Sue. (1996). *A classroom teacher's experience with writing as a vehicle for teaching science* (State University of New York at Buffalo). DAI-A 57(01), p. 0168, 1996. [AAI9613146]

Normally-achieving and learning disabled students' understanding regarding the nature of scientific methodology and scientific content was assessed quantitatively by the examination of writing samples over thirteen weeks. Both groups increased performance significantly.

chs, nas, ped, kns (EL)

Keen, Gerald Lee. (1996). *A study of the effect of systemic reform in elementary science education with historically underrepresented students* (University of La Verne). DAI-A 58(02), p. 0418, 1997. [AAI9720830]

Study is descriptive research of changes in historically underrepresented students' interest, engaged learning time, understanding of and performance in science. Some findings were: students seem to grasp concepts better when they are involved in collaborative inquiry study and collaboration among teachers is highly valuable.

ref, eqt, cpl, ntw, ach, ats (EL)

Kelly, Christine M. (1996). *Understanding our sensitivity to the natural environment: An initial theory of the nature of environmental responsiveness* (University of Maryland College Park). DAI-B 57(10), p. 6153, 1997. [AAI9707627]

Study was an attempt to determine an individual's attitude toward the environment by identifying his or her causal contributions to environmental beliefs and responses. Findings indicated that the nature of environmental responsiveness can be understood as it is represented in the individual thought process.

ene, bfs, ats, kns (GEN)

Keng, Hsiao-Tseng. (1996). *A comparative study of note-taking, outlining and concept mapping learning strategies on National Taipei Teachers College students' understanding of heat and temperature* (The University of Iowa). DAI-A 57(05), p. 1996, 1996. [AAI9629675]

College sophomore non-science students who used either an outlining or concept mapping learning strategy during a study of heat and temperature scored significantly better than students who used only a personalized note-taking strategy.

sks, lrg (PS)

Kennedy, Helen Louise. (1996). *Science learning: A self-efficacy study in higher education* (University of Southern California). DAI-A 57(07), p. 2856, 1997. [AAI9636718]

This study investigated the relationship between science self-efficacy, mathematics self-efficacy, self-regulated learning and previous academic experience with academic experiences and career plans. The conclusion was that self-efficacy expectations are more important than ability or performance in career choice.

chs, ats, car, bkg (PS)

Keyser, Janice Olexia. (1996). *Teaching portfolios for middle school science teachers: A staff development tool for effecting and documenting transfer* (University of Maryland College Park). DAI-A 58(01), p. 0136, 1997. [AAI9719762]

This study focused on the practical application of teaching portfolios in the middle school science classroom. Teaching portfolios were defined as the record of skills, materials and activities selected as relevant to teachers' needs. Results indicated a positive perception regarding the program and a strong connection between initial needs and classroom implementation.

tpd, mat, att (TE)

Kilian-Shrum, Stella Mary. (1996). *An investigation into the implementation of a high school science program with an STS dimension* (University of Alberta). MAI 35(05), p. 1131, 1997. [AAIMM18221]

Qualitative study of teachers implementing an integrated, STS-oriented high school science course found that teachers had difficulty adjusting their views of themselves as discipline-specific teachers.

sts, bft, ped, cur (HS)

Kindfield, Peter Birns Atkins. (1996). *Student control of whole-class discussions in a community of designers*

(University of California, Berkeley). DAI-A 58(02), p. 0375, 1997. [AAI9723059]

Study was an analysis of a project which engaged students in controlling activity. Concludes that if we want students to perform well out of school we must provide an in-school environment that is similar to the one they will experience out of school.

cur, cid, lth (SE)

King, Virginia Cribari. (1996). *Engaging community members in constructivist learning: Parent involvement in the development of a middle school science curriculum* (Columbia University Teachers College). DAI-A 57(07), p. 2833, 1996. [AAI9635990]

The impact and context of teacher networks at two elementary schools were studied in an effort to determine whether teacher networks affect teachers' science instruction and sense of efficacy about implementing the California Science Framework with students who are English Language Learners.

ref, ntw, mce, att, tpd (EL, TE)

Kiviet, Agnes Makhosazana. (1996). *Perceived self-efficacy beliefs among teachers of science in the Transkei Region of South Africa* (Columbia University Teachers College). DAI-A 57(11), p. 4692, 1997. [AAI9713881]

ANOVA and Pearson's product moment correlation were used to analyze the beliefs of science teachers in regard to demographic factors, locus of control, attitudes and anxiety. Attitude showed the strongest contribution to variation in self-efficacy. Multivariate relationships of the variables was also examined.

cht, att, bft (TE)

Klein, Elizabeth Shiner. (1996). *Effective elementary science inservice education: The teacher perspective* (University of Virginia). DAI-A 57(08), p. 3447, 1997. [AAI9701420]

Naturalistic study of two participants in an elementary science teacher inservice program revealed that the modeling of constructivist-based learning methods enabled a single inservice program to meet the needs of two diverse teachers. The study indicated that peer interaction was important in changing teaching behaviors.

cns, tpd, ntw (TE)

Klimbal, Gerard Anthony. (1996). *Tech prep/applied academics: An evaluation of an applied science curriculum* (Northern Arizona University). DAI-A 57(07), p. 2834, 1997. [AAI9636614]

This study determined whether an applied academics program provided equivalent academic achievement when compared to a traditional college preparatory program. Results suggests that student attitudes are not affected by either approach. The need for future research is discussed.

cur, ach, tec, ats (SE)

Knight, Jane G. (1996). *A study of teachers' concerns and use of a curricular innovation* (Auburn University). DAI-A 57(02), p. 0533, 1996. [AAI9619203]

This study identified teacher concerns about a curricular change and explored relationships between concerns and implementation of the innovation. Results showed that most of the concerns focused on knowledge and understating of the curricular innovation and a need for a systemic staff development program.

cur, knt, att, tpd (TE)

Koba, Susan Beth. (1996). *Empowering teachers: A critical ethnography of a multicultural science reform* (The University of Nebraska - Lincoln). DAI-A 57(09), p. 3879, 1997. [AAI9703785]

The purpose of this collaborative, critical ethnographic study was to understand teacher culture during a science reform process, to determine barriers to reform, and to serve as an advocate during attempts to reduce these barriers.

att, ref, mce, eqt (TE)

Koker, Mark Hampton. (1996). *Students' decisions about environmental issues and problems: An evaluation study of the SEPUP programme* (University of Southampton). DAI-C 58(03), p.0770, 1997. [AAIC547439]

Students who participated in the SEPUP program were significantly more likely to make responsible decisions about environmental issues and were more likely to transfer an evidence-based orientation to problems set in less scientific contexts as were non-participant students (n=288).

ene, pbs, kns, sts (SE)

Kos, Ivo. (1996). *Teaching clinically-oriented embryology with computer simulations* (New York University). DAI-B 57(10), p. 6159, 1997. [AAI9710925]

The objective of this study was to determine the effectiveness of a method of teaching which promotes a clinically-oriented approach. Analysis showed that students who were exposed to the alternative method did significantly better than those using the traditional

method. The need for future research is also discussed.

ped, cbi, lrg (PS)

Koscher, Elizabethann A. (1996). *Alternative conceptions held by adults on the concept of decomposition and the cyclic nature of matter* (University of Massachusetts). DAI-A 57(02), p. 0629, 1996. [AAI9619402]

Interviews and surveys were used to examine the scientific and alternate views of adults on the concept of decomposition. Adults had firmly held ideas about the decomposition of bones and little understanding of the microbial role in decomposition.

alf, bio, lit (AD)

Krause, Lois Breur. (1996). *An investigation of learning styles in general chemistry students* (Clemson University). DAI-A 57(08), p. 3378, 1997. [AAI9703465]

A cognitive profile inventory was administered to introductory level chemistry students and the course grades between control and experimental groups were compared. Significant differences were found by gender, major and cognitive dominance. The results reinforce the theory that no one method will be best for all learners.

lsy, ach, gen (PS)

Kristjanson, Cheryl Roberta. (1996). *Voices from the other side of the room: A study on changing teaching strategies to include girls in math, science and technology* (The University of Manitoba). DAI-A 58(04), p. 1192, 1997. [AAINN16182]

Study found three factors to be critical in the success of females and other marginalized groups in learning science: a connection between the students and the teacher, a connection between subject material and the student, and a connection between the subject material and the real world.

eqt, gen, ped (SE)

Kuhla, Karen Ann. (1996). *Pre-college engineering intervention program alumni: A case study* (University of Virginia). DAI-A 57(08), p. 3448, 1997. [AAI9701380]

A case-study approach was used to determine the effect on 12 alumni of a precollege intervention program. Eight of the twelve are pursuing careers in science or engineering-related fields and four are not in science or engineering fields.

car, cur (SE)

Kuitunen, Hannu Uolevi. (1996). *FINISTE network as a tool for innovation in activating a wider spectrum of approaches to teaching in science education.* (FINISTE-tietoverkko innovaation vaelineenae luonnontieteiden opetuksen tyoetapoja monipuolistettaessa) (Helsingin Yliopisto, Finland). DAI-C 58(01), p. 0008, 1997. [AAIC532277]

This project included the development of FINISTE, a network established to promote a broad spectrum approach to science teaching. Analysis showed that FINISTE was successful, due to factors including the way members were recruited, the commitment of participants, the usefulness of instructional methods presented, and the project organization.

tpd, ntw, cur, ped (ALL)

Kusnick, Judith Elaine. (1996). *Constructing a constructivist classroom: Knowledge, learning and language in science education* (University of California, Davis). DAI-A 57(04), p. 1547, 1996. [AAI9627746]

Teachers' beliefs about knowledge influenced teaching, but concerns about control and time also helped determine each teacher's commitment to constructivist teaching. Detailed study of one constructivist lesson revealed three discourse structures and four discourse strategies.

cns, bft, cid, ped, phe (TE)

Laborde, Ilia M. (1996). *Rediscovering San Cristobal Canyon: Constructing better student ecological perspectives using technology and a model of global education in a central Puerto Rican secondary school pilot project* (Columbia University Teachers College). DAI-A 57(07), p. 2834, 1997. [AAI9635991]

This project investigated the design and description of a global education model in order to determine if it could stimulate the construction of knowledge about the environment. It concluded that the pilot achieved many of its goals. Shortcomings and suggestions for the future are also discussed.

ene, kns, cns, cur, tec (SE)

Lai, Patrick Kwong Jong. (1996) *University students' conceptual understanding and application of meiosis* (The University of British Columbia). DAI-A 57(06), p. 2421, 1996. [AAINN0911]

Study attempted to identify problems encountered with conceptual understanding and problem solving in an undergraduate genetics program. Findings indicated that a solid understanding of meiosis is a

necessary but not sufficient requirement for students to solve a problem in applied genetics.

pbs, kns, alf, bio (PS)

Lang, Harold Murray. (1996). *The development of the biology instrument bank (Ontario academic course level) for the Ontario Assessment Instrument Pool: A social history* (University of Toronto). DAI-A 57(08), p. 3469, 1997. [AAINN11773]

Naturalistic study of the development of a pool of instruments for teachers to use as up-to-date authentic classroom assessment. The process was a model of curriculum development by a contractor under government supervision.

asm, cur, bio (SE)

Langley, Raymond Garold. (1996). *Natural selection successfully taught* (University of Illinois at Urbana-Champaign). DAI-A 57(08), p. 3448, 1997. [AAI9702572]

This work addresses the teaching of evolution with clear and focused presentations of aspects which often prove confusing or counter intuitive. Two groups of students, one traditionally instructed and one using supplementary text and illustrations, were studied. The treatment group showed increased understanding.

evo, ped, mat, cur (SE)

Larreamendy-Joerns, Jorge. (1996). *Learning science from text: Effects of theory and examples on college students' ability to construct explanations in evolutionary biology* (University of Pittsburgh). DAI-A 58(01), p. 0122, 1997. [AAI9718640]

This research investigated how students learn to explain from theory as opposed to examples in a conceptual scientific domain. Analysis showed that example group students engaged more in strategies such as hypothesizing and explaining while theory group engaged in monitoring and exemplifying.

lth, kns, cns, mat (PS)

Larson, Jane Oswald. (1996). *Chemistry curriculum modulation: An investigation of text, teacher and learner interactions in a classroom milieu* (University of Colorado at Boulder). DAI-A 57(04), p. 1469, 1996. [AAI9628571]

Qualitative study of curriculum modulation found it to be an evolutionary, transformative process in which the text, teacher and learners interacted within a dynamic system to mutually construct outcomes and meanings in a high school chemistry classroom.

cur, cid, cns, che (HS)

Lavonen, Jari Matti Juhani. (1996). *Experimental nature of the teaching of physics and measurement automation* (Fysiikan opetuksen kokeellisuus ja mittausautomaatio) (Helsingin Yliopisto, Finland). DAI-C 58(01), p. 0015, 1997. [AAIC532269]

Evidence to support the experimental nature of the teaching of physics was found. A concrete example is presented in the form of the use of the measurement system in demonstrating the laws of mechanics in senior secondary school physics.

phy, ped, edt (SE)

Lee, Sookyoung. (1996). *The effects of computer animation and cognitive style on the understanding and retention of scientific explanation* (Virginia Polytechnic Institute and State University). DAI-A 57(10), p. 4248, 1997. [AAI9710954]

Students who received animated instructional materials performed significantly better than those viewing static visuals on problem-solving activities, but not on recall. Animation was shown to be especially effective for field-dependent students.

edt, lsy, pbs, lrg (PS)

Leeth, James David. (1996). *A study of the attitudes of students and the concerns of teachers toward the Science 1 and traditional life science curriculum* (Texas A&M University). DAI-A 57(06), p. 2343, 1996. [AAI9634794]

This research attempted to determine if a difference existed between attitudes of seventh grade students and concerns of teachers in the Science 1 curriculum and the traditional life science curriculum. The ANCOVA did not indicate a difference in the attitudes of students toward science in either program. The concerns of teachers about Science 1 were different.

bft, ats, int, cur, ref (SE)

Lekhavat, Patananya. (1996). *The impact of adjunct questions emphasizing the particulate nature of matter on students' understanding of chemical concepts presented in multimedia lessons* (University of Northern Colorado). DAI-A 57(08), p. 3448, 1997. [AAI9701962]

This study investigated the use of pictorial representations to enhance and assess student learning of molecular chemistry concepts. Results suggest that textual and pictorial test questions are equivalent in their ability to assess student understanding of molecular-level chemistry concepts.

rem, asm, che, edu (PS, HS)

Lerew, Susan Jane. (1996). *Cross-age teaching in elementary science* (Texas Woman's University). MAI 35(03), p. 0640, 1997. [AAI1382857]

Study concluded that cross-age instruction involving hands-on activities is a valuable tool in the enhancement of elementary science and can have a positive impact on the learning experience of all students involved.

ped, hos (EL)

Levitt, Karen Elizabeth. (1996). *An analysis of the beliefs of elementary teachers regarding the teaching and learning of science and the nature and knowing of science and the extent to which teachers beliefs are consistent with the philosophy of science education reform* (University of Pittsburgh). DAI-A 58(01), p. 0089, 1997. [AAI9718642]

Elementary teachers' (n=16) beliefs about teaching and learning science, and the nature of science were ascertained. Beliefs aligned most closely with those elements of science education reform that had been directly addressed by the program of reform in which teachers were involved.

bft, ref, nas, tpd, phe (TE)

Lien, Nguyen Bich. (1996). *The social context of genetics education in Vietnam: A case study at Dalat University* (Simon Fraser University). MAI 35(05), p. 1106, 1997. [AAIMM17029]

An investigation of how Vietnamese university students (n=39) responded to a social issues-oriented cell genetics course found that students showed interest in exploring science-related social issues and appeared to enjoy studying in a cooperative context.

sts, ats, cpl, bio (PS)

Lindenmeier, Donna K. (1996). *An investigation of the congruency of outdoor education components: Environmental education and adventure education* (Texas A&M University). DAI-A 57(06), p. 2673, 1996. [AAI9634797]

This project was designed to give direction to the decision-makers of Texas to propel environmental education, adventure education and outdoor education in the most useful direction. The panelists determined that environmental and adventure education are sufficiently dissimilar to warrant formulation of a new model.

ene, nfd, fsd, cur, ref (ALL)

Liu, Daonian. (1996). *Teaching chemistry on the Internet: A qualitative case study* (The University of Nebraska - Lincoln). DAI-A 57(10), p. 4336, 1997. [AAI9708072]

A case study was used to explore what students and instructor experienced in a course delivered on the Internet. Findings showed a positive evaluation of the course in terms of providing otherwise unattainable educational service, creating a collaborative learning environment and meeting needs of chemistry teachers.

che, tec, cpl, ntw, ats, att (PS)

Lucena, Juan Carlos. (1996). *Making policy for making selves in science and engineering: From Sputnik to global competition* (Virginia Polytechnic Institute and State University). DAI-A 57(08), p. 3645, 1997. [AAI9701838]

This cultural history discusses how the images of nation, its problems and solutions have shaped policies and programs for education and training of scientists and engineers since World War Two. Also discussed is how policies and programs come to define images of scientists and engineers.

his, phe, car, ref (GEN)

Mahyoub, Ahmed Ahmed. (1996). *Approaches to study process and university classroom environment: The case of preservice science teachers at the College of Education in Sana'a University* (Yemen) (University of Pittsburgh). DAI-A 57(12), p. 5103, 1997. [AAI9716626]

Study found that Yemeni students were more likely to use Deep Approach and Achieving Approaches than Surface Approaches in their study, and that significant differences existed between genders. Students' perceptions of the classroom learning environment were related to educational level.

chs, cht, lrg, gen, att (PS, TE)

Martof, Norma Moore. (1996). *How does the personal belief system of novice and veteran biology teachers play out in practice?* (University of Maryland College Park). DAI-A 58(01), p. 0125, 1997. [AAI9719787]

This qualitative study of three novice and three veteran biology teachers compared their beliefs about learners, society, schooling, and teachers' selves. A "reciprocal relationship" was found between teachers' beliefs and their experiences.

bft, cht, bkg, phe (TE)

Maschewske, Elizabeth Ann. (1996). *Implementation of inquiry-based freshman chemistry laboratories* (Grand Valley State University). MAI 34(04), p. 1361, 1996. [AAI1378526]

This thesis included teaching of a pilot laboratory section meant to incorporate an inquiry-based chemistry curriculum into freshman lab sections. An action plan for implementation was developed.

cur, lab, inq, che (PS)

Matkins, Juanita Joan. (1996). *Characteristics of women scientists: Science in different voices* (University Of Virginia). DAI-A 57(10), p. 4313, 1997. [AAI9708549]

Case studies of six women scientists determined that factors supporting their success were views of a "possible self," strong maternal role models, parental support, spousal support, expectation of financial responsibility, availability of spousal employment and individual interest in the science.

gen, car, bkg, eqt (PS)

Mauldin, Penny Lynne. (1996). *Selection and evaluation of experiments in instrumental analysis for schools with limited instrumental resources utilizing the inquiry oriented approach* (Middle Tennessee State University). DAI-A 57(10), p. 4313, 1997. [AAI9709894]

The intent of these experiments was to give students the opportunity to acquire skills in working with laboratory instruments. The conclusion was that 92% of faculty and 70% of the students preferred the new type of experiment.

lab, sks, inq, che (SE)

McClure, Patricia Head. (1996). *Computer-related technology use in the high school physics classroom: A case study* (Virginia Polytechnic Institute and State University). DAI-A 58(01), p. 0125, 1997. [AAI9719920]

Qualitative analysis of the integration of technology into a high school physics classroom found the combination of technology and collaborative work allowed for increased student learning.

edt, cpl, lrg, phy (HS)

McCormick, Megan E. (1996). *The influence of gender-role identity, mathematics self-efficacy, and outcome expectations on the math-and science-related career interests of gifted adolescent girls* (The University of Utah). DAI-A 57(09), p. 3812, 1997. [AAI9706100]

Three questionnaires were used to investigate the effect of gender-role identity, math self-efficacy, and career context on the expectations of gifted girls for math- and science-related careers. The relationship between expressiveness and career satisfaction expectations was the only gender difference found.

gen, chs, car (SE)

McCoy, Sara Henry. (1996). *A study of the use of analogy and models to promote conceptual change and overcome misconceptions about chemical equilibrium* (Columbia University Teachers College). DAI-A 57(07), p. 2953, 1997. [AAI9636000]

Different analogies selected from episodic, visual representation, and concrete were presented to each student. The effectiveness depends on the conceptual framework and strategies were employed by the learner. The more concrete analogy was more effective.

che, ped, ccg, kns, atf (SE)

McDermott, Terrel K. (1996). *A comparative analysis of final examination mean scores for applied and academic classes in sophomore level high school biology* (Idaho State University). MAI 34(04), p. 1340, 1996. [AAI1378784]

Study found that student achievement (n=196) was higher for biology students taught with hands-on methods rather than lecture.

ach, hos, bio (HS)

McDonnell, Ann Marie. (1996). *Gender and ethnic preferences in selection of science fair topics* (Texas Woman's University). MAI 35(05), p. 1131, 1997. [AAI1384848]

Two-year study of 241 students in grades 3 through 8 found that females exhibited a slight preference for biological science topics, and males slightly preferred physical science topics for science fair experiments. At the middle school level, there was a significant shift toward biological science topics for both genders. Asian students showed strong preferences for physical science topics.

gen, eth, ats (EL)

McEwen, Malcolm Keith. (1996). *A study of the relationships among teacher inservice training, geographic residence, student knowledge acquisition, and student marine experiences in the evaluation of a marine science curriculum* (West Virginia University). DAI-A 57(07), p. 2836, 1997. [AAI9639443]

The purpose of this study was to investigate the relationships among inservice training, geographic residence, marine science knowledge acquisition and student scores on the curriculum evaluation form. A

significant relationship was found between attitudes, teacher training and residence.

cur, tpd, bkg, ats, kns (TE)

McGee, Steven Michael. (1996). *Designing curricula based on science communities of practice* (Northwestern University). DAI-A 57(06), p. 2422, 1996. [AAI9632746]

The taught and learned curriculum in four CoVis earth science classrooms was analyzed. Students were more successful if they were given concrete feedback about how to engage in scientific inquiry.

cur, inq, kns, esg (SE)

McIlveene, Martha H. (1996). *A comparison of Russian and American students' concerns about environmental issues: Implications for environmental education curriculum* (Georgia State University). DAI-A 57(04), p. 1547, 1996. [AAI9628835]

Middle school students from the United States and Russia displayed similar perceptions of environmental concerns. Significant differences were found in several cultural factors and in perceptions of the difficulty of solving environmental problems.

cul, bfs, ene, bkg, pbs, sts (MS)

McKenzie, Woodrow Lee. (1996). *Investigative learning in an undergraduate biology laboratory: An investigation in reform in science education* (Virginia Polytechnic Institute and State University). DAI-A 57(07), p. 2953, 1997. [AAI9637453]

This study used a project-based curriculum in biology which focused on how biological concepts of species are developed. Qualitative methods revealed richer, more complex definitions of species.

cur, ref, kns, bio (PS)

Meadows, George Richard. (1996). *The effect of constructivist hypermedia in bringing about conceptual change in preservice elementary teachers' science frameworks* (West Virginia University). DAI-A 57(04), p. 1547, 1996. [AAI9625977]

Preservice elementary teachers who used a constructivist hypermedia program about global warming gained a more sophisticated understanding of the phenomenon of global warming and their views became more similar to current scientific understanding. However, initial alternative frameworks were not abandoned.

ccg, cbi, knt, esg (TE)

Melendez, Julio Alcibiades. (1996). *A methodology to assess safety conditions in Louisiana agriscience laboratories* (The Louisiana State University and Agricultural and Mechanical College). DAI-A 57(07), p. 4311, 1997. [AAI9637796]

A methodology was developed to assess forty one high school science laboratories. Safety problems were identified and recommendations made to improve laboratory safety. The instrument used has been recommended for use in the workplace, especially agriscience laboratories.

lab, asm (SE)

Mendenhall, Gordon Lee. (1996). *A model for the assessment of in-service education using data on the acquisition of human genetics concepts by secondary biology teachers and their students and implementation of selected teaching strategies* (Ball State University). DAI-A 57(03), p. 1084, 1996. [AAI9623148]

This study is an analysis of the relationships between teacher competency, number of teaching strategies and student competency. A significant correlation was found between teacher competency, student competency and number of strategies. No correlation was found between number of strategies alone and student performance.

tpd, knt, kns, skt (SE)

Mendoza, Charles Phillip. (1996). *Effectiveness of the 1990 California State Science Framework as perceived by middle grade science teachers* (Northern Arizona University). DAI-A 57(10), p. 4249, 1997. [AAI9710204]

Survey of science teachers (n=291) found no substantial difference in teacher perceptions of the 1990 California State Science Framework when compared to perceptions of the 1978 Framework. Concludes that school districts should not expect changes in frameworks to dramatically affect what occurs in specific districts and classrooms.

ref, bft (K-12)

Midling, Michael J. (1996). *Environmental education in China: The case of secondary schools in Sichuan Province* (Stanford University). DAI-A 57(08), p. 3448, 1997. [AAI9702943]

Study found that six pilot Environmental Education school sites in China produced students who scored significantly higher on an environmental knowledge and attitudes scale than students from nine non-pilot schools.

ene, cur, ats, kns (SE)

Miller, David William. (1996). *Earth science literacy of preservice and in-service elementary and secondary school teachers* (The Ohio State University). DAI-A 57(05), p. 1996, 1996. [AAI9630936]

Earth science literacy levels of preservice and inservice elementary and secondary teachers were found to be similar to those of the general population as reported by other researchers.

knt, esg, lit (TE)

Miller-Shaivitz, Patricia. (1996). *The feasibility of assembling a contemporary human skeletal collection for forensic anthropological education and research* (University of South Florida). DAI-A 57(03), p. 1206. 1996. [AAI9622252]

Literature reviews and questionnaires found a definite need for the assemblage of a new contemporary human adult skeletal collection for forensic anthropological education and research. Obstacles include issues of procurement, emotional factors, religious implications, legal and ethical concerns.

bio, bkg, res, sts (PS)

Molsbee, Robert Glenn. (1996). *Science achievement as a criterion for judging the effectiveness of home schooling, Christian schooling and public schooling* (The University of Southern Mississippi). DAI-A 58(01), p. 0125, 1997. [AAI9718188]

This study compared the effectiveness of three different educational environments on science achievement. Analysis showed home schooled students scored significantly higher than students in public or Christian schools.

ach, ped. (MS)

Monaghan, James Michael. (1996). *Use of collaborative computer simulation activities by high school science students learning relative motion* (University of Massachusetts). DAI-A 57(02), p. 0630, 1996. [AAI9619414]

This work investigated problem solving skills and the use of a computer simulation to facilitate conceptual change. The results indicated that presentation of numerical data can help students use mechanical algorithms and that computer simulations can impact student cognition.

cbi, ccg, pbs, cpl (SE)

Monhardt, Rebecca Meyer. (1996). *A comparison of a writing-to-learn strategy in two science classrooms* (The University of Iowa). DAI-A 57(07), p. 2954, 1997. [AAI9640003]

Two case studies were used to identify some conditions needed for successful implementation of writing-to-learn strategies in science classes.

ped, att, ats, lrg (SE)

Monroe, Ronnie Lee. (1996). *The analysis of teacher beliefs and supporting structures in environmental education: A case study* (University of Montana). DAI-A 57(10) p. 4314, 1997. [AAI9707545]

A teacher's beliefs regarding the objectives for environmental education were explored using a case study. Findings were that college education greatly influenced the teacher's beliefs and practices, and that she lacked necessary support structures.

ene, bft, bkg, tpd (SE, TE)

Moran, Carrol Eleanor. (1996). *The development of language in a bilingual science class: An ethnographic study* (Stanford University). DAI-A 57(08), p. 3381, 1997. [AAI9702947]

Year-long study of the development of the language of science in a sixth-grade bilingual classroom looked at structural elements of the classroom culture, language use and conceptual understanding, and teacher knowledge base.

cid, mce, knt, kns (MS)

Morey, Marilyn. (1996). *The relationships among student science achievement, elementary science teaching efficacy, and school climate* (Illinois State University). DAI-A 57(06), p. 2422, 1996. [AAI9633423]

This study determined the relationships among science achievement, science teaching efficacy and school climate in public elementary schools. The multiple regression analysis revealed many relationships including that achievement is higher in schools with a high sense of teacher efficacy.

ach, ped, cht (EL)

Musial, Linda Malatesta. (1996). *Situated cognition and science process learning* (University of Maryland College Park). DAI-A 58(01), p. 0075, 1997. [AAI9719795]

A descriptive study relating learning of science process skills among elementary students to the situated cognitive theory of Greeno. Readers are provided with a foundation for conceptualization of situated cognitive theory.

sks, lth, kns (EL)

Nagelhout, Edwin R. (1996). *Writing and professional apprenticeship: Case studies of biology graduate students' entry into the scientific community* (Purdue University). DAI-A 57(07), p. 3005, 1997. [AAI9638209]

This multiple-case study of biology graduate students examines how writing affects the process of becoming a biologist. In-depth stories about writing were created and the study helped to characterize writing's role across and within professions.

bio, kns, car, sks (PS)

Nelson, William A. (1996). *Environmental literacy and residential outdoor education* programs (University of La Verne). DAI-A 57(10), p. 4314, 1997. [AAI9708891]

Students who attended a residential environmental education program showed significant score increases on affective, cognitive, and to some degree, behavioral items. Increases did not appear to be influenced by gender and/or ethnicity.

ene, nfd, lit, ats, bfs (MS)

Nester, Karen Marie. (1996). *Writing and thinking in the middle school science classroom* (Christopher Newport University). MAI 34(06), p. 2146, 1996. [AAI1380607]

A descriptive study of four seventh grade science classes was conducted in which assignments and student writing were analyzed in terms of Bloom's Taxonomy. It was concluded that higher-level assignments are important to give students the opportunity to use higher-level thinking as they write.

ped, lrg, kns, lth (MS)

Nguyen, Kim Sa T. (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, 1996. [AAI9626615]

Study was an attempt to identify factors that cause students to leave math/science programs. The factors identified were academic involvement, educational practices of the institution, gender, and enrollment status. Cumulative grade point average did not have any causal link.

ats, gen, car, bkg (PS)

Nyman, Jeffrey Scott. (1996). *Learning from experience: Perspectives on a constructivist science curriculum in a middle school* (Texas Woman's University). MAI 35(01), p. 0028, 1997. [AAI1380995]

Qualitative study of constructivist practice in middle school science classes found that play is important in science curriculum, discussion skills are important, respect for all ideas is important, and teachers need sufficient time to implement the practice well.

cns, cur, ped, sks (MS)

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, 1996. [AAI9631046]

A regression analysis with Black, Hispanic and White ethnic groups, gender, mathematics self-efficacy and ethnic identity entered as predictors was used to study math/science career interests. Results indicated that ethnic identity did not affect variance but all other factors did.

car, gen, chs, eth (SE)

Obielodan, James Bolanle. (1996). *Evaluating the efficacy of computer courseware designed to support concept learning in college-level physiology* (Michigan State University). DAI-A 58(05), p. 1670, 1997. [AAI9734164]

The effects of courseware programs on learning achievement for college students in a physiology course were analyzed using descriptive statistics, ANOVA, multidimensional scaling, and stepwise regression. Students who used all three programs performed significantly better than other students; however, gender and GPA were the significant predictors of achievement.

cbi, ach, gen (PS)

Ogorzaly, Molly Conner. (1996). *A qualitative study of an innovative program to support children's learning of botanical conceptions* (The University of Texas at Austin). DAI-A 57(06), p. 2423, 1996. [AAI9633252]

A study of a program involving bringing in senior citizens and other adults from the surrounding community to engage in informal science experiences and environmental service projects. The program was found to be most effective in enhancing self-esteem. Other effects varied with each child. The program received the President's Environmental Youth Award for 1994.

nfd, ntw, ene, chs (MS)

Olson, Daniel Raymond. (1996). *Toward a theory of learning science for scientific literacy among professional educators* (Northern Illinois University). DAI-A 57(07), p. 2975, 1997. [AAI9639931]

This qualitative study used a discursive approach to determine educators' beliefs about scientific literacy. The findings generated a theory on how educators learn science and indicated that despite a large availability of scientific information, non-professional interest in science prevents an increase in knowledge.

lth, bft, lit, knt, phe (TE)

Olson, Eric Arne. (1996). *Six complementary case studies of parents and children completing hands-on activities at home which were tied to the science education the child was receiving at school* .(The University of Iowa). DAI-A 57(12), p. 5104, 1997. [AAI9715176]

An examination of the roles played by parents and children as they performed home activities that were linked to science instruction. The results indicated that parental interaction can be effective but care must be taken to minimize negative aspects such as misconceptions.

hos, bkg, alf (EL)

Ossei-Anto, Theophilus Aquinas. (1996). *Assessing laboratory skills of students in selected high school physics topics in optics* (State University of New York at Buffalo). DAI-A 57(01), p. 0161, 1996. [AAI9617898]

A performance-based instrument to assess the skills of high school physics students was developed and validated. Students performed poorly at taking safety precautions and recognizing sources of error. Gender, grade level, and type of physics course were significantly correlated with student achievement.

asm, sks, lab, phy, gen (HS)

Owens, Caroline Virginia. (1996). *Fifth-graders' science talk and science writing* (Indiana University). DAI-A 57(09), p. 3819, 1997. [AAI9704753]

The science expressed in students' formal writing was compared with science ideas expressed during interviews and casual conversations with peers. Students' formal writing about science did not indicate the depth or scope of science thinking which was expressed orally by participants.

cid, kns, asm (EL)

Park, Sunghye. (1996). *Development and validation of the Korean Science Teaching Efficacy Beliefs Instrument (K-STEBI) for prospective elementary school teachers* (The Pennsylvania State University). DAI-A 57(08), p. 3448, 1997. [AAI9702357]

STEBI-B was translated, validated and applied into a Korean school context to allow for researching the self-efficacy beliefs of Korean prospective elementary school teachers.

asm, chs, cul (TE)

Passmore, Gregory Gene. (1996). *The effects of Gowin's Vee heuristic diagramming and concept mapping on meaningful learning in the radiation science classroom and laboratory* (University of Missouri—Columbia). DAI-A 58(06), p. 2143, 1997. [AAI9737850]

The effects of Vee heuristic diagramming and concept mapping utilization during classroom and laboratory learning by college-level nuclear medicine technology students were investigated. Meaningful learning was evidenced by group performance gains, positive attitudinal preferences, and student misconception identification and remediation.

lrg, ach, ccg, ats, lth (PS)

Peasley, Kathleen Lynne. (1996). *Science as discourse: The role of discourse in constructing understanding in a third-grade science class* (Michigan State University). DAI-A 57(09), p. 3879, 1997. [AAI9706546]

Literacy, linguistics, and science education reform documents were used to define scientific literacy and analyze classroom discourse and student learning. Social constructivism was the theoretical framework of the class and two case studies were used to determine extent to which students made sense of science content.

cid, lit, ref, cns, kns (EC)

Peiffer, Bernadette McGovern. (1996). *Interactive science exhibits: Adapting and testing a model for motivating formation and examination of mental models to explain physical phenomena* (Georgia State University). DAI-A 57(02), p. 0630, 1996. [AAI9619338]

This study adapted and tested a model for museum exhibits that facilitated integrated experiential learning among families. The goal was engagement and cognition. Visitors showed longer interaction times for the new design. The model was a useful step in the development of a rubric for creation of educational exhibits.

lrg, nfd, int (GEN)

Perez, Catherine Herzog. (1996). *The development of the Learning Theory Evaluation (LTE) instrument for software* (The University of Rochester). DAI-A 57(05), p. 1951, 1996. [AAI9630664]

The Learning Theory Evaluation instrument for evaluating instructional software programs in chemis-

try was developed and validated. The instrument allows educators to assess the potential effectiveness of software for facilitating learning.

edt, asm, lrg (HS. PS)

Petrides, Lisa Ann. (1996). *A study of the gendered construction of the engineering academic context in graduate school* (Stanford University). DAI-A 57(08), p. 3422, 1997. [AAI9702962]

An exploratory study suggesting that the gendered construction of the engineering academic context renders graduate school unattractive for women. A survey and in-depth interviews of 540 graduate students as to experiences, beliefs and expectations provided a reconceptualization of the underrepresentation of women and suggests implications for policy.

gen, car, bkg, eqt (PS)

Pinkerton, Jane. (1996). *Meta-analysis of ACT scores, TCAP science scores, and science teacher perceptions of rural and nonrural schools in Tennessee* (The University of Memphis). DAI-A 57(12), p. 5039, 1997. [AAI9717229]

A comparison of rural and nonrural schools as to the science achievement of students and expenditure for equipment and supplies. Both groups perceived their equipment and supplies to be less than adequate. Nonrural students were found to have higher academic achievement in math and science but not in English and reading.

ach, bkg, mat (SE)

Pinkerton, K. David. (1996). *Language-rich teaching in the high school physics classroom* (University of Denver). DAI-A 57(05), p. 1996, 1996. [AAI9629233]

Language-rich techniques such as structured discussions with peers and teachers were used in a three-way study (low, medium, high) to help students develop conceptual learning. Results suggest that differences in conceptual learning due to language-rich teaching do exist.

ped, cid, lrg, phy (SE)

Pitman, Lisa Jo Gansar. (1996). *An analysis of the science teacher component in the development of a statewide distance learning project* (University of Georgia). DAI-A 57(03), p. 1107, 1996. [AAI9624037]

Study found that science teachers with limited knowledge of distance learning technology found it difficult to produce videoconferencing sessions, and media specialists had difficulties motivating science teachers to learn about the new technology. A successful model is described.

tec, skt, att, tpd (TE)

Pittman, Kim Marie. (1996). *Cells are similar to factories: Analogies in science* (National-Louis University). DAI-A 57(07), p. 2954, 1997. [AAI9639091]

Instruction with analogies was shown to be more effective than traditional methods of instruction of protein synthesis for eighth grade science students.

ped, lrg, bio (SE)

Plummer, Donna Mae. (1996). *Line graphing skills of freshman biology non majors* (University of Missouri - Columbia). DAI-A 57(12), p. 5104, 1997. [AAI9717165]

This research attempts to determine if a relationship exists between attitudes toward graphing and ACT mathematics scores and if there is a difference between graph construction ability for researcher-provided data and student-collected data. No significant relationship was noted except for ACT scores and graph interpretation scores.

ats, ach, sks (PS)

Poe, Peggy Marie. (1996). *A descriptive study of the perceptions, attitudes, and behaviors that limit science instruction* (Texas Woman's University). MAI 34(05), p. 1749, 1996. [AAI1379419]

Despite expressions of frustration and awareness of negative environmental factors, pro ram and non-program teachers did not allow negative perceptions to limit their science teaching behaviors.

att, bft, cht, tpd (TE)

Popp, John David. (1996). *The relationship of students' beliefs about learning university p ysics and serialist/holist learning style with performance on physics examinations* (The Pennsylvania State University). DAI-A 57(12), p. 5104, 1997. [AAI9716291]

This research tested the hypotheses about student variables that affect performance on physics examinations. The Formula/Equation View construct was defined and an instrument developed to measure it. Significant correlations were found between the construct and performance on examinations.

asm, ach, phy (SE)

Powell, Kathryn Marie. (1996). *Teachers' perceptions of their own learning: An exploration of biology teach-*

ers' sense-making (Texas A&M University). DAI-A 58(01), p. 0137, 1997. [AAI9718436]

The purpose of this inquiry was to explore teachers' perceptions of their personal sense-making as they participated in a summer institute. Intense workshops with demanding schedules were perceived as ways to acquire new skills and knowledge.

tpd, bft, knt, skt (TE)

Prather, Edward Newman. (1996). *Better than the SAT: A study of the effectiveness of an extended bridge program on the academic success of minority first-year engineering students* (University Of Cincinnati). DAI-A 57(03), p.1049, 1996. [AAI9622371]

African-American, Latino/a, and American Indian students considered at risk on traditional admissions criteria participated in an academic bridging program. Students performed academically and were retained at the same level as those who met higher traditional admissions criteria.

eth, ach, eqt, cur, car (PS)

Pratt, Shirley Ann. (1996). *The preferences of third-grade girls for biological or physical science* (Texas Woman's University). MAI 35(03), p. 0640, 1997. [AAI382863]

A master's thesis which surveyed 33 girls before and after a two-week period of activities in biology and physical sciences. Results indicated that there was a similar interest in both biology and physical science.

gen, ats (MS)

Priestley, Holly Delk. (1996). *Exploring the impact of longer term intervention on reforming life science teachers' approaches to science instruction: Seeking a more effective role for laboratory instruction* (Temple University). DAI-A 57(06), p. 2423, 1996. [AAI9632086]

Research explored the effects of a longer-term intervention designed to prepare a group of ten life science teachers to begin units of instruction with laboratory investigations. Length of professional background and viability of laboratory facilities had minimal impact on teachers' ability to employ the modeled approach.

lab, ped, cht, bkg, mat (TE)

Quinn, Mary Allison. (1996). *Measuring tutoring effectiveness by program delivery model: Small group tutoring compared to tutoring in labs in mathematics, physics and accounting* (East Tennessee State Univer ity). DAI-A 57(07), p. 2840, 1997. [AAI9638792]

This study tests the effectiveness of common tutoring models by analyzing the grades of tutored and non-tutored students. Gender and age effects are also measured. The results indicate that gender and age had a greater effect than tutoring and that more research is needed, especially in physics.

lrg, gen, ped, phy (PS)

Ramirez, Reynaldo, Jr. (1996). *A systematic development and evaluation of a curriculum for coordinated-thematic seventh-grade science teachers* (University of Houston). DAI-A 57(04), p. 1548, 1996. [AAI9626756]

The purpose of this study was to develop and evaluate a teacher training curriculum integrating the concerns of teachers, curriculum developers and subject area experts. Results strongly recommended two areas of training: providing teachers with an understanding of strategies for middle school and integrating chemistry, physics, earth/space and biology content.

tpd, cur, int (TE)

Ratcliffe, Mary. (1996). *Adolescent decision-making about socio-scientific issues within the science curriculum* (University of Southampton). DAI-C 58(01), p. 0015, 1997. [AAIC523736]

Qualitative analysis of male adolescent students' (n=93) decision-making about socio-scientific issues found that pupils use little scientific evidence in making decisions. Implications for pedagogy are discussed.

sts, sks, ped (SE)

Reyes-Herrera, Lilia. (1996). *An i terpretive study of social forces that constrain actions and interactions in a science classroom in Columbia* (The Florida State University). DAI-A 57(08), p. 3449, 1997. [AAI9700224]

An ethnographic methodology was used to study teacher and students' actions and interactions and the social forces associated with the community. Teachers can improve the quality of learning in their classrooms if they identify and reflect on the referents for their actions and interactions.

bkg, cid, lrg, ped (SE)

Riddile, Jill Katherine Thomas. (1996). *Sixth-grade students' science thinking made visible through writing and discussion* (Texas Woman's University) MAI 35(03), p. 0629, 1997. [AAI1382865]

No significant difference in learning was found between sixth-grade students (n=66) who wrote and discussed chemistry activities and students who only wrote about them.

ped, cid, lrg (MS)

Riley, Dana Maria. (1996). *The representation and interpretation of the image of science and scientists at a museum of natural history* (Miami University). DAI-A 57(07), p. 2840, 1997. [AAI9639425]

Based on a constructivist methodology, this study explored how the staff of a museum believed science and scientists were presented in the museum. The staff believed the presentation was fun and exciting in order to attract visitors and provide economic stability.

nfd, cns, lrg (GEN)

Rismiller, Jon C. (1996). *An inquiry into student perspectives and school practices that promote middle level students' understandings leading to an ecologically sustainable future* (Pacific Lutheran University). MAI 35(01), p. 0028, 1997. [AAI1380998]

Qualitative study of middle level students found that while students have some knowledge of environmental issues, their behavior does not mirror this knowledge.

kns, ats, ene (MS)

Ritter, Robert John. (1996). *Alternative assessment in senior high school classrooms* (University of Alberta). DAI-A 58(06), p. 2148, 1997. [AAINN18100]

Nine teachers in three high schools were profiled as they attempted to implement alternative assessment strategies in senior high school science classes. Teachers identified current assessment approaches as insufficient in supporting the intent of a new curriculum initiative.

asm, cur (HS)

Rivard, Leonard Paul. (1996). *The effect of talk and writing, alone and combined, on learning in science: An exploratory study* (The University of Manitoba). DAI-A 57(10), p. 4297, 1997. [AAINN13481]

Study of problem tasks given to eighth-grade science students found that peer discussion may be important in students' construction of knowledge and that peer discussion combined with writing may enhance the retention of science learning over time.

cid, cns, lrg, ped (SE)

Roberts, Lily Lee Corina. (1996). *Methods of evaluation for a complex treatment and its effects on teacher professional development: A case study of the Science Education for Public Understanding Program* (University of California, Berkeley). DAI-A 58(02), p. 0432, 1997. [AAI9723160]

The framework for studying teacher change as a result of professional development is reviewed from a multilevel perspective and the implications for evaluating teacher change is described. Leadership, institutional support, teacher proximity and collaboration are identified with change in middle school science teachers.

tpd, knt, att, ntw (ALL)

Robinson, James Wayne. (1996). *The effects of the global thinking project on middle school students' attitudes toward the environment* (Georgia State University). DAI-A 57(04), p. 1548, 1996. [AAI9628839]

Study found a positive change in middle school students' attitudes and behaviors toward the environment, environmental literacy levels, and attitudes toward telecommunications after participation in the Global Thinking Project.

ene, ats, kns, tec, lit (MS)

Roessingh, Hetty. (1996). *ESL students and the inclusive high school science class: An investigation into the effects of curriculum restructuring* (University of Calgary). DAI-A 58(06), p. 2144, 1997. [AAINN18643]

Two general science classrooms which included ESL students were studied. The thematically organized, integrated science curriculum resulted in statistically significant gains in the reading scores of ESL students, while ESL students in the traditional class were unable to make these gains.

mce, int, ach, ped (HS)

Rop, Charles Jay. (1996). *The good student: What does it mean and what does it take to be successful in high school chemistry? Or "Will this stuff be on the test?"* (Michigan State University). DAI-A 58(01), p. 0137, 1997. [AAI9718886]

This study used participant observation to understand students' views of success in two Midwestern public high school chemistry classes. Rather than deep understanding of chemical processes, students describe traditional strategies and task performances that become a rite of passage.

bfs, sks, ach, chs, che (HS)

Ross, James William. (1996). *The graininess of everyday thinking: Schemata, metaphors, and children's ideas of heat* (The University of Western Ontario). MAI 34(06), p. 2146, 1996. [AAIMM09826]

Evidence is presented that everyday speech contains metaphors which organize the students' cognitive representations in ways that are very different from scientific accounts of heat and temperature. These metaphorical structures may lie at the root of student conceptions across many domains of science learning.

cid, kns, lth, cns, alf (EL)

Rubin, Susan Finlay. (1996). *Evaluation and meta-analysis of selected research related to the laboratory component of beginning college level science instruction* (Temple University). DAI-A 57(03), p. 1084, 1996. [AAI9623799]

Meta-analysis of research detailing the effect of traditional and various non-traditional approaches to the laboratory component of instruction at the beginning college level found that non-traditional approaches significantly improved cognitive and noncognitive student learning.

lab, ped, lrg, res (PS)

Runcie, Bereta Hermabelle. (1996). *Jamaican secondary high school science teachers' perceptions of their teaching environment and their strategies for adapting* (Columbia University Teachers College). DAI-A 57(02), p. 0630, 1996. [AAI9620165]

The perceptions of 147 teachers of their teaching environment was studied via a questionnaire. Many negative factors were revealed including little in-service training, low salaries, slow promotion and class sizes. Suggestions for improvement were included.

bft, bkg, tpd (SE)

Rutledge, Michael Lorne. (1996). *Indiana high school biology teachers and evolutionary theory: Acceptance and understanding* (Ball State University). DAI-A 57(06), p. 2423, 1996. [AAI9632834]

This study explores the relationship between teacher acceptance of evolutionary theory, teacher understanding of evolutionary theory, teacher understanding of the nature of science and their effect on the emphasis evolution receives in the classroom. A significant relationship was found between teacher acceptance and the level of instructional time allotted

evo, knt, nas, bft (SE)

Sager, Martha Ann. (1996). *The effects of gender affirmative supplemental science material on sixth-grade students' attitudes toward science and science careers* (Florida Institute of Technology). DAI-A 57(04), p. 1548, 1996. [AAI9627522]

No significant differences in students' attitudes toward science and science careers were found between students receiving female gender affirmative newspapers, male gender affirmative newspapers, and gender-blended newspapers for six weeks. Females did improve scores from pretest attitudes.

ats, gen, car, nas (MS)

Salonius, Annalisa. (1996). *Contextualizing the under-representation of women in science and engineering: A graphical analysis of trends in Canadian degree attainment statistics* (McGill University). MAI 35(01), p. 0120, 1997. [AAIMM12081]

Statistics for degree attainment in traditionally male-dominated fields for both sexes from 1962-1989 were displayed graphically and analyzed visually. The largest gains in representation have been in autonomous, self-employed professions rather than positions in large organizations.

car, gen, his, eqt (PS)

Sanger, Michael James. (1996). *Identifying, attributing, and dispelling student misconceptions in electrochemistry* (Iowa State University). DAI-A 57(07), p. 2954, 1997. [AAI9635349]

Student misconceptions in electrochemistry were identified. College-level chemistry textbooks were analyzed for vague or misleading statements relative to electrochemistry. Computer animation was shown to have little effect on conceptual change, but chemical demonstration-based conceptual change instruction significantly decreased misconceptions.

ccg, alf, mat, cbi, ped (HS, PS)

Schefter, Maria. (1996). *Student reactions to tentative language (hedging) in genres of environmental science writing* (The Union Institute). DAI-A 57(08), p. 3476, 1997. [AAI9701080]

This study explored the extent to which scientists and non-scientists share perceptions of hedging (linguistic elements) and how this is reflected in textbooks. Norms for hedging require attention in English and science courses from junior high through the university level.

mat, enc, bfs (PS)

Schinzel, Dan Donald. (1996). *Advanced placement science programs in Catholic high schools* (The University of Nebraska - Lincoln). DAI-A 57(03), p. 1084, 1996. [AAI9623639]

Surveys and on-site visitations were used to analyze existing Advanced Placement science programs in Catholic schools. Thirteen guidelines for the implementation of an Advanced Placement science program were established.

cur, cht (HS)

Schroeder, Lucia Ann. (1996). *Poetry and science-symbiosis: Integrated lessons at the elementary level* (The University of North Dakota). DAI-A 58(01), p. 0090, 1997. [AAI9721220]

This study examined the use of poetry reading and writing integrated with constructivist methods to teach science in the fifth-grade. The results indicated that the students developed both a knowledge of and a desire to learn more science.

ped, cns, int, ats, kns (MS)

Schroeder, Michael Wayne. (1996). *Making connections: A qualitative study of science learning in five- and six-year-old children* (University of Illinois at Urbana-Champaign). DAI-A 57(08), p. 3449, 1997. [AAI9702659]

This qualitative study used "minds-on" science activities to investigate the science learning of very young children. The results indicate that both conceptions and reasoning were more complex than stated in previous studies.

kns, ped, lrg (EL)

Schroeder, Patricia Gayle. (1996). *Science as argument: A context using peer dyads to promote conceptual change among community college chemistry students* (Kansas State University). DAI-A 57(04), p. 1549, 1996. [AAI9629066]

Characteristics of students and conceptual understanding of basic science was examined. The results were inconclusive and the researcher recommends much continued study of actual understanding of science.

chs, kns, cpl, ecg, cid (PS)

Seminara, Laurie. (1996). *An exploration of the relationship between conceptual knowledge, sex, attitude and problem-solving in chemistry* (Columbia University Teachers College). DAI-A 57(11), p. 4692, 1997. [AAI9713888]

The study was designed to identify what conceptual knowledge was needed prior to solving an unfamiliar problem in order to create a meaningful solution to the problem de novo. The most successful solvings were accomplished by students from single-sex environments.

kns, pbs, gen, ats, che (HS)

Serianz, Rachel Kathryn. (1996). *An investigation of the philosophical perspectives of science projected by instructors of non-majors' science courses in relationship to science anxiety among preservice elementary teachers* (The University of Iowa). DAI-A 57(07), p. 2870, 1997. [AAI9640016]

Study was an empirical investigation into the impact of science courses and perspectives of science projected by instructors on science anxiety. It was concluded that the impact of a perspective upon a student may involve either ontological/epistemological or psychological interactions. Many possibilities for future research are indicated.

phe, ats, nas (EL)

Sherin, Bruce Lawrence. (1996). *The symbolic basis of physical intuition: A study of two symbol systems in physics instruction* (University of California, Berkeley). DAI-A 57(09), p. 3879, 1997. [AAI9703278]

Study compared the use of two symbol systems, algebraic notation and programming languages, in physics instruction. A theoretical and empirical basis for understanding the use of symbol systems' effect on students' conceptualization is provided.

kns, lth, phy (SE)

Shields, Lynne Marie. (1996). *The differential effects of single student responding and write-on response cards on the on-task/disruptive classroom behaviors of elementary students at-risk for academic failure during whole class science instruction* (The Ohio State University). DAI-A 57(07), p. 2870, 1997. [AAI9639345]

A functional relationship was not demonstrated between the use of write-on response cards or single-student responding and the disruptive behaviors of academically at-risk elementary science students.

cid, ped, chs, ats (EL)

Shon, Mi. (1996). *Formative research on an instructional theory for the design of computer-based simulations for teaching causal principles* (Indiana University). DAI-A 57(12), p. 5124, 1997. [AAI9716499]

A theory for the design of computer-based simulations was empirically tested by observing and interviewing Korean high school students who worked with a

physics simulation. Observed strengths and weaknesses of the theory are discussed.

edt, asm. phy (HS)

Sirochman, Rudy Francis. (1996). *A quantitative/qualitative study of conceptual change in a college physics class* (Indiana University). DAI-A 57(07), p. 2955, 1997. [AAI9640138]

This research studied the bridge between the curriculum and its application to college physics. The Rasch Model of test item analysis, a factor analysis, and ANOVA were performed. Results include specific areas of the lab manuals that need revision and recommendations for effective Socratic dialoguing.

ccg, cur, lab. cid, phy (PS)

Slevinksy, Karen. (1996). *The School Achievement Indicators Program: 1988-1996* (University of Alberta). MAI 35(05), p. 1140, 1997. [AAIMM18222]

Study traced and described the chronological development of the national School Achievement Indicators Program from 1988 to 1996.

asm, ref, his (SE)

Smist, Julianne Marie. (1996). *Science self-efficacy, attributions and attitudes toward science among high school students* (The University of Connecticut). DAI-A 57(06), p. 2423, 1996. [AAI9634556]

This study examined a structural equation model which tested the relationships between aptitude, science self-efficacy, science attribution and attitudes toward science. Males showed more positive attitudes and were more open-minded than females but females had more positive attitudes about the normality of scientists.

chs, ats, gen. ach (SE)

Smith, Chad Stephen. (1996). *Evaluation and design of physics software* (University of Alabama in Huntsville). MAI 35(02), p. 0539, 1997. [AAI1382694]

Sample programs from different areas of computer software in physics are critiqued based on their usefulness and cost.

edt, asm, phy (HS)

Smith, Deborah Ann. (1996). *A meta-analysis of student outcomes attributable to the teaching of science as inquiry as compared to traditional methodology* (Temple University). DAI-A 57(06), p. 2424, 1996. [AAI9632097]

The question of science as inquiry as opposed to traditional methodology was quantitatively studied. It was found that inquiry methods increased students' mastery of science content, critical thinking and laboratory skills but not process skills.

inq, lrg, sks. lab (SE)

Smith, Denise Patricia. (1996). *The changing attitudes of students toward science after interaction with professional scientists* (Texas Woman's University). MAI 35(03), p. 0641, 1997. [AAI1382871]

Elementary students' attitudes about science were more positive after participating in hands-on science investigations where there was direct interaction with professional scientists.

ntw, ats, nas (EL)

Srisethanil, Chaisak. (1996). *Pedagogical framework for an engineering intelligent tutoring system* (Georgia Institute of Technology). DAI-B 57(07), p. 4579, 1997. [AAI9636314]

The advantages and disadvantages of the Intelligent Tutoring System in the education of engineering students is studied. The evaluation indicates usefulness to training of engineers and extension to other learning environments including the traditional classroom.

tec, kns, cbi. lrg (PS)

Stallings, Mark Anthony. (1996). *Enhancing an understanding of evolution: The influence of a diversified instructional strategy on high school biology students* (Kansas State University). DAI-A 57(11), p. 4641, 1997. [AAI9714357]

High school biology students (n=87) attending a rural school in North Georgia were tested for the effect of a diversified instructional strategy on their measured conceptual knowledge and/or acceptance of evolution.

ped, evo, ats. kns, nas (HS)

Starr, Mary L. (1996). *Elementary pre service teachers' use of content specific and general pedagogical strategies in science instruction* (The University of Michigan). DAI-A 57(03), p. 1102, 1996. [AAI9624735]

The content specific and general pedagogical strategies used by three pairs of first year preservice elementary teachers are described.

ped, tpd, knt, skt (TE)

Stephen, Sandra Lou. (1996). *A comparison of ACT mathematics and science assessment scores of male and female examinees with similar situations and*

aspirations (The University of Iowa). DAI-A 57(07), p. 2988, 1997. [AAI9640022]

Descriptive statistics were used to show that gender differences in ACT science and mathematics achievement can be reduced by as much as 50% when students are matched on ethnicity, family income, science and mathematics coursework, and intended college major.

gen, ach, bkg, chs, eth (HS)

Stevens, Marilyn H. (1996). *A survey of teaching methodologies grades K-8 in San Diego County, California* (Walden University). DAI-A 57(06), p. 2424, 1996. [AAI9633617]

A survey was used to determine which teaching methodologies and activities were being used and the amount of time spent on teaching science in grades K-8 during implementation of the Science Framework for California Public Schools in San Diego. Results showed a correlation between knowledge of the Framework and use of hands-on activities.

ref, ped, hos, knt (EL)

Stocker, Ann. (1996). *Teacher beliefs about the goals and objectives of an environmental studies center program. A cross-case analysis of teacher thinking about the development of responsible environmental behavior* (Florida Institute of Technology). DAI-A 57(06), p. 2424, 1996. [AAI9634639]

Study was a naturalistic inquiry of the explication of teachers' goals and objectives for an environmental studies center. It also compared teachers' thinking about these programs and the development of responsible environmental behavior. Findings revealed that teachers' thought processes were rich in perspectives concerning knowledge, awareness and behavior.

bft, ene, nfd, knt (EL)

Stratford, Steven Joseph. (1996). *Investigating processes and products of secondary science students using dynamic modeling software* (The University of Michigan). DAI-A 57(06), p. 2450, 1996. [AAI9635621]

This study qualitatively explores research questions related to processes and products of students creating dynamic models of stream ecosystems using learner-centered modeling software. It concludes that dynamic modeling is a viable classroom activity fostering engagement in cognitive strategies but more research is needed.

tec, ene, rem, lrg (SE)

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, 1996. [AAI9627568]

This study is a historical analysis of the significant events that led to the creation and evolution of the Texas Academy of Mathematics and Science (TAMS) from 1987 to 1992 and a description of the key individuals contributing to the development of the program.

his, cur (GEN)

Suparno, Paulus. (1996). *Conceptual change in probability and randomness of high school students using computer simulations* (Boston University). DAI-A 57(01), p. 0162, 1996. [AAI9613193]

Significant conceptual change occurred for high school students using computer simulation programs to study probability and randomness.

cbi, ccg (HS)

Taylor, Violette J. (1996). *The effect of computer simulations and experiments on sixth-grade students' learning in science* (Texas Woman's University). MAI 35(03), p. 0624, 1997. [AAI1382876]

Sixth-grade students increased their understanding of physical science concepts due to hands-on instruction and computer-assisted instruction.

cbi, hos, lrg (MS)

Thomas, Jeff Alan. (1996). *Analyzing factors affecting knowledge and defensibility of attitudes toward wetlands* (The University of Southern Mississippi). DAI-A 57(10), p. 4314 , 1997. [AAI9708977]

A statistically significant, positive relationship between students' knowledge of wetlands concepts and attitude defensibility toward wetlands issues was found after an intervention emphasizing field study.

fsd, kns, ats, ene (HS)

Thompson, Barry Richard. (1996). *The differentiation between attitudes toward science based upon plant studies and gender* (University of Virginia). DAI-A 57(10), p. 4314, 1997. [AAI9708550]

Hands-on experiments using seeds of fast-growing plants did not significantly improve the attitudes of rural seventh grade students toward science or botany. No significant difference between the attitudes of male and female students was found.

hos, ats, lab, gen, bio (SE)

Thrall, Debra Nalene. (1966). *Radon testing: A study of scitech and life science students' environmental knowledge and attitudes* (The University of New Mexico). DAI-A 57(10), p. 4314, 1997. [AAI9709807]

This study attempts to determine if exposure to an environmental activity such as radon testing has an effect on students' environmental knowledge and attitude. Results suggest no linear relationship between teaching of environmental knowledge and positive attitudes. Gender and age did seem to have a significant effect.

ene, ats, nfd, gen (SE)

Tiede, Katherine Doris. (1996). *Appropriating the discourse of science: A case study of a grade eight science class* (University of Toronto). DAI-A 58(06), p. 2041, 1997. [AAINN19037]

A longitudinal case study of one grade eight science classroom in a multilingual, inner-city school context is used to argue that Bakhtin's theory of language provides new perspectives on academic language learning.

cid, lth, mce, lrg (MS)

Tillotson, John Ward. (1996). *A study of the links between features of a science teacher preparation program and new teacher performance with regard to constructivist teaching* (The University of Iowa). DAI-A 57(12), p. 5121, 1997. [AAI9715205]

Collective case study examined the links between the University of Iowa UPSTEP program and the teaching attitudes of graduates as beginning science teachers. The outcome suggests that several of the program features were linked to constructivist teaching exhibited by the new teachers.

tpd, cns, ped, cht (TE)

Tinh, Vo Thih Hong. (1996). *An environmental approach to the general chemistry curriculum for basic science students in Ho Chi Minh City University* (Simon Fraser University). MAI 35(05), p. 1132, 1997. [AAIMM17160]

First-year students (n=48) in Vietnam studied general chemistry through an environmental, STS-suggested approach. The approach was shown to have a positive effect on students' interest and motivation toward studying chemistry, and on awareness of environmental issues.

sts, ats, kns, chc, ene (PS)

Tolley, Kimberly F. Higgins. (1996). *The science education of American girls, 1784-1932* (University of California, Berkeley). DAI-A 57(09), p. 3853, 1997. [AAI9703029]

In 1840, more girls than boys were studying science, but by 1932 the situation had completely turned around. How and why this shift occurred is the primary puzzle this study sought to solve.

gen, his, bkg (TE)

Tristan, Jayne A. (1996). *Dewey's theory of inquiry: Experimental logic* (Southern Illinois University at Carbondale). DAI-A 57(10), p. 4405, 1996. [AAI9708782]

Usefulness of Dewey's theory of inquiry in illuminating the pattern of scientific discovery while still accounting for objectivity of scientific truths in the methodological, effective, and relevant meanings of such terms is shown.

phe, nas, inq (GEN)

Tsai, Chin-Chung. (1996). *The interrelationships between junior high school students' scientific epistemological beliefs, learning environment preferences and their cognitive structure outcomes* (Columbia University Teachers College). DAI-A 57(07), p. 2955, 1997. [AAI9636044]

A qualitative study to explore the interrelationships between students' scientific epistemological beliefs, references for constructivist learning and cognitive structures with applications to improve science teaching. It was found that students with constructivist-oriented views recalled more information, showed more richness, and a higher precision of knowledge.

cns, kns, bfs, lrg (SE)

Tsai, Shuh-Wang Colin. (1996). *A study of science inservice needs of elementary teachers as perceived by teachers, principals and teacher educators* (The University of Iowa). DAI-A 57(05) p. 1997, 1996. [AAI9629730]

A survey was used to determine the inservice training needs of science teachers in public secondary schools in Bandung, Indonesia. The top ten needs were identified. They involved such things as delivering science instruction, content knowledge and student safety in laboratories.

tpd, bft, lab, knt (TE)

Uliana, Karla Ann. (1996). *An investigation of a community-based approach to environmental education: A*

case study (University of Guelph). MAI 34(05), p. 1732, 1996. [AAIMM08674]

Study of the effectiveness of a community approach to environmental education found six factors that influenced and promoted environmentally responsible behavior: depth of knowledge of issues, personal investment, knowledge of and skill in using environmental action strategies, internal locus of control, intent to act, and a community approach.

ene, cpl, nfd, chs (AD)

van den Berg, Ellen. (1996). *Effects of inservice education on implementation of elementary science* (Universiteit Twente). DAI-C 58(01), p. 0016, 1996. [AAIC537732]

Study of various effects of an inservice program on teachers' professional development. Inservice was aimed at introducing innovative curricular materials to enable teachers to implement a more constructivist approach to elementary science teaching.

tpd, cur, cns, bft (TE)

Varghese, Valsamma. (1996). *Visualization of stereochemistry: The comparison of computer-animated, hand-held and two-dimensional representations of molecular models* (The University of Oklahoma). DAI-B 57(11), p. 6958, 1997. [AAI9712663]

The effectiveness of three kinds of molecular representations on comprehension of stereochemical concepts was explored. Students in the computer animated group had higher scores on a test of understanding. No significant spatial ability or gender differences were found.

rem, cdt, lrg, gen (PS)

Venable, Margaret H. (1996). *The effects of a computer-based multimedia general chemistry laboratory manual on student attitudes and achievement as related to gender, ethnicity, self-confidence and knowledge of chemical terms* (Georgia State University). DAI-A 57(10), p. 4315, 1997. [AAI9710254]

Study results indicated that a computer-based multimedia general chemistry laboratory manual did appeal to students who are traditionally at increased risk of leaving science: minorities, females, and students with low self-confidence.

cbi, ats, che, gen, eth, chs (PS)

Verdel, Ellen Frances Olivia. (1996). *Collaborative learning and computer-based instruction in introductory chemistry* (The University of Texas at Austin). DAI-A 57(09), p. 3880, 1997. [AAI9705974]

Collaborative group work did not produce significantly higher achievement in university chemistry students, but did in some cases improve students' attitudes toward chemistry.

cpl, ach, ats, che (PS)

Verna, Marilyn Ann. (1996). *The relationship between the home environment and academic self-concepts on achievement of gifted high school students* (St. John's University). DAI-A 57(12), p. 5108, 1997. [AAI9717916]

The focus of this study was to determine the linkages among home environment and self-concepts on mathematics and science achievement. Results showed that prior ability played a major role in influencing educational achievement and suggest that parental communication and family processes are beneficial to educational growth.

bkg, chs, ach (SE)

Veronesi, Peter Dwight. (1996). *A case study of alternative assessment: Student, teacher, and observer perceptions in a ninth-grade biology classroom* (The University of Iowa). DAI-A 57(07), p. 2957, 1997. [AAI9640030]

Thi single-site phenomenological case study examined the perceptions of the researcher, one teacher, his stud ts, colleagues, and principal toward alternative assessment strategies and associated phenomena in a ninth grade biology classroom.

asm, bft, bfs, cur (HS, TE)

Viguie, Margaret Ann. (1966). *A study of the role of the California Science Implementation Network in increasing the use of "hands-on" science in elementary classrooms.* (University of La Verne). DAI-A 57(07), p. 2977, 1997. [AAI9639688]

This study examined the use of the California Science Implementation Network Level I Professional Development Program. The recommendations include: Providing training for staff, teachers and principals about how to integrate additional opportunities: collaboration and collegiality; and that schools spend time and money on helpful elements.

tpd, ntw, hos, bt (EL)

Wall, Betty Sue. (1996). *Discovery learning in kindergarten* (Texas Woman's University). MAI 35(03), p. 0626, 1997. [AAI1382879]

Kindergarten students who studied developmentally appropriate science concepts were able to communicate more effectively when "free exploration" time

was supplemented with a vocabulary lesson.

sks, cid, kns, hos (EC)

Waller, Patricia Letchko. (1996). *Gender representation in elementary science trade book visuals* (Lehigh University). DAI-A 57(05), p. 1997, 1996. [AAI9629385]

This study analyzed the visuals in children's science trade books identified as outstanding by the National Science Teachers Association in 1976 and 1993. Significant differences in the frequency and type of portrayal of males and females were found between content analysis categories within a single year and between years.

gen, mat (EL)

Wallin-Oittinen, Toini Matilda. (1996). *Is it possible to teach optimism? Quasi-experimental teaching experiment about the effect of two methods toward the attitude change in the teaching of biology and geography (Voiko myoenteisyyttae opettaa? Vertaileva tutkimus kahdan opetusmenetelmaen vaikutuksesta asenteiden muutokseen biologian ja maantiedon opetuksessa)* (Helsingin Yliopisto, Finland). DAI-C 58(01), p. 0010, 1997. [AAIC532155]

Written in the Finnish language, this study investigated the attitude change of 300 students toward the earth's situation and the future; natural resources; and nature conservation. The results showed that change occurred in all groups regardless of therapeutic methods used.

ene, ped, ats, bfs (SE)

Wang, Jia. (1996). *A multilevel modeling study of opportunity to learn (OTL) and science achievement* (University of California, Los Angeles). DAI-A 57(06), p. 2424, 1996. [AAI9632894]

This investigation focuses on the relationship between OTL and achievement of 623 eighth-graders. It was found that OTL variables were significant predictors of achievement even when students' general ability level, ethnicity and gender were controlled.

ach, gen, eth (MS)

Warren, Dawn Marie. (1996). *Student learning of science process and critical thinking skills in the Science I and Science II curriculum* (Texas Woman's University). MAI 35(03), p. 0641, 1997. [AAI1382880]

No significant difference in content knowledge was found between groups of students who were exposed to Science I before taking a Science II course and students who took a life science course before Science II. Significant differences in critical thinking and process skills were found between the groups.

int, kns, sks (SE)

Washington, Sandra L. (1996). *An historical study of Say Yes to a Youngster's Future(tm)a mathematics/science/technology enrichment program and its impact on selected elementary schools* (Texas Southern University). DAI-A 57(12), p. 5105, 1997. [AAI9716707]

This historical review of Say Yes to a Youngster's Future (tm) documents the program's growth, success, and impact on minority students.

his, cur, mce (EL)

Webb, Evelyn E. J. (1996). *The Meyers-Briggs type indicator and retention of students at the Mississippi School for Mathematics and Science* (The University of Southern Mississippi). DAI-A 57(07), p. 2958, 1997. [AAI9638556]

This is an analysis of the psychological make-up of the junior and senior student population and what effect it may have on the drop-out rate. Over the three year period no significant effect was found for any psychological type, race or gender.

chs, ach, eth, gen (SE)

Westerlund, Julie Fairbanks. (1996). *Reform and reality: A two-year study. Observations of Texas teachers on the Biology I End of Course Examination* (The University of Texas at Austin). DAI-A 58(01), p. 0126, 1997. [AAI9719516]

This study explored the perspectives of teachers towards the Texas Biology I End of Course Examination. Some of the major themes which emerged are: teacher confusion about the purpose, concerns about validity and alteration of the biology curriculum.

att, asm, ref, cur, bio (SE)

Whitson, Joseph David, Jr. (1996). *The relationship of videotaped laboratory presentations as advance organizers with attitudes toward science and academic success of community college students* (The University of Texas at Austin). DAI-A 57(06), p. 2339, 1996. [AAI9633327]

This quasi-experimental study investigated the relationship of videotaped laboratory presentations on learning chemistry. Results showed a high correlation between the use of videotape organizers and academic success.

che, lab, lrg, tec (PS)

Whittier, David Bryant. (1996). *Technology in two middle school classrooms: A case study* (Boston University). DAI-A 56(12), p. 4737, 1996. [AAI9609833]

Technology-based material on oceans was found to be successful at creating a dynamic learning environment in the middle school classroom. The technology played a significant role in presenting information, creating a simulation, and engaging students in role playing.

tec, cid, lrg, ped (MS)

Whittley, Ruby Sue. (1996). *Female science students' perceptions of self-esteem and the relationship of behavior in mixed gender cooperative learning groups* (Oregon State University). DAI-A 57(03), p. 1085, 1996. [AAI9623303]

Study found that females in mixed-gender cooperative learning groups were less openly critical of other students in groups than males were, and that females' self-esteem could be negatively affected by dominant male behavior.

gen, cpl, chs (SE)

Williams, Jennifer K. (1996). *The students have spoken, but are we listening? A study into students' perceptions of science* (Pacific Lutheran University). MAI 34(06), p. 2146, 1996. [AAI1380855]

Survey of seventh-grade students (n=156) found that a majority perceived science in "school-centered" terms and many were unable to make connections between what they learned in science class to their daily lives.

nas, bfs, lit (MS)

Williamson, Anne. (1996). *The Great Lakes Education Program: An in-depth evaluation of program impacts on fourth grade students* (Michigan State University). MAI 35(05), p. 1355, 1997. [AAI1385115]

Students who participated in the GLEP vessel experience (n=945) exhibited a highly significant increase in Great Lakes knowledge, significant increase in positive attitudes toward the Great Lakes (females), and no change in responsible behavioral intentions.

ats, kns, ene (EL)

Witiw, Michael Richard. (1996). *Integration of technology into the meteorology classroom: The effects of advance organizers on the success of basic aviation meteorology students* (Florida Institute of Technology). DAI-A 57(10), p. 4315, 1997. [AAI9706786]

The effectiveness of advance organizers presented through technology was investigated. Data from the experimental and control groups was analyzed by multiple analysis of covariance and follow-up univariate analysis of covariance. Conceptual knowledge seemed to be increased by technology. The need for future research was also indicated.

tec, ped, lrg, kns, esg (PS)

Wosilait, Karen. (1996). *Research as a guide for the development of tutorials to improve student understanding of geometrical and physical optics* (University of Washington). DAI-A 57(12) p. 5105, 1997. [AAI9716942]

Pretests, post-tests, individual demonstration interviews, informal observations and discussions with students were used to determine understanding of optics. Results guided the design of two tutorial materials which are effective in addressing student difficulties.

kns, alf, lrg, mat (SE)

Wu, Shezhang. (1996). *The impact of the microcomputer-based laboratory in learning physics concepts: A case study of the PSL* (Michigan State University). DAI-A 57(05), p. 2012, 1996. [AAI9631363]

This study qualitatively investigated the impact of microcomputer-based laboratory activities on physics learning for students at various levels. Results indicated that learning was enhanced and motivation was increased for students using the Personal Science Laboratory package.

cbi, lrg, ats, phy (SE, PS, TE)

Wu, Ya-Heng. (1996). *The standard curriculum of chemical technology education in five-year junior colleges in Taiwan, Republic of China* (University of Arkansas). DAI-A 57(08), p. 3384, 1997. [AAI9700377]

An examination of the chemical technology curriculum in Taiwan. Questionnaires were used and the data analyzed by ANOVA and Pearson's correlation coefficient.

cur, che, tec (PS)

Yamauchi, Jeffrey Scott. (1996). *The greening of American Zen: An historical overview and specific application* (Prescott College). MAI 35(03), p. 0639, 1997. [AAI1382790]

This thesis represents an exploration of the integration of Zen Buddhism and environmentalism. The viability of American Zen for addressing the environmental crisis is shown.

ene, his, phe (GEN)

Yan, Jean Weiqin. (1996). *Examining local item dependence effects in a large-scale science assessment by a Rasch partial credit model* (Michigan State University). DAI-A 58(01), p. 0142, 1997. [AAI9718914]

The purpose of this study was to investigate the local item dependence effects on testlets in the tryout version of the Michigan High School Proficiency Test in Science by the Rasch partial credit model.

asm, ref (HS)

Yarbrough, Rebecca Brink. (1996). *Family science night* (Texas Woman's University). MAI 35(03), p. 0641, 1997. [AAI1382881]

Parents' responses and attitudes toward an organized Family Science Night event were examined. Results showed that parents enjoyed the hands-on activities and wanted the program to continue.

nfd, hos, bkg (GEN)

Zembal, Carla Marie. (1996). *The emergence of preservice elementary teachers' science content representations* (The University of Michigan). DAI-A 57(03), p. 1085, 1996. [AAI9624773]

Study found that preservice teachers were able to develop multiple and accurate representations that related science content to children's everyday lives as a result of a two-year, specially-designed elementary preparation program.

tpd, ped, rem, knt (TE)

Zhang, Weijia. (1996). *Using multimedia to teach optics to college students* (The University of Nebraska - Lincoln). DAI-A 57(09), p. 3880, 1997. [AAI9703799]

Study was an investigation of students' understanding of optics, the development of multimedia activities and assessment of students' learning. The multimedia activities resulted in considerable improvement in students' understanding of optical concepts.

edt, kns, ccg, phy (PS)

Zint, Michaela Theresia. (1996). *Science education as a means for improving Great Lakes citizens' risk decision-making skills and predicting teachers' intention to incorporate risk education: A comparison of the theories of reasoned action, planned behavior and trying* (Michigan State University). DAI-A 57(09), p. 3880, 1997. [AAI9706591]

A mail questionnaire and follow-up telephone interview were used to assess the needs of science teachers with regard to incorporating risk and Great Lakes education. Effectiveness of theories of reasoned action, planned behavior and trying education were also used. Teachers were very interested in incorporating these items.

ped, cur, sts, tpd, ene (SE)

Zukoski, Ann Therese. (1996). *Initial misconceptions and change in misconceptions through traditional instruction, and their relationship to students' learning styles and achievement in first semester college physics* (University of Southern Mississippi). DAI-A 58(01), p. 0126, 1997. [AAI9718201]

An investigation of the relationship between misconceptions and change in misconceptions after traditional instruction. Interaction of achievement and sociological, physiological, and cognitive learning styles was also studied. A significant relationship between the Force Concept Inventory and final grade was found but no other significant relationships were found.

ccg, ach, lsy, ped, alf (PS)

Zydeck, Royaleanne Mancuso. (1996). *An activity based ecology unit integrated into eighth grade science curriculum* (Michigan State University). MAI 35(03), p. 0641, 1997. [AAI1383429]

An ecology unit was developed and implemented. Student achievement was measured. The results of student interviews showed a significant increase in understanding of human impact on the environment.

ene, cur, lrg (MS)

Dissertations by Institution

Acadia University
Forsythe

Arizona State University
Cavalier

Auburn University
Knight

Ball State University
Mendenhall; Rutledge

Boston College
Armstrong

Boston University
Coulter; Gama; Hakerem; Johow; Suparno; Whittier

Carleton University
Carty

Christopher Newport University
Nester

The Claremont Graduate School
Froebe

Clemson University
Krause

Columbia University Teachers College
Bischoff; Callaway; Espinoza; King; Kiviet; Laborde; McCoy; Runcie; Seminara; Tsai, C.

Dalhousie University
Harding

Drexel University
Hur

East Carolina University
Daniel; Dawkins

East Tennessee State University
Quinn

Florida Institute of Technology
Dreschel; Eryilmaz; Sager; Stocker; Witiw

Florida International University
Alonso

The Florida State University
Reyes-Herrera

Fordham University
Anyanechi; Cozza; O'Brien

Georgia Institute of Technology
Srisethanil

Georgia State University
McIlveene; Peiffer; Robinson; Venable

Gonzaga University
Crowley

Grand Valley State University
Maschewske

Harvard University
Colley; Eggers-Pierola; Jay

Helsingin Yliopisto
Kuitunen; Lavonen; Wallin-Oittinen

Idaho State University
Bauer; McDermott

Illinois State University
Franson; Morey

Indiana University
Owens; Nguyen; Shon; Sirochman

Iowa State University
Sanger

Kansas State University
Bolick; Schroeder, P.G.; Stallings

Lehigh University
Waller

The Louisiana State University and Agricultural and Mechanical College
Guruswamy; Melendez

McGill University
Salonius

Memorial University of Newfoundland
Eddy, L.

Miami University
Carnes; Damnjanovic; Grim; Riley

Michigan State University
Almuqate; Bronson; Castle; Cogan; Corlew; Coverdale; Dailey; Eicher; Fisher; Hazelwood; Hoekwater; Obielodan; Peasley; Rop; Williamson; Wu, S.; Yan; Zint; Zydeck

Middle Tennessee State University
Mauldin

National-Louis University
Pittman

New York University
Kos

North Carolina State University
Doolittle

Northern Arizona University
Klimbal; Mendoza

Northern Illinois University
Hillison; Olson, D. R.

Northwestern University
McGee

The Ohio State University
Chen, Chin-Chang; Good; Grener; Hensley; Miller; Shields

Ohio University
Gallaher

Oklahoma State University
Hardwick; Herman; Hildinger; Hunt

Oregon State University
Fan; Hale; Whittley

Pacific Lutheran University
Boyer; Rismiller; Williams

The Pennsylvania State University
Harry; Park; Popp

Prescott College
Yamauchi

Purdue University
Adams; Nagelhout

St. John's University
Cipriani-Sklar; Verna

Simon Fraser University
Davidge-Johnston; Hao; Lien; Tinh

Southern Illinois University at Carbondale
Tristan

Stanford University
Fontana; Helms; Midling; Moran; Petrides

State University of New York at Albany
Back

State University of New York at Buffalo
Hines; Karmazin; Ossei-Anto

Stockholms Universitet
Chen, X.

Syracuse University
Brophy

Temple University
Berman; Priestly; Rubin; Smith, D. A.

Texas A & M University
Hidy; Leeth; Lindenmeier; Powell

Texas Southern University
Washington

Texas Woman's University
Acker, Brown, L. M.; Burke; Cox; Edington; Green; Heath; Hinojos; Hinojosa; Jones, M. G.; Lerew; McDonnell; Nyman; Poe; Pratt; Riddile; Smith, D. P.; Taylor; Wall; Warren; Yarbrough

The Union Institute
Carey; Schefter
Universiteit Twente
van den Berg
The University of Alabama
Jones, R. L.
University of Alabama at Birmingham
Brown, J. E. P.
University of Alabama in Huntsville
Smith, C. S.
University of Alberta
Aherne; Delay; Kilian-Shrum; Ritter; Slevinsky
University of Arkansas
Wu, Y.
The University of British Columbia
Han; Lai
University of Calgary
Johnstone; Roessingh
University of California, Berkeley
Clark; Gutwill; Kindfield; Roberts; Sherin; Tolley
University of California, Davis
Kusnick
University of California, Los Angeles
Wang, J.
University of California, Riverside
De Miranda
University of Cincinnati
Chekuri; Prather
University of Colorado at Boulder
Davis; Larson
The University of Connecticut
Smist
The University of Dayton
Henry
University of Denver
Pinkerton, K. D.
University of Florida
Donnelly
University of Georgia
Deru; Pitman
University of Guelph
Uliana
University of Hartford
Fritz
University of Hawaii
Brennan
University of Houston
Cisneros; Ramirez
University of Illinois at Urbana-Champaign
Caldwell; De Coste; Erdosne Toth; Frazier; Langley; Schroeder, M. W.
The University of Iowa
Alexandra; Keng; Monhardt; Olson, E. A.; Serianz; Stephen; Tillotson; Tsai, S.; Veronesi
University of Kentucky
Gilmore
University of La Verne
Keen; Nelson; Viguie
University of Lowell
Duffy; Forawi
The University of Manitoba
Cuthbert; Diduck; Kristjanson; Rivard
University of Maryland College Park
Kelly; Keyser; Martof; Musial
University of Massachusetts
Habib; Koscher; Monaghan
The University of Memphis
Pinkerton, J.
The University of Michigan
Antony; Boylan; Crawford; Starr; Stratford; Zembal
University of Missouri - Columbia
Passmore; Plummer
University of Montana
Monroe
The University of Nebraska - Lincoln
Crowther; Duff; Koba; Liu; Schinzel; Zhang
The University of New Mexico
Thrall
The University of North Dakota
Johnson, M. A.; Schroeder, L. A.
University of North Texas
Stride
University of Northern Colorado
Baxter; Lekhavat
University of Northern Iowa
Chen, Chang-Cheng
The University of Oklahoma
Gerber; Varghese
University of Pittsburgh
Eddy, R. M.; Larreamendy-Joerns; Levitt; Mahyoub
The University of Regina
Bailey
The University of Rochester
Perez
University of South Carolina
George
University of South Florida
Miller-Shaivitz
University of Southampton
Koker; Ratcliffe
University of Southern California
Alters; Anukam; Belongia; Kennedy
The University of Southern Mississippi
Molsbee; Thomas; Webb; Zukoski
The University of Tennessee
Blough
The University of Texas at Austin
Barrett; Bissett; Byrd; Chang; Chiu; Filkins; Hua; Ogorzaly; Verdel; Westerlund; Whitson
University of Toronto
Barnett; Lang; Tiede
The University of Utah
McCormick
University of Victoria
Holden
University of Virginia
Klein; Kuhla; Matkins; Thompson
University of Washington
Byrne; Wosilait
The University of Western Ontario
Ross
The University of Wisconsin - Madison
Greene; Johnson, S. K.
Utah State University
Eide
Virginia Polytechnic Institute and State University
Heric; Lee; Lucena; McClure; McKenzie
Walden University
Downing; Gork; Stevens
West Virginia University
Ditty; McEwen; Meadows
Western Michigan University
Brewer

Research Articles Published in 1996

John R. Mascazine, *The Ohio State University*

This section lists 215 articles in science education research that were published in 1996. Each entry is coded (see Key to Codes) with one to three major codes (in bold type) and up to three minor codes, as well as the grade level (in parentheses). Studies related to preservice or inservice teacher education are indicated by the the code for "teacher professional development" (tpd). The level designation that accompanies the teacher professional development varies, depending on the focus of the research. A general code, "TE," is used if the research focuses strictly on issues related to teacher educatio, but a second level code is added when appropriate to indicate the grade level(s) at which the intern or teacher participants teach. All entries are indexed by major codes at the end of the volume (see page 149). A list of the journals searched and the number of articles included from each is included at the end of this section (page 129).

Abimbola, Isaac Olakanmi; Baba, Salihu. (1996). Misconceptions and alternative conceptions in science textbooks: The role of teachers as filters. *American Biology Teacher*, 58(1), 14-19.

Analyzes a senior secondary biology textbook in Nigeria, STAN Biology, for its misconceptions and alternative conceptions. Discusses how the classroom teacher might filter the conceptual problems before they are presented to students as knowledge.

mat, bio, alf, ccg (SE)

Ahiakwo, M. J. (1996). An investigation into public perception and knowledge of science and technology in Nigeria. *Journal of Science Education and Technology*, 5(2), 155-59.

Examines the perception and knowledge of 205 adults regarding issues related to science and technology. Results indicate that some adults are not well informed about science and technology, major differences exist among respondents on the basis of gender, and there exists a lack of knowledge about certain aspects of elementary science.

sts, tec, lit, gen, alf (AD)

Alexopoulou, Evinella; Driver, Rosalind. (1996). Small-group discussion in physics: Peer interaction modes in pairs and fours. *Journal of Research in Science Teaching*, 33(10), 1099-1114.

Investigates how Greek secondary school students interacted in pairs and fours while discussing and attempting to explain physical phenomena. Results indicate that students progressed significantly more in their physics reasoning after participation in fours than in pairs.

cpl, ccg, cid, phy (SE)

Appleton, Ken; Asoko, Hilary. (1996). A case study of a teacher's progress toward using a constructivist view of learning to inform teaching in elementary science. *Science Education*, 80(2), 165-80.

Describes the extent to which an elementary teacher used teaching principles based on constructivism after attending an inservice program. Use of the new principles was influenced by his views of science and of learning, how he usually planned his teaching, and his confidence in his own understanding of the topic.

cns, tpd, ped, bft, phe, cht (EL, TE)

Appleton, Ken; Symington, David. (1996). Changes in primary science over the past decade: Implications for the research community. *Research in Science Education*, 26(3), 299-316.

Describes a study which identifies what were considered new directions for science teaching and research in 1984 and compares those with actual developments. Considers possible future directions for research. One key implication is the need for more collaboration.

ref, res, ntw (EL)

Arnold, Michael; Millar, Robin. (1996). Learning the scientific "story": A case study in the teaching and learning of elementary thermodynamics. *Science Education*, 80(3), 249-81.

Describes and discusses an approach to teaching elementary thermodynamics which focuses on promoting and consolidating conceptual change in the classroom toward the accepted scientific view. Reports that this approach enabled a significant proportion of the student group involved to demonstrate understanding of the key ideas.

ccg, ped, phy, lrg (SE)

Atwater, Mary M. (1996). Teacher education and multicultural education: Implications for science education research. *Journal of Science Teacher Education*, 7(1), 1-21.

Article reviews research and theoretical perspectives in teacher education and multicultural education, and gives recommendations for how the two should overlap. Directions for future research in multicultural teacher education are also considered.

res, mce, tpd (TE)

Atwood, Ronald K.; Atwood, Virginia A. (1996). Preservice elementary teachers' conceptions of the causes of seasons. *Journal of Research in Science Teaching*, 33(5), 553-63.

Investigates 49 preservice elementary teachers' conceptions of what causes the seasons using both a written procedure and a procedure that used models with verbal explanations. Results suggest that preservice elementary teachers are likely to show a high frequency of alternative conceptions.

alf, knt, esg (TE)

Audet, Richard H.; et al. (1996). Learning logs: A classroom practice for enhancing scientific sense making. *Journal of Research in Science Teaching*, 33(2), 205-22.

Describes a case study of an advanced physics class that analyzes the implications of using computerized journalizing. Reports that this technique provides a vehicle for students and teachers to make their knowledge public, builds an atmosphere for valuing the conceptual understanding of others.

tec, ped, kns, phy (HS)

Baird, John R.; Penna, Chris. (1996). Challenge in learning and teaching science. *Research in Science Education*, 26(3), 257-69.

Explores the nature and extent of perceived challenge in learning and teaching science. Teachers (n=7) and students (n=37) in five secondary schools were the subjects of this study. Findings suggest that many students and teachers are unchallenged by science in school.

bfs, bft, cur, ref (HS)

Barman, Charles R.; Ostlund, Karen L. (1996). A protocol to investigate students' perceptions about scientists and relevancy of science to students' daily lives. *Science Education International*, 7(4), 16-21.

Explores the current images that students have of scientists, student perceptions of science study in school, and student awareness of their use of science outside of school. Fifth grade students (n=117) were the subjects of this study that asked students to sketch scientists and school science.

bfs, nas, ats (EL)

Barrow, Lloyd; Haskins, Sandra. (1996). Earthquake knowledge and experiences of introductory geology students. *Journal of College Science Teaching*, 26(2), 143-46.

Explores introductory geology students' (n=186) understanding of earthquakes. Results indicate that: (1) the mass media seem to provide students greater details about the cause and impact than the actual experience itself; (2) students lack a broad understanding about plate tectonics; (3) introductory geology students have extensive misconceptions about earthquakes.

esg, kns, alf (PS)

Battle, Robyn; Hawkins, Isabel. (1996). A study of emerging teacher practices in internet-based lesson plan development. *Journal of Science Education and Technology*, 5(4), 321-42.

Discusses the design of an Internet-based lesson plan development project. Examines strategies teachers used and their effect on lesson plan design, information gathering, and organization.

tec, ped, skt (K-12)

Beasley, Warren. (1996). Reforming the visions of high school chemistry: A perspective from "Down Under." *Journal of Chemical Education*, 73(4), 344-46.

Analyzes two initiatives in Australian education that have attempted to influence the future directions of high school chemistry curricula: the concept of a national curriculum encompassing eight key learning areas and the reform processes of individual state governments.

ref, cur, che (HS)

Bezzi, Alfredo. (1996). Use of repertory grids in facilitating knowledge construction and reconstruction in geology. *Journal of Research in Science Teaching*, 33(2), 179-204.

Describes a case study of the social construction of knowledge when undergraduate students are engaged in collaborative analysis of repertory grids produced by themselves and their instructor. Results indicate that this approach motivates students to be responsible for their own learning.

cns, cpl, ats, ped, esg (PS)

Bieniawski, Z.T.; Bieniawski, Stefan R. (1996). Curriculum initiatives in the United States, Germany and Japan for world-class education in the 21st century. *Bulletin of Science, Technology and Society*, 16(4), 189-96.

Summarizes a research study performed to assess curriculum changes in engineering education. Discusses the implications of the various curriculum strategies and initiatives and identifies the necessary socio-technological ingredients for world-class education of engineers.

cur, cul, ref, car (PS)

Blank, Rolf K. (1996). How are state curriculum frameworks in science changing across the states? *NASSP Bulletin*, 80(577), 16-23.

Many states are creating new curriculum frameworks as a strategy for improving science education. This article shows how these frameworks are organizing and presenting recommendations on science content. A recent Council of Chief State School Officers report analyzes related aspects, such as content/policy linkages on assessment, teacher education, and materials selection.

ref, cur, tpd, mat (HS)

Bleicher, Robert E. (1996). High school students learning science in university research laboratories. *Journal of Research in Science Teaching*, 33(10), 1115-33.

Presents a case study of a high school student working as an apprentice in a university research laboratory. Examines communication between mentors and students and how it constrained or supported learning.

ntw, lab, cid, lrg (SE)

Bol, Linda; Strage, Amy. (1996). The contradiction between teachers' instructional goals and their assessment practices in high school biology courses. *Science Education*, 80(2), 145-63.

Examined the correspondence between teachers' student learning outcome goals and teachers' assessment practices of high school biology teachers (n=10) using interviews. Their assessment practices did not support their goals for students of developing higher order study skills.

asm, bio, lrg, sks (HS)

Borun, Minda; et al. (1996). Families are learning in science museums. *Curator*, 39(2), 123-38.

Reports on a study designed to identify and measure family learning in science museums. Findings indicate that families do learn from exhibits and the level of learning is related to specific observed behaviors. Grouping these behaviors as performance indicators provides a useful measure of exhibit learning.

nfd, bkg, lrg (GEN)

Boylan, Colin. (1996). Quality teaching, relevant content: Catering for all. *Australian Science Teachers Journal*, 42(1), 59-62.

Reports on the stated preferences of first year high school students (n=499) about a range of science topics. Analyses of responses indicate that some topics were selected equally by boys and girls while other topics were selected predominantly by girls.

gen, cur, ats (HS)

Bradford Cristine S.; Dana, Thomas M. (1996). Exploring science teacher metaphorical thinking: A case study of a high school science teacher. *Journal of Science Teacher Education*, 7(3), 197-211.

Interviews and observations of a high school science teacher determined a high level of confidence and self-efficacy; concern for students; and conflicting perceptions about what it means to be a good science teacher. The primary conflict in perception was between teacher-as-facilitator and teacher-as-student-controller. Implications for teacher education are discussed.

bft, cht, skt, tpd, ped (TE)

Brewer, Steve. (1996). A problem-solving approach to the teaching of evolution. *Bioscience*, 22(2), 11-17.

Describes a research program that provides insight into the nature of phylogenetic problems and problem-solving methods and how these might be applied to teaching evolution. Contains a new description of the nature of phylogenetic problems and factors contributing to their difficulty.

evo, pbs, ped, bio (PS)

Briscoe, Carol; Stout, David. (1996). Integrating math and science through problem-centered learning in methods courses: Effects on prospective teachers' understanding of problem solving. *Journal of Elementary Science Education*, 8(2), 66-87.

Reports on the views on problem-solving developed by prospective elementary teachers as a result of experiencing problem-centered learning in an integrated math-science methods course.

pbs, int, bft, tpd (TE)

Brody, Michael J. (1996). An assessment of 4th-, 8th-, and 11th-grade students' environmental science knowledge related to Oregon's marine resources. *Journal of Environmental Education*, 27(3), 21-27.

Assesses the understanding that a sample of Oregon public school students (n=159) had of geology, physical and chemical characteristics, ecology and natural resources as related to a marine environment.

alf, kns, esg, bio (K-12)

Brooke, Helen; Solomon, Joan. (1996). Hands-on, brains-on: Playing and learning in an interactive science center. *Primary Science Review*, (44), 14-16.

Investigates whether children who visited an interactive science center were simply playing or whether they were learning as they played. Concludes that to maximize the benefit of such a visit, children need both preparation and follow-up activities.

nfd, lrg, ped (EL)

Bunderson, Eileen D.; Anderson, Tamigene. (1996). Preservice elementary teachers' attitudes toward their past experience with science fairs. *School Science and Mathematics*, 96(7), 371-77.

Explores the experiences of preservice elementary teachers with science fairs, attitudes resulting from their participation in science fairs as students, and the importance of these past histories for their students.

att, bkg, cur (EL)

Bunderson, Eileen D.; Bunderson, C. Victor. (1996). Implications of teachers' recollections of topics selected by boys and girls for science fair projects. *Journal of Elementary Science Education*, 8(2), 21-31.

Analyzes science fair choices of 2149 students for diversity of topics and scientific merit and matches them with teachers' recollections of topics thought most likely to be chosen. Reports that teachers recollections of topics seldom matched students' choices.

ats, bft, cur (EL)

Burnett, John; et al. (1996). Small group behavior in a novel field environment: Senior science students visit a marine theme park. *Australian Science Teachers Journal*, 42(4), 59-64.

Proposes a model for conceptualizing changes in novelty experienced by students in informal settings. Presents a case study and discusses patterns of verbal and non-verbal student behavior with reference to the level of novelty experienced. Reports that student behavior was found to vary with changes in the level of novelty experienced.

nfd, cid, ats (SE)

Cannon, John R.; Scharmann, Lawrence C. (1996). Influence of a cooperative early field experience on preservice elementary teachers' science self-efficacy. *Science Education*, 80(4), 419-36.

Interviews and surveys (n=120) using the Science Teaching Efficacy Beliefs Inventory of preservice elementary teachers' science teaching self-efficacy before and after planning and teaching a cooperative elementary science lesson at a local public school found evidence that early cooperative field experience had a positive influence science teaching self-efficacy.

cht, cpl, ped, tpd (TE)

Carlisle, Joanne F.; Chang, Victor. (1996). Evaluation of academic capabilities in science by students with and without learning disabilities and their teachers. *Journal of Special Education*, 30(1), 18-34.

Two cohorts of students with and without learning disabilities were followed for three years, and they and their teachers annually rated their capabilities and efforts in science. Some age differences in student self-evaluation were found. Comparison of student and teacher ratings suggests that teachers often have higher expectations for students than students have for themselves.

ats, att, chs (MS)

Cavallo, Ann M.L. (1996). Meaningful learning, reasoning ability, and students' understanding and problem solving of topics in genetics. *Journal of Research in Science Teaching*, 33(6), 625-56.

Explores relationships among school students' (n=189) meaningful learning orientation, reasoning ability and acquisition of meaningful understandings of genetics topics, and ability to solve genetics problems.

pbs, kns, lth (SE)

Chan, Kara K.W. (1996). Environmental attitudes and behavior of secondary school students in Hong Kong. *Environmentalist*, 16(4), 297-306.

Describes an investigation into the environmental attitudes of students in Hong Kong and their readiness to engage in pro-environmental behavior that could involve change in personal lifestyle. Students' over-optimism towards technological development and the perceived importance of the benefits of modern

consumer goods were major factors that contradicted their concern for the environment. Gender was also significant.

ene, ats, tec, gen (HS)

Choi, Jung-Suk; Song, Jinwoong. (1996). Students' preferences for different contexts for learning science. *Research in Science Education*, 26(3), 341-52.

Provides the results of a survey administered to high school students (n=379) in which they select the most and least preferred learning situations out of six. Results indicate that student preferences are largely influenced by their perceptions of the relevance and the psychological effects of contexts.

ats, lsy, lrg, bfs (HS)

Christidou, Vasilia; Koulaidis, Vasilis. (1996). Children's models of the ozone layer and ozone depletion. *Research in Science Education*, 26(4), 421-36.

The views of 40 primary students on ozone and its depletion were recorded through individual, semi-structured interviews. The data analysis resulted in the formation of a limited number of models concerning the distribution and role of ozone in the atmosphere, the depletion process, and the consequences of ozone depletion.

alf, kns (EC)

Clark, Margaret R. (1996). A successful university-school district partnership to help San Francisco's K-12 students learn about science and medicine. *Academic Medicine*, 71(9), 950-56.

The Science and Health Education Partnership was established in 1987 at the University of California, San Francisco, to support local school district efforts to improve science education. Components include instructional assistance to teachers and direct work with students. Emphasis has evolved from helping teachers and students to supporting systemic change. Lessons learned and advice for creation of new partnerships are discussed.

ntw, tpd (K-12)

Clarke, Valerie A.; Teague, G. Joy. (1996). Characterizations of computing careers: Students and professionals disagree. *Computers & Education*, 26(4), 241-46.

Researchers studying attitudes toward computer careers interviewed 68 students in a university computer science course, 33 secondary school girls, and 19 women working professionally in computer-based careers. Both groups of students tended to stereotype computer-related careers as menial, isolating, and overly technical; this view differed sharply from positive attributes highlighted by the professionals.

car, ats, gen, tec (HS, PS)

Clerc, Jeanne. (1996). Teaching laboratory safety: A case study. *Journal of College Science Teaching*, 15(5), 337-40.

Presents a case study of an unsafe situation in a science laboratory and its administrative consequences. Discusses issues related to laboratory safety and faculty evaluation.

lab, tpd (TE)

Collins, Michael A.J. (1996). A successful experiment with an electronic bulletin board in a large class. *Journal of College Science Teaching*, 26(3), 189-91.

Describes an approach that uses an electronic bulletin board in a large class to promote cooperation and interactivity among students both inside and outside the classroom. Concludes that this approach facilitated student-student and student-professor interactions.

cbi, ats, ntw, ped, cpl (PS)

Cooper, Geoff. (1996). Assessing the value of outdoor and environmental education programmes provided by residential centres. *Environmental Education*, 52(3), 23-25.

Assesses the value of residential outdoor education programs through questionnaires and letters from teachers using two local education authority outdoor centers. Results indicate that residential outdoor experiences encourage success through increased motivation and confidence.

ene, fsd, nfd, ats, chs (K-12)

Corral-Verdugo, Victor; et al. (1996). Predictors of environmental critical thinking: A study of Mexican children. *Journal of Environmental Education*, 27(4), 23-27.

Questionnaires given to Mexican elementary students (n=60) revealed that the use of teaching strategies (exposition, examples, feedback, and positive reinforcement), the possession of pro-environmental competencies, and the exhibition of academic skills were significant determinants of the ability to distinguish environmental facts from opinions.

kns, ped, sks, ene (EL)

Cottle, Paul D.; Hart, Gerald E. (1996). Cooperative learning in the tutorials of a large lecture physics class. *Research in Science Education*, 26(2), 219-31.

Evaluates the introduction of in-class cooperative learning in a large lecture college physics sequence. Results indicate that cooperative learning sessions helped the students achieve at a higher level than expected.

cpl, ach, ped, phy (PS)

Czerniak, Charlene M.; Lumpe, Andrew T. (1996). Relationship between teacher beliefs and science education reform. *Journal of Science Teacher Education*, 7(4), 247-266.

Science teachers' (n=168) beliefs about reforms and degree of implementation of reforms were measured. Teachers believed that most reform strands were "necessary" or "very necessary" to be an effective science teacher; however, 81% of respondents felt that constructivism was "not very necessary" or "unnecessary," and used constructivist teaching practices less than once per week.

ref, bft, att, cns (TE)

Czerniak, Charlene M.; Lumpe, Andrew T. (1996). Predictors of science fair participation using the theory of planned behavior. *School Science and Mathematics*, 96(7), 355-61.

Uses the Theory of Planned Behavior to examine factors that predict junior high and secondary students' (n=303) attitudes toward participating in district science fair competitions, beliefs about who would approve or disapprove of participation, and perceptions of control.

ats, bfs, cur (SE)

Davis, Nancy T. (1996). Looking in the mirror: Teachers' use of autobiography and action research to improve practice. *Research in Science Education*, 26(1), 23-32.

Uses teachers' autobiographies and action research as data sources to present an argument for valuing subjective, reflective knowledge based on Habermas' category of cognitive interest of emancipatory knowing. Explores the process of personal empowerment.

knt, bkg, eqt, cht (TE)

Demastes, Sherry S.; et al. (1996). Patterns of conceptual change in evolution. *Journal of Research in Science Teaching*, 33(4), 407-31.

Investigates the patterns of students' conceptual restructuring within the theoretical framework of biologic evolution. Results indicate that many conceptions in this content are closely interwoven, so that a change in one conception requires a change in many others.

evo, ccg, bio (HS)

Di Stefano, R. (1996). Preliminary IUPP results: Student reactions to in-class demonstrations and to the presentation of coherent themes. *American Journal of Physics*, 64(1), 58-68.

Presents the results of the evaluation of the Introductory University Physics Project (IUPP). Evaluation data from four model curricula indicate that students perceive demonstrations as beneficial to learning.

ped, lrg, bfs, phy (PS)

Didion, Catherine Jay. (1996). Motivating women students. *Journal of College Science Teaching*, 25(6), 439.

Discusses the results of a study that examined the factors that influenced women science undergraduates to pursue and remain in scientific careers and demonstrated the critical role the faculty play in students' decisions.

car, gen, bkg (PS)

Dlamini, Betty; et al. (1996). Liked and disliked learning activities: Responses of Swazi students to science materials with a technological approach. *Research in Science and Technological Education*, 14(2), 221-35.

Reports on the impact of the introduction of science materials with a technological approach in some junior secondary classes in Swaziland. Results indicate that contextualized activities are highly appreciated and are capable of maintaining girls' interest.

tec, int, ats, gen, eth (SE)

Doerr, Helen M. (1996). Integrating the study of trigonometry, vectors, and force through modeling. *School Science and Mathematics*, 96(8), 407-18.

Investigates the construction of understanding of the motion of an object down an inclined plane which takes place through the process of model building in an integrated algebra, trigonometry, and physics class. Discusses four major themes related to student learning through modeling.

cns, rem, lrg, int, lth (SE)

Dove, Jane. (1996). Student teacher understanding of the greenhouse effect, ozone layer depletion, and acid rain. *Environmental Education Research*, 2(1), 89-100.

Describes the results of a survey designed to ascertain details of student teachers' knowledge and misconceptions about the greenhouse effect, acid rain, and ozone layer depletion. Results indicate familiarity with the issues but little understanding of the concepts involved.

knt, alf, ene (TE)

Downing, Jan E.; Gifford, Vernon. (1996). An investigation of preservice teachers' science process skills and questioning strategies used during a demonstration science discovery lesson. *Journal of Elementary Science Education*, 8(1), 64-75.

Investigates preservice elementary teachers' science process skills and the questioning strategies used during a discovery science lesson. Results indicate that subjects with a high level of competency in the science process skills asked significantly more questions and demonstrated an increased use of divergent, high-level questions in their teaching performance.

skt, inq, ped, tpd (TE)

Duch, Barbara J. (1996). Problem-based learning in physics: The power of students teaching students. *Journal of College Science Teaching*, 15(5), 326-29.

Describes an honors general physics course designed to demonstrate to students that physics is vital to their understanding of physiology, medicine, the human body, rehabilitation, and other health fields. Presents evidence that indicates that active group learning and connections to real-world applications help students learn and apply physics.

pbs, ped, int, cpl, sts, lrg (PS)

Duggan, Sandra; et al. (1996). A critical point in investigative work: Defining variables. *Journal of Research in Science Teaching*, 33(5), 461-74.

Reports research concerning the definition of variables by pupils aged 12 to 14 during investigative work. Findings suggest that an increase in the complexity of an investigation lowers the ability to identify relevant variables and substantive concepts.

pbs, sks, cur, lab, ped (SE)

Ebenezer, Jazlin V.; Erickson, Gaalen L. (1996). Chemistry students' conceptions of solubility: A phenomenography. *Science Education*, 80(2), 181-201.

Conceptions of grade 11 chemistry students (n=13) via interviews were grouped into six categories related to students' preferred explanations for solubility phenomena. Argues that an understanding of the typical conceptions used by students should form an integral component of chemistry teaching.

che, alf, ccg, ped (HS)

Everett, Kenneth G.; et al. (1996). Women in the ranks: Faculty trends in the ACS-approved departments. *Journal of Chemical Education*, 73(2), 139-41.

Analyzes the faculty rank situation of women at schools with departments approved by the American Chemical Society (ACS). Reports a leveling off in the proportion of women entering chemistry faculties and of those at the department head level.

gen, car, che (PS)

Fawns, Rod; Salder, Jo. (1996). Managing students' learning in classrooms: Reframing classroom research. *Research in Science Education*, 26(2), 205-17.

Analyzes Australian students' public and private statements to themselves and their peers collected in the course of a multi-year study of teacher management of communication in cooperative learning groups. Data reflect how students perceived and responded to subtle features in the public enactment of the curriculum, the task, and the setting during the ongoing lesson.

cpl, cid, ats, cur (SE)

Fedock, Patricia M.; et al. (1996). The professional development of college science professors as science teacher educators. *Science Education*, 80(1), 5-19.

Qualitatively examines the development of four community college science professors as science educators while they prepared and taught a summer life science academy for K-12 teachers. Reports that the professors came to see their traditional lecture/lab approach to science education as inadequate with regard to most students.

tpd, ped, bft (PS)

Felder, Richard M. (1996). Active-inductive-cooperative learning: An instructional model for chemistry? *Journal of Chemical Education*, 73(9), 832-36.

Describes a sequence of five experimental courses in chemical engineering that are designed to meet the

needs of students with various learning styles. The courses use a variety of teaching methods and are designed to develop and enhance creative problem-solving. lsy,

cur, ped, pbs (PS)

Feldman, Allan. (1996). Enhancing the practice of physics teachers: Mechanisms for the generation and sharing of knowledge and understanding in collaborative action research. *Journal of Research in Science Teaching*, 33(5), 513-40.

Examines ways that teachers' knowledge about teaching and their educational situations grow when they are engaged collaboratively with other teachers in inquiry on their own practice.

knt, ntw, tpd, phy (HS)

Ferry, Brian. (1996). Probing personal knowledge: The use of a computer-based tool to help preservice teachers map subject matter knowledge. *Research in Science Education*, 26(2), 233-45.

Reports on the use of a HyperCard-based tool by preservice teachers to create and modify concept maps about science related subject matter. Data gathered from interviews, journals, and concept maps indicate that the concept mapping tool was easy to use and allowed teachers to better organize their cognitive frameworks.

edt, att, knt (TE)

Ferry, Brian. (1996). Probing understanding: The use of a computer-based tool to help preservice teachers map concepts. *Journal of Science Teacher Education*, 7(4), 283-293.

Preservice teachers used a computer program to create concept maps of astronomy topics. Such practices could help teachers identify areas of inadequate content knowledge. The author recommends further research on whether preservice teachers will be motivated to acquire more content knowledge when they are made aware of their alternative frameworks.

knt, alf, edt, tpd (TE)

Fien, John; Rawling, Richard. (1996). Reflective practice: A case study of professional development for environmental education. *Journal of Environmental Education*, 27(3),

11-20. Presents a case study of a professional development program in environmental education concerned with the education of reflective practitioners. Results indicate that students who develop their reflective practice skills benefit from heightened political awareness.

ene, tpd, skt, sts, knt (TE)

Finkel, Elizabeth A. (1996). Making sense of genetics: Students' knowledge use during problem solving in a high school genetics class. *Journal of Research in Science Teaching*, 33(4), 345-68.

Examines ways in which students collaborate to construct, use, and revise conceptual and strategic knowledge as they solve complex genetics problems. Concludes that students used three types of knowledge during model revision: knowledge of genetics, knowledge of the process of model revision, and knowledge of their own problem solving strategies.

pbs, cpl, cns, rem (SE)

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

Investigates 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.

bfs, nas, eqt, car (HS)

Fleer, Marilyn. (1996). Fusing the boundaries between home and child care to support children's scientific learning. *Research in Science Education*, 26(2), 143-54.

Reports on a study that investigated the impact of a science teaching and learning program on families of children attending an Australian child care center. Findings show that science-based discussions in family contexts were common during the program and that parents gained greater insights into specific aspects of their child's learning.

nfd, lrg, bkg (EC)

Flick, Lawrence B. (1996). Understanding a generative learning model of instruction: A case study of elementary teacher planning. *Journal of Science Teacher Education*, 7(2), 95-122.

Elementary teachers were taught to plan for science lessons using a generative learning model of instruction. Analysis of teachers' conversations during the planning revealed that teachers recognized three theoretical points of conflict between generative

learning and instructional process models. Implications for science teacher education are discussed.

lth, ped, tpd, **asm, hos, cur (TE, EL)**

Galili, Igal; Kaplan, Dov. (1996). Students' operations with the weight concept. *Science Education*, 80(4), 457-87.

Analyzed operational knowledge of the weight concept of high school students after two educational levels: introductory and advanced physics. Results showed that apparent and true weight concepts are poorly assimilated by most of the advanced placement students.

kns, alf, ccg, phy (HS)

Gambro, John S.; Switzky, Harvey N. (1996). A national survey of high school students' environmental knowledge. *Journal of Environmental Education*, 27(3), 28-33.

Analyzes environmental knowledge of high school students using a national probability sample. Indicates that students can recognize basic facts regarding environmental issues but are unable to apply this knowledge.

ene, lit, sks, sts (HS)

Germann, Paul J.; et al. (1996). Identifying patterns and relationships among the responses of seventh-grade students to the science process skill of designing experiments. *Journal of Research in Science Teaching*, 33(1), 79-99.

Uses the Science Process Skills ventory (SPSI) to analyze student efforts at writing experimental designs. Results indicate that explicit, incremental development of the science process skills of formulating hypotheses and identifying variables may be a means to facilitate student success in designing science experiments.

sks, pbs, ped (MS)

Germann, Paul J.; et al. (1996). Comparing features of seven high school biology laboratory manuals. *American Biology Teacher*, 58(2), 78-84.

Compares a broad cross section of high school biology laboratory manuals with respect to several standard features as well as the degree to which they engage students in scientific inquiry. Makes comparisons with respect to topics contained in the manuals, types of activities, lab exercises.

inq, lab, mat, bio (SE)

Germann, Paul J.; et al. (1996). Analysis of nine high school biology laboratory manuals: Promoting scientific inquiry. *Journal of Research in Science Teaching*, 33(5), 475-99.

Analyzes nine high school biology manuals to determine how well they promote the basic and integrated science process skills that are involved in scientific inquiry. Results indicate that the manuals seldom enable students to use their knowledge and experience to pose questions, solve problems, or investigate natural phenomena.

inq, lab, mat, sks (HS)

Gibson, David J. (1996). Textbook misconceptions: The climax concept of succession. *American Biology Teacher*, 58(3), 135-40.

Reviews the development of the climax concept of succession, illustrates the misconceptions in current textbooks, and provides a conceptual model for an updated view of succession useful in teaching at the introductory level.

bio, mat, alf, ped, ccg (PS)

Gibson, David J. (1996). Where do nonscience majors find environmental science articles? *American Biology Teacher*, 58(4), 212-16.

Environmental science articles submitted for extra credit by 281 of 677 students in introductory ecology courses were examined to find what types of magazines were used, the range of topics, and which type of student responded.

ene, ats, mat, chs (PS)

Grayson, Diane J.; McDermott, Lillian C. (1996). Use of the computer for research on student thinking in physics. *American Journal of Physics*, 64(5), 557-65.

Describes using computer-based interviews as a research technique for investigating how students think about physics. One program called Graphs and Tracks, designed for use as an instructional aid, displays motions of a ball rolling along a track.

res, cbi, kns (PS)

Greenfield, Teresa Arambula. (1996). Gender, ethnicity, science achievement, and attitudes. *Journal of Research in Science Teaching*, 33(8), 901-33.

Assesses patterns of enrollment in science, science achievement, and attitudes of students in grades 3-12 representing the four major ethnic groups in Hawaii. Results indicate that more differences were accounted for by ethnicity and even grade than by gender and

there was little interaction between ethnicity and gender.

eth, ach, ats. gen (K-12)

Greenwood, Anita. (1996). When it comes to teaching about floating and sinking, preservice elementary teachers do not have to feel as though they are drowning. *Journal of Elementary Science Education*, 8(1), 1-16.

A three-phase constructivist teaching sequence was used in a graduate level elementary science methods course to improve preservice teachers' knowledge of density and to provide a model for approaching the teaching of science.

cns, ped, tpd, knt (TE)

Griffiths, Alan K.; Heath, Nancy Parsons. (1996). High school students' views about technology. *Research in Science and Technological Education*, 14(2), 153-62.

Explores high school students' (n=26) understanding of the meaning of technology and the differences between science and technology. Reports that most students had a good understanding of the general purposes of both science and technology.

tec, bfs nas (HS)

Gunn, Cathy L. (1996). A telecommunications agenda: Contexts and new knowledge construction. *Computers in the Schools*, 12(1/2), 59-71.

In 1994-95, an Arizona Math and Science Eisenhower Grant helped a Northern Arizona University-sponsored project train 20 K-12 Arizona science teachers in telecommunications applications and science curriculum integration. Preservice teachers also participated. Problems encountered were differences in teachers' workplace telecommunications experience and unreliable Internet access. Funded for a second year, the project retained 17 original participants.

tec, skt, tpd, int (HS)

Guzzetti, Barbara J.; Williams, Wayne O. (1996). Gender, text, and discussion: Examining intellectual safety in the science classroom. *Journal of Research in Science Teaching*, 33(1), 5-20.

Presents a case study that focused on students' perceptions of gender differences in instructional activity and discussion about that activity in physics classes. Data analysis indicates that although teachers may be unaware of gender inequities, students of both sexes are aware of such inequities.

gen, cid, eqt, ped, bfs (SE)

Halyard, Rebecca A. (1996). The college science classroom: What we are doing right? *Journal of College Science Teaching*, 26(2), 125-26.

Highlights some National Science Board's science and engineering indicators that confirm that those who teach college-level science appear to be doing something right. Presents ideas about how they can continue to improve.

res, ach, ats (PS)

Haney, Jodi J.; et al. (1996). Teacher beliefs and intentions regarding the implementation of science education reform strands. *Journal of Research in Science Teaching*, 33(9), 971-93.

Explores factors influencing teachers' (n=800) intentions to implement the four strands of the State of Ohio's Competency Based Science Model. Examines the influence of three constructs on teachers' intentions.

att, ref, bft (K-12)

Hardy, Garry R.; et al. (1996). Dollars and sense. *Science and Children*, 34(3), 12-15.

Reports on a nationwide survey of elementary teachers about factors relating to the acquisition of science equipment and materials, including the amount of personal funds spent to enhance their science instruction. Reports that the average amount spent per teacher totaled $199 with the maximum amount being $2000 and a sizable group not spending any personal funds on science materials.

mat, cht (EL)

Hargreaves, D.J. (1996). How undergraduate students learn. *European Journal of Engineering Education*, 21(4), 425-34.

Describes the use of three questionnaires in assessing how students learn. Results of the study process questionnaire, the course experience questionnaire, and the learning style inventory indicate that lecturers need to change their teaching paradigm to one where the lecturer is closely involved in the learning context.

ped, lsy, lth (PS)

Harrison, Allan G.; Treagust, David F. (1996). Secondary students' mental models of atoms and molecules: Implications for teaching chemistry. *Science Education*, 80(5), 509-34.

Examines the reasoning behind views of atoms and molecules held by students (n=48) and investigates how mental models may assist or hamper further

instruction in chemistry. Reports that students prefer models of atoms and molecules that depict them as discrete, concrete structures.

alf, rem. che (HS)

Hashweh, Maher Z. (1996). Effects of science teachers' epistemological beliefs in teaching. *Journal of Research in Science Teaching*, 33(1), 47-63.

Administered questionnaires to 35 science teachers to test the hypotheses that teachers holding constructivist beliefs: are more likely to detect alternative conceptions, have a richer repertoire of teaching strategies, use more effective teaching strategies for inducing conceptual change, and report frequent use of effective teaching strategies.

bft, cns, ped, phe (K-12)

Hashweh, Maher Z. (1996). Palestinian science teachers' epistemological beliefs: A preliminary survey. *Research in Science Education*, 26(1), 89-102.

Explores the congruence of Palestine science teachers' beliefs about knowledge and learning with the recent constructivist/conceptual change epistemological basis of science education and the factors that influence these beliefs.

bft, phe, cns, cht (TE)

Hays,Timothy A. (1996). Spatial abilities and the effects of computer animation on short-term and long-term comprehension. *Journal of Educational Computing Research*, 14(2), 139-55.

To determine if different levels of graphic presentation affected understanding, 131 middle school science students with high and low spatial ability were shown programs teaching concepts of molecular diffusion with no graphics, static graphics, or animated graphics. Students with low spatial ability benefited from animated presentations. Spatial ability was a significant factor in short-term comprehension.

chs, cbi, lrg (MS)

Hendley, Dave; Lyle, Sue. (1996). Pupils' perceptions of design and technology: A case-study of pupils in South Wales. *Research in Science and Technological Education*, 14(2), 141-51.

Explores pupils' (n=1675) perceptions of the subject of design and technology. Results show agreement between pupils across key stages and between genders. Findings indicate that pupils are positive towards key aspects of design and technology.

tec, bfs, ats, gen (K-12)

Hines, S. Maxwell; Mussington, Cathy G. (1996). Preservice science teachers as researchers: Exte ing field-based learning. *Journal of Science Teacher Education*, 7(2), 143-150.

Nine preservice teachers designed, implemented, and interpreted research studies on gender equity issues. Benefits to the student teachers and the teacher education program are discussed.

res, tpd, gen, eqt (TE)

Hofstein, Avi; et al. (1996). The learning environment of high school students in chemistry and biology laboratories. *Research in Science and Technological Education*, 14(1), 103-116.

Compares students' perceptions of laboratory classes in chemistry and biology using the Science Laboratory Environment Inventory (SLEI). Results indicate significant differences on the subscales of 'integration' and 'open-endedness'.

lab, bfs, ats. int, inq (SE)

Hogan, Kathleen; Fisherkeller, JoEllen. (1996). Representing students' thinking about nutrient cycling in ecosystems: Bidimensional coding of a complex topic. *Journal of Research in Science Teaching*, 33(9), 941-70.

Describes the development of a coding scheme that represents students' ideas and its application to the analysis of interviews with urban students (n=8). Results indicate that decomposition is a linchpin concept for building an understanding of nutrient cycling.

kns, lth, res, bio (MS)

Holton, Brian E.; Horton, George K. (1996). The Rutgers physics learning center: Reforming the physics course for first-year engineering and science students. *Physics Teacher*, 34(3), 138-43.

Describes efforts aimed at reforming physics courses for first-year engineering and science students at Rutgers-The State University of New Jersey. Discusses the establishment and working of the Physics Learning Center (PLC) and its impact on the retention and performance of students.

ach, ref, phy, cur (PS)

Holtz, Robert E. (1996). Environmental education: A state survey. *Journal of Environmental Education*, 27(4), 9-11.

Describes survey results sent to all state environmental education coordinators designed to reveal a generalized picture of environmental

education requirements, guidelines, resource materials, staff, and teacher education requirements in the United States.

ene, ref, tpd, mat (K-12, TE)

Huddle, P. A.; Pillay, A. E. (1996). An in-depth study of misconceptions in stoichiometry and chemical equilibrium at a South African university. *Journal of Research in Science Teaching*, 33(1), 65-77.

Analyzes students' attempts to answer examination questions involving stoichiometry and chemical equilibrium and reports that the majority of the students do not fully understand either concept. Concludes that the main difficulty with these topics is that they are highly abstract and first taught to students before they have reached formal operational stage.

kns, lth, alf, che (SE)

Hudson, Sharon P. (1996). Broad field science endorsements in the United States. *School Science and Mathematics*, 96(6), 298-304.

Reports on data on broad field science endorsements collected from the state science supervisors. Findings indicate that 61% of the responding states have one or more broad field science endorsements.

tpd, ref (K-12)

Huinker, DeAnn. (1996). Teaching mathematics and science in urban elementary schools. *School Science and Mathematics*, 96(7), 340-49.

Assesses the capacity of elementary teachers from a large urban school district to provide quality mathematics and science instruction. Identifies strengths and barriers in instructional and assessment practices.

asm, ped, skt, cur, mat (EL)

Hurst, Roy W.; Milkent, Marlene M. (1996). Facilitating successful prediction problem solving in biology through application of skill theory. *Journal of Research in Science Teaching*, 33(5), 541-52.

Reports on a study conducted to identify cognitive factors associated with differences in predicting problem-solving success among high school biology students. Results indicate that successful prediction depends on several factors including a subject's procedural and declarative knowledge, and stage of cognitive development.

pbs, kns, lth (HS)

Irwin, A. (1996). A survey of the historical aspects of science in school textbooks. *School Science Review*, 78(282), 101-07.

Discusses the traditional approach to writing science textbooks, the situation preceding the National Curriculum, and the effect of the National Curriculum. Summarizes the historical content of current science textbooks including biographical narratives and human interest material.

cur, mat, his, ref (K-12)

Jarman, Ruth; McAleese, Liam. (1996). Physics for the star-gazer: Pupil's attitudes to astronomy in the' northern Ireland science curriculum. *Physics Education*, 31(4), 223-26.

Reports on a study of the implementation of the new science curriculum in secondary schools in Northern Ireland. Findings suggest that astronomy has caught the interest of many students. Concludes that these findings justify the inclusion of astronomy in the Northern Ireland Science Curriculum.

esg, ats, cur (SE)

Jegede, Olugbemiro J.; et al. (1996). The validity of the science student stress inventory using a sample of South African high school students. *Research in Science and Technological Education*, 14(1), 67-89.

Investigates the validity of an instrument used to identify factors perceived as stressful by secondary science students. Results indicate that students regarded the fear of scoring low marks in examinations as the most stressful factor and that perceptions of factors vary with location of students and ethnic groupings.

asm, ats, ach, chs, bkg, eth (SE)

Jegede, Olugbemiro J.; Okebukola, Peter A.O. (1996). Students' ranking of and opinions about the standards of learning in Nigerian science education programs. *Journal of Research in Science Teaching*, 33(6), 665-75.

Investigates how science education students (n=265) rank some identified science education program standards and discusses their perceptions of the desirability and achievement of the standards in Nigeria.

bft, ref, att (TE)

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

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.

gen, ach, bkg (SE)

Judd, Michael; Judd, Elizabeth. (1996). Tradition and technology: A magnet school-museum partnership. New Schools, *New Communities*, 12(2), 39-44.

Presents a case study of an educational partnership between an Albuquerque magnet elementary school and the New Mexico Museum of Natural History and Science. Descriptions of the school and museum are provided as well as the program's goals, current activities and products, outcomes, and future directions. The Proyecto Futuro program, a multiyear initiative for family science learning, is described.

ntw, nfd (EL)

Kelly, Gregory J.; Crawford, Teresa. (1996). Students' interaction with computer representations: Analysis of discourse in laboratory groups. *Journal of Research in Science Teaching*, 33(7), 693-707.

Analyzes student discourse in four grade 12 lab groups working on microcomputer-based laboratories. Analysis reveals the role the computer plays in the group context and the ways that this context is shaped by the computer.

cid, cbi (HS)

Kempa, R.F.; Orion, Nir. (1996). Students' perception of cooperative learning in earth science fieldwork. *Research in Science and Technological Education*, 14(1), 33-41.

Investigates students' perceptions of selected aspects concerning the organization of and learning from fieldwork. Findings indicate that students either seek partners whom they regard as capable of making positive contributions to the fulfillment of learning tasks, or they opt for friendship groups.

fsd, cpl, bfs, lrg (SE)

Kennedy, Eileen. (1996). What do they think of chemistry? Australian Science Teachers Journal, 42(2), 53-59.

Reports on a study that explored alternative ways of presenting chemistry in junior high schools through the use of an attitude survey taken by students (n=593). Analyzes and discusses student suggestions for curriculum, teaching strategies, and learning environments.

ats, ped, che, cur (MS)

Keys, Carolyn W.; Golley, Priscilla S. (1996). The power of a partner: Using collaborative reflection to support constructivist practice in middle grades science and mathematics. *Journal of Science Teacher Education*, 7(4), 229-246.

Teachers working in mentor-mentee relationships to collaboratively plan and reflect on science lessons developed an understanding of constructivism as a referent for science and mathematics teaching in terms of valuing students' knowledge and ideas, searching for new ways to assess students' ideas, and monitoring their own teaching process through continual reflection.

cns, ped, tpd, **ntw (TE, EL, MS)**

Kirkwood, Valda; Symington, David. (1996). Lecturer perceptions of student difficulties in a first-year chemistry course. *Journal of Chemical Education*, 73(4), 339-43.

Analyzes perceptions of staff members concerning difficulties facing students in a first-year chemistry program. Results indicate that the staff have very different views of student difficulties and how they should be overcome. Suggests that it is important for staff to engage in conversation about such issues.

bft, ntw, che (TE)

Kortland, Koos. (1996). An STS case study about students' decision making on the waste issue. *Science Education*, 80(6), 673-89.

Assesses students' existing and developing decision-making ability against the background of a normative model of the decision making process. Results indicate that after a unit on household packaging waste the students' arguments about a decision-making situation improved in terms of validity and clarity of the criteria used.

sks, ped, sts (EL)

Kramer, Pamella E.; et al. (1996). Engineering 'up front': Why 'hands on' engineering education works for women and girls. *GATES*, 3(1), 39-44.

Presents results from a research evaluation of the effects of a team approach and learning styles preferences in a new hands-on laboratory course in beginning engineering.

cpl, lsy, hos, gen (PS)

Kumar, David D.; Helgeson, Stanley L. (1996). Effect of computer interfaces on chemistry problem solving among various ethnic groups: A comparison of Pen-

Point and PowerBook computers. *Journal of Science Education and Technology*, 5(2), 121-30.

Investigates the effect of Pen-Point and PowerBook computers on solving a multiple-step chemistry problem among White, Afro-American and Hispanic students. Results suggest that the Pen-Point computer has a more positive effect on the problem solving performance and attitude of students towards computers than the PowerBook computer.

cbi, pbs, eth, ats, tec (HS)

Lane, Jennie; et al. (1996). Wisconsin EE mandates: The bad news and the good news. *Journal of Environmental Education*, 27(2), 33-39.

Examines Wisconsin teachers' perceived competencies in, attitudes toward, and amount of class time devoted to teaching about the environment. Discusses the effects of Wisconsin environmental education mandates concerning preservice preparation in environmental education and K-12 environmental education curriculum plans.

ene, cht, att, tpd (K-12)

Leask, Marilyn; et al. (1996). Recruiting science teachers from ethnic minority groups: Selection for initial teacher education. *Research in Science and Technological Education*, 14(1), 5-20.

Reports on a pilot study that investigated the procedures used by universities to select and interview science graduates applying for teacher training courses. Identifies important issues related to selection and recruitment procedures.

cht, eth, bkg, car (TE)

Lee, John Chi-kin; Ma, William Hing Tong. (1996). Environmental education through subject teaching in Macau: Lessons from a small state. *International Journal of Environmental Education and Information*, 15(2), 109-20.

Discusses findings from two surveys of the contribution to environmental education of social studies, science, and health education in primary subject teaching and of geography and science teaching at the secondary level.

ene, cur, int (K-12)

Lee, Kam-Wah Lucille; et al. (1996). Cognitive variables in problem solving in chemistry: A revisited study. *Science Education*, 80(6), 691-710.

Presents results from Singaporean and Australian studies on the relationships between the cognitive variables and problem solving performance in three electrochemistry problems of different degrees of familiarity for comparisons. Idea association, problem translating skill, prior problem solving experience, specific knowledge, and relevant but nonspecific knowledge are significant determinants of problem solving performance.

pbs, cul, kns, sks, che (SE)

Lee, Okhee; Brophy, Jere. (1996). Motivational patterns observed in sixth-grade science classrooms. *Journal of Research in Science Teaching*, 33(3), 303-18.

Draws on theories of student motivation to learn and conceptual change learning in science to describe patterns of student motivation observed in sixth-grade classrooms. Highlights the value of distinguishing motivation to learn from intrinsic motivation, and of distinguishing general motivational traits from situation-specific motivational states.

ats, ccg, chs (MS)

Lee, Valerie E.; Burkam, David T. (1996). Gender differences in middle grade science achievement: Subject domain, ability level, and course emphasis. *Science Education*, 80(6), 613-50.

Uses base-year data from a nationally representative database (NELS:88) to identify important explanatory factors for gender differences in science performance. Documents a large advantage for boys on the subtest of physical science and a modest advantage for girls in life science.

gen, ach, cur, ped (MS)

Lehman, James D.; Brickner, Dianna. (1996). Teachers' uses and perceptions of interactive videodiscs in the science classroom. *Journal of Computers in Mathematics and Science Teaching*, 15(1/2), 85-102.

Examined (n=36) teachers' perceptions and use of interactive videodiscs (IVD) in the teaching of science. Perceptions tended to be positive. Major barriers to IVD usage were limited equipment availability and lack of time to develop and implement IVD-based lessons.

edt, ped, ats, bft (TE)

Levine, Tamar; Donitsa-Schmidt, Smadar. (1996). Classroom environment in computer-integrated science classes: Effects of gender and computer ownership. *Research in Science and Technological Education*, 14(2), 163-78.

Compares classroom environment in a group which used multimodal computer-based activities with that

of a control group which used traditional science instruction strategies.

cbi, cid, ped (SE)

Lewis, Eileen Lob. (1996). Conceptual change among middle school students studying elementary thermodynamics. *Journal of Science Education and Technology*, 5(1), 3-31.

Studies the conceptual changes and factors affecting eighth grade physical science students (n=180) investigating elementary thermodynamics. Classifies three types of students regarding their learning methods: converging, progressing, and oscillating.

ccg, lsy, chs (SE)

Lin, Huann-Shyang; et al. (1996). The effectiveness of teaching science with pictorial analogies. *Research in Science Education*, 26(4), 495-511.

This study uses a conceptual problem-solving test to investigate the effect of a series of pictorial analogies on the concepts of density, pressure, and atmospheric pressure in Year 8 classrooms. Findings indicate that students taught with the pictorial analogies scored significantly higher than their counterparts. Low achievers were the most apt to benefit from this strategy.

ped, kns, ach, pbs (SE)

Lindauer, Ivo E.; Queitzsch, Mary L. (1996). A profile of public school biology teachers in the USA. *American Biology Teacher*, 58(1), 20-33.

Uses data from the National Center for Educational Statistics' Schools and Staffing Survey (SASS) to present a profile of biology teachers. Discusses background of biology teachers, preparation in the physical and life sciences, who does the preparation, and expected future trends.

cht, bkg, bio (SE)

Lindblom-Ylanne, Sari; et al. (1996). Selecting students for medical school: What predicts success during basic science studies? A cognitive approach. *Higher Education*, 31(40), 507-27.

A study with 503 applicants to the University of Helsinki (Finland) medical school compared the predictive validity of multiple-choice science tests and a "learning-from-text" test (LFT) designed to measure deep-level text processing. Results indicated the LFT was the best predictor of student academic progress in basic science courses.

ach, asm, kns (PS)

Linfield, Rachel Sparks. (1996). Can scientific understanding be assessed through drama? *Primary Science Review*, (45), 4-5.

Evaluates the use of drama to assess children's knowledge of scientific concepts. Describes a case study of 7-year-olds and the study of magnetism. By taking science concepts out of the context of practical science activities, teachers could assess student knowledge without simply seeing what was expected, and students could explore ideas and apply knowledge.

asm, lrg, kns (EC)

Lucas, Keith B.; Roth, Wolff-Michael. (1996). The nature of scientific knowledge and student learning: Two longitudinal case studies. *Research in Science Education*, 26(1), 103-127.

Investigates the relationship between students' views of the nature of scientific knowledge and their own learning of physics, and the evolution of this relationship over time. Uses two intensive case studies to illustrate students' views over time.

lrg, kns, nas, phy (HS)

Lumpe, Andrew T.; Beck, Judy. (1996). A profile of high school biology textbooks using scientific literacy recommendations. *American Biology Teacher*, 58(3), 147-53.

Analyzes high school biology textbooks with the aim of providing descriptive information and determining the emphasis on scientific literacy themes of body of knowledge, nature of science, inquiry, and Science-Technology-Society (STS) issues.

mat, lit, bio, nas, sts, inq (HS)

Lunt, Barry M. (1996). Predicting academic success in electronics. *Journal of Science Education and Technology*, 5(3), 235-40.

Attempts to identify variables for predicting academic success in electronics and find a model for predicting success in each of three main types of electronics programs. Results indicate that student's success in math and science in high school is a good predictor.

ach, chs, phy (PS)

Magnusson, Shirley J. (1996). Complexities of learning with computer-based tools: A case of inquiry about sound and music in elementary school. *Journal of Science Education and Technology*, 5(4), 297-309.

Examines what 4th-grade students learned by using computer-based tools intended to help them

understand sound and music. Findings provide critical information for future instruction with the goal of supporting learning about sound and music from such tools.

cbi, lrg, ped (EL)

Maitra, Krishna; Kumari, Harsh. (1996). Gender differences in the perceptions of choice of subjects pertaining to science. *Gifted Education International*, 11(2), 86-90.

This study examined the perceptions of 90 gifted students in India about their choices of scientific disciplines for in-depth study. Males tended toward engineering; females toward biology. Gender differences that emerged from student responses are discussed, as are suggestions for fostering students' intrinsic motivation to choose nontraditional fields of study.

bfs, car, chs, eth (HS)

Mancl, Karen; LaBarge, Gregory. (1996). Educating youth in water quality land use principles through outdoor education. *Ohio Journal of Science*, 96(1), 23-26.

Examines pre/post tests, land use plans, and oral presentations in order to assess whether the Conservation Camp was successful in increasing the knowledge and abilities of young people to consider water quality impacts in land-use decisions.

ene, lrg, fsd, sts (SE)

Mason, Lucia; Sorzio, Paolo. (1996). Analogical reasoning in restructuring scientific knowledge. *European Journal of Psychology of Education*, 11(1), 3-23.

Presents the results of an experiment that evaluated the efficiency of analogy in the conceptual restructuring of a science topic. The experiment involved a fifth-grade class studying water and heat flow. Discovered that analogy can act as an effective trigger for restructuring knowledge.

ccg, kns, ped, phy (MS)

McArthur, Julia M.; Wellner, Karen L. (1996). Reexamining spatial ability within a Piagetian framework. *Journal of Research in Science Teaching*, 33(10), 1065-82.

Examines results of Piagetian spatial research studies while focusing on the existence of gender differences in Piagetian spatial assessments. Results indicate that a majority of performance assessments did not demonstrate a significant difference between males and females.

gen, lth (K-12)

McGinnis, J. Randy. (1996). Promoting an electronic community with the use of communication technology in a graduate elementary science methods class. *Journal of Elementary Science Education*, 8(1), 39-63.

Documents and interprets the use of an electronic mail discussion group in a graduate elementary science education course (n=13). Student feedback indicated that their interest in communication technology was piqued by the use of the discussion group and it enhanced communication and community formation.

tec, cid, ntw, tpd (TE)

MacDonald, Dougal. (1996). Making both the nature of science and science subject matter explicit intents of science teaching. *Journal of Science Teacher Education*, 7(3), 183-196.

The instructional strategy of an experienced teacher intending to teach the nature of science as well as science content material was analyzed. Pedagogical strategies and reasons for integration of nature of science into science content are addressed.

ped, nas, **phe, tpd (TE, SE)**

McGinnis, J. Randy; et al. (1996). Beliefs and perceived needs of rural K-12 teachers of science toward the uses of computing technologies. *Journal of Science Education and Technology*, 5(2), 111-20.

Explores the accessibility, use, and perceived needs toward computing technologies of elementary and secondary science teachers in two large rural school districts. Data analysis indicate significant differences in many areas between elementary and secondary teachers' responses.

mat, tec, bft (K-12)

Meece, Judith L.; Jones, M. Gail. (1996). Gender differences in motivation and strategy use in science: Are girls rote learners? *Journal of Research in Science Teaching*, 33(4), 393-406.

Examines gender differences in fifth- and sixth-grade students' self-reports of confidence, motivation goals, and learning strategies in whole-class and small-group sessions. Overall, results reveal few gender differences and indicate that students report greater confidence and mastery motivation in small-group lessons.

gen, chs, lsy (MS)

Messmore, Ann B. (1996). Measuring the impact of grassroots outreach. *Science Communication*, 17(4), 430-42.

Describes the results of the American Chemical Society Public Outreach Office's research program to measure the impact of the Kids & Chemistry program on both the children and the volunteer scientists. Highlights include objectives of the program, pretest research, focus group results, field tests, and pre- and posttest survey results.

ntw, lrg, ats, che (MS, SE)

Mexal, J.G.; et al. (1996). Scientists teach science in elementary schools: Case studies. *Journal of Natural Resources and Life Sciences Education*, 25(2), 31-36.

Reports on two case studies of the Science Advisor (SCIAD) Program. Goals of this program include improving science and technology literacy, and increasing the number of highly qualified scientists.

lit, ntw, car, tec (EL)

Moody, David E. (1996). Evolution and the textbook structure of biology. *Science Education*, 80(4), 395-418.

Surveyed secondary biology textbooks to ascertain how the topic of evolution functioned in the overall structure of the subject matter. Results indicated that there has occurred a marked increase in the role played by evolution in the generation of textbooks published during the 1990s.

mat, evo, his (SE)

Morais, Ana M.; Miranda, Clementina. (1996). Understanding teachers' evaluation criteria: A condition for success in science classes. *Journal of Research in Science Teaching*, 33(6), 601-24.

Analyzes the extent to which students (n=92) understand teachers' evaluation criteria and the relation of that understanding with social class, social context of the school, teacher's conceptual demand, teacher's explicitness of criteria, and science achievement.

asm, bkg, cht, ach, ped (K-12)

Murphy, Tony P. (1996). Sense-Making—A case study using the movie Jurassic Park. *Journal of Science Education and Technology*, 5(1), 77-86.

Introduces Sense-Making, an alternative methodology which allows an insight into a person's perception of reality. Interviews science teachers following a viewing of Jurassic Park to investigate the relationship of the movie to their ontological view of science, society, and self.

bft, phe, nas, sts (TE)

Nakhleh, Mary B.; et al. (1996). Narrowing the gap between concepts and algorithms in freshman chemistry. *Journal of Chemical Education*, 73(8), 758-62.

Reports on a study, Project REMODEL, that implemented and evaluated innovations in lecture, laboratory, and assessment for students in the introductory sequence for undergraduate chemistry.

asm, ped, lab, che (PS)

Nason, Rod; et al. (1996). Format-free databases and the construction of knowledge in primary school science projects. *Research in Science Education*, 26(3), 353-73.

Reports on a study in which a teacher used the collaborative development of a format-free computer database to facilitate the construction of knowledge by a group of students (n=3) during a science project.

cns, tec, cpl, ped (EL)

Newell, Andrew; Ross, Keith. (1996). Children's conception of thermal conduction— Or, the story of a woolen hat. *School Science Review*, 78(282), 33-38.

Reports on discussions with a year 10 group, following their first lesson on heat energy transfer, that revealed that they still had not realized that insulation acted as a barrier; instead they saw it as an active warming agent.

alf, phy (SE)

Niaz, Mansoor. (1996). How students circumvent problem-solving strategies that require greater cognitive complexity. *Journal of College Science Teaching*, 15(5), 361-63.

Analyzes the great diversity in problem-solving strategies used by students in solving a chemistry problem and discusses the relationship between these variables and different cognitive variables.

pbs, lsy, lth (PS)

No Author Given. (1996). Reshaping the graduate education of scientists and engineers. *AWIS Magazine*, 25(5), 8-9.

Summarizes a report from the joint committee of the National Academy of Sciences and the National Academy of Engineering, Institute of Medicine that recommends a new model of Ph.D. education based on changes in science, engineering, the economy, and society in general.

ref, car sts (PS)

No author given. (1996). Looking beyond one's self through SKILL. *Winds of Change*, 11(1), 14-16.

Scientific Knowledge for Indian Learning and Leadership (SKILL) was implemented by South Dakota School of Mines and Technology in 1990 to improve the college readiness of American Indian students in math and science. Over 2,000 Indian students have participated in SKILL's academic-year programs, elementary summer programs, 4-week residential programs, and the 4-year NASA Honors Program.

eth, ntw, ach, fsd (K-12)

Nyamwange, Monica. (1996). Public perception of strategies for increasing participation in recycling programs. *Journal of Environmental Education*, 27(4), 19-22.

Assesses public perception of selected strategies for increasing participation in city recycling programs: increasing the level of knowledge about recycling, using effective channels to inform the community about recycling, increasing the convenience of recycling, etc.

ene, bkg (AD)

Odom, Arthur L.; Settlage, John, Jr. (1996). Teachers' understandings of the learning cycle as assessed with a two-tier test. *Journal of Science Teacher Education*, 7(2), 123-142.

The Learning Cycle Test was developed to assess teachers' understandings of the learning cycle. Twenty-eight misconceptions were identified.

lth, knt, lrg, asm, tpd (TE)

Palmer, Bill; Treagust, David F. (1996). Physical and chemical change in textbooks: An initial view. *Research in Science Education*, 26(1), 129-40.

Examines how chemistry/science textbooks from different countries and written at different levels of education deal with physical and chemical change. Results indicate that the ideas concerning the teaching and learning of physical and chemical change evident in textbooks are not complete.

mat, che, alf (SE)

Palmer, David. (1996). Students' application of a biological concept: Factors affecting consistency. *Research in Science Education*, 26(4), 409-19

Investigates factors affecting students' ability to consistently apply the concept of adaptations. Individual interviews were conducted with 74 Year 10 students in Australia, of whom only 47% showed an understanding of the concept. It was found that the students were more likely to apply the concept to vertebrates.

kns, bio, chs (HS)

Palmer, Joy A.; et al. (1996). Formative experiences of environmental educators: Overview and comparison of empirical research in two nations. *Environmental Education*, 52(3), 5-8.

Reports on a new phase in the research project, Development of Concern for the Environment and Formative Experiences of Educators, which involves the comparison of data in the United States and Great Britain. Compares practical activities engaged in by the respondents.

ene, cul, tpd (SE)

Papageorgiou, G.; et al. (1996). Environmental education at primary level: A study of its application in northeastern Greece. *International Journal of Environmental Education and Information*, 15(3), 331-38.

This research attempts to establish the level of success of environmental education at the primary level in Thrace, Greece. Questionnaires were completed by students (n=620) from the upper three grades of primary schools.

ene, cur (EL)

Paterson, Craig C. (1996). Self-regulated learning and academic achievement of senior biology students. *Australian Science Teachers Journal*, 42(2), 48-52.

Describes a study that compares the achievement of biology students (n=48) under the conditions of self-regulation and a traditional approach. Concludes that higher measures of reported self-regulation were significantly associated with higher academic performance scores.

bio, ach, chs, ped (SE)

Peters, Joseph; O'Brien, George. (1996). Using multimedia in a science methods course for preservice elementary teacher training. *Journal of Computers in Mathematics and Science Teaching*, 15(1/2), 153-72.

Studied the effectiveness of having science methods students design their own multimedia programs and then use those programs during a field-based teaching experience. Findings suggested that multimedia can be used effectively in preservice teacher education.

edt, tpd, ped (TE)

Phelps, Amy J. (1996). Teaching to enhance problem solving: It's more than the numbers. *Journal of Chemical Education*, 73(4), 301-04.

Evaluates an instructional method in general chemistry that attempts to bridge the gap between algorithmic problem-solving abilities and conceptual understanding of chemistry students and emphasizes conceptual problem-solving in the initial phase of a concept.

ped, pbs, kns, che (PS)

Phipps, Roy. (1996). Planning the primary science curriculum. *Primary Science Review*, (45), 6-8.

Reports on a survey of primary teachers on science curriculum development. Cites a plethora of planning terminology and lack of a government-agency model for a primary science plan as obstacles to curriculum planning. Presents a curriculum planning model derived from the rationale that curriculum should be learning outcomes-driven.

cur, tpd, ref (EC)

Pollio, Howard R. (1996). The two cultures of pedagogy: Teaching and learning in the natural sciences and the humanities. *Teaching Learning Issues*, (75), 1-33.

This paper first evaluates discipline classification schemes and general differences between disciplines associated with the natural sciences and those associated with the humanities. It then reviews research which either asked students how professors in these fields teach, observed teachers in their classrooms, or asked students to describe their reactions to professors teaching science and humanities classes.

bfs, ped, ats, nas (PS)

Potari, Despina; Spiliotopoulou, Vassiliki. (1996). Children's approaches to the concept of volume. *Science Education*, 80(3), 341-60.

Explores 11-year-old children's approaches to the concept of volume using six tasks that were developed to identify commonalties in children's responses. Results suggest that children hold and use different conceptions in their effort to explain and compare aspects of volume.

kns, lrg (EL)

Potts, Alison; et al. (1996). Children's ideas about the ozone layer and opportunities for physics teaching. *School Science Review*, 78(283), 57-62.

Examines the potential of global environmental issues as starting points for learning science by studying the preconceptions of children aged 12-13 about the nature, functions, and vulnerability of the ozone layer. Results indicate that children are familiar with the location and nature of the ozone layer but less informed about its magnitude and that of the holes.

ene, kns, sts (EL)

Pryor, Amanda Z.; et al. (1996). Putting trust in change: A partnership for better science education. *T.H.E. Journal*, 24(3), 74-76.

The Ann Arbor Public Schools and University of Michigan partnership created the Foundations of Science (FOS) course, designed to integrate the high school science sequence into a three-year project based upon real-life science investigations. Specially designed software, information technology, and Internet resources were utilized. Student interest and abilities increased and FOS participation expanded throughout the district.

ref, cur, ats, ach, tec (HS)

Pyle, Eric J. (1996). Influences on science fair participant research design selection and success. *School Science and Mathematics*, 96(8), 400-06.

Examines the influences on research design selection and success in competition of 22 finalists at the 44th International Science and Engineering Fair. Findings include: students are largely accurate in self-reports of design and interact with mentors on several levels, outside influences reflect shifts in motivation, and success reflects internalization.

res, cur, ach, ntw (K-12)

Ramey-Gassert, Linda; et al. (1996). A qualitative study of factors influencing science teaching self-efficacy of elementary-level teachers. *Science Education*, 80(3), 283-315.

Examines factors that influence personal science teaching efficacy and science teaching outcome expectancy in elementary teachers. Data collection methods included questionnaires and interviews. Results indicate that preservice and inservice experiences such as success in high quality science courses and workshops influence personal science teaching efficacy.

cht, bkg, tpd (TE)

Rath, Alex; Brown, David E. (1996). Modes of engagement in science inquiry: A microanalysis of elementary students' orientations toward phenomena at a summer science camp. *Journal of Research in Science Teaching*, 33(10), 1083-97.

Analyzes videotape data of a summer science camp for elementary school children and characterizes students' orientations when exploring natural phenomena as modes of engagement.

fsd, cid, lrg (EL)

Rayner-Canham, Marelene F.; Rayner-Canham, Geoffrey W. (1996). Women in chemistry: Participation during the early 20th century. *Journal of Chemical Education*, 73(3), 203-205.

Analyzes the enrollment patterns in chemistry during the first part of this century. Shows that the early progress of women in the first two decades of this century was not sustained and that a decrease in women's participation in all fields of chemistry was seen in the next few decades.

gen, che, his, car (PS)

Reinhard, Barbara. (1996). How does the medium of instruction affect the learning of chemistry? *School Science Review*, 78(283), 73-78.

Explores how different media of instruction affect the learning of chemistry in a Malawian school. Reports that teachers and pupils needed time to get used to the new language of instruction but enjoyed the new experience. However, the performance of students instructed in their vernacular language did not improve as much as expected.

mat, ped, lrg, che (HS)

Rennie, Leonie J.; Parker, Lesley H. (1996). Placing physics problems in real-life context: Students' reactions and performance. *Australian Science Teachers Journal*, 42(1), 55-59.

Investigates the effect of the presence of context in physics problems by comparing the performance of physics students (n=8) on two sets of matched problems. Results indicate that the students performed better on the tasks with context.

phy, pbs (SE)

Richmond, Gail; Striley, Joanne. (1996). Making meaning in classrooms: Social processes in small-group discourse and scientific knowledge building. *Journal of Research in Science Teaching*, 33(8), 839-58.

Analyzes group discourse (n=24) during laboratory investigations in order to understand how students solve scientific problems and the ways social roles shape the development and articulation of arguments.

lab, cid, pbs, bkg (SE)

Ritchie, Stephen M.; Hampson, Brad. (1996). Learning in-the-making: A case study of science and technology projects in a year six classroom. *Research in Science Education*, 26(4), 391-407.

This interpretive study of a Year Six classroom in North Queensland, Australia focuses on how two contrasting groups of children designed ill-defined engineering structures. The collaboration processes within the research team are explored. Classroom-related findings are also reported.

cpl, pbs, cid (EL)

Ritchie, Stephen M.; Rigano, Donna L. (1996). School Labs as sites for fraudulent practice: How can students be dissuaded from fudging? *Australian Science Teachers Journal*, 42(2), 13-16.

Describes research that documents the falsification of laboratory results by chemistry and physics students. Discusses some factors that encourage students to fabricate results and why some students do not feel the need to falsify data.

lab, ats, che, phy (SE)

Roberts, Nancy; et al. (1996). The dynamics of learning in a computer simulation environment. *Journal of Science Teacher Education*, 7(1), 41-58.

Pilot study found that computer simulations can be used effectively for learning and concept development in science. The most important critical variables for productive learning were the teacher's conditional use of direct teaching and student interest in the subject.

ped, edt, rem, tpd, ats (MS, TE)

Rogan, John M. (1996). Rural teachers meet the internet. *Journal of Computing in Teacher Education*, 12(3), 21-25.

Results are reported from surveys and interviews with 22 rural teachers who participated in "Reach for the Sky," an initiative that links reform in math and science education with telecommunications use. Topics include benefits and frustrations of using the Internet, math/science resources found on the Internet, and the impact of Internet use on classroom practice and student learning.

tpd, tec, ref, att (TE)

Rogers, Laurence; Wild, P. (1996). Data-logging: Effects on practical science. *Journal of Computer Assisted Learning*, 12(3), 130-45.

A pilot study of laboratory data logging in three secondary schools found that when computers were used students spent less time measuring, recording,

and reporting data and more time observing and discussing. Qualitative changes, however, were much more context dependent. Contextual factors were computer skill, physical nature of the topic under investigation, learning objectives, and learning style.

lab, tec, bkg, lsy (HS)

Rohas de Astudillo, Luisa; Niaz, Mansoor. (1996). Reasoning strategies used by students to solve stoichiometry problems and its relationship to alternative conceptions, prior knowledge, and cognitive variables. *Journal of Science Education and Technology*, 5(2), 131-40.

Investigates reasoning strategies students use in solving stoichiometric problems and explores the relation between these strategies and alternative conceptions, prior knowledge, and cognitive variables.

pbs, alf, kns, lth (SE)

Roth, Wolff-Michael. (1996). Teacher questioning in an open-inquiry learning environment: Interactions of context, content, and student responses. *Journal of Research in Science Teaching*, 33(7), 709-36.

Describes a case study of an expert teacher's questioning strategies during an open-inquiry engineering curriculum in a Grade 4/5 classroom. Analysis provides evidence for the complexity of questioning that is characterized by the interactions of context and content.

inq, ped, skt (EL)

Roth, Wolff-Michael. (1996). The co-evolution of situated language and physics knowing. *Journal of Science Education and Technology*, 5(3), 171-91.

Explores evolutionary changes in students' (n=46) motion-related language mediated by computer-based Newtonian microworlds. Documents how ways of talking emerge and how the convergence of meaning arises from the affordances provided by the interpretive flexibility of the microworld, conversations with the teacher, and the microworld which assures the topical cohesion of student talk.

cbi, cid, cns, ph, lth (SE)

Rubba, Peter A.; et al. (1996). The Leadership Institute in STS Education: A collaborative teacher enhancement, curriculum development, and research project of Penn State University and West Virginia University with rural middle/junior high school science teachers. *Journal of Science Teacher Education*, 7(1), 23-40.

Describes the Leadership Institute in STS Education inservice teacher program designed to assist middle-school science teachers in implementing the STS approach to issues education in their classrooms. Participants cited increased professional networking opportunities and student enthusiasm and growth as positive outcomes of the Institute.

sts, tpd, ntw, skt, sks, alf (TE, MS)

Ruiz-Primo, Maria Araceli; Shavelson, Richard J. (1996). Rhetoric and reality in science performance assessments: An update. *Journal of Research in Science Teaching*, 33(10), 1045-63.

Addresses the rhetoric of performance assessment with research on important claims about science performance assessments. Discusses findings related to concepts and terminology, sensitivity to task and method, higher-order thinking skills, and other factors.

asm (K-12)

Sakai, Ann K.; Lane, Melissa J. (1996). National science foundation funding patterns of women and minorities in biology. *BioScience*, 46(8), 621-25.

Examines patterns of participation of women and under-represented minorities over the past 10 years in research and related activities at the National Science Foundation's Directorate of Biological Sciences. Discusses relative funding success of women and minorities, women and minorities in the pipeline, and current status of women and minorities.

gen, eth, car, res (PS)

Sandler, Bernice R.; et al. (1996). The chilly classroom climate: A guide to improve the education of women. *AWIS Magazine*, 25(5), 10-11.

Summarizes a report offering over 270 recommendations for action toward equity at the individual, classroom, institutional, and policy levels. Describes the classroom context of myriad small inequities and emphasizes that professors need expertise, resources, and training to achieve sex equity.

eqt, gen, tpd, cid, ped (PS)

Sawicki, Mikolaj. (1996). What's wrong in the nine most popular texts. *Physics Teacher*, 34(3), 147-49.

Presents an analysis of the treatment of Newton's Laws and relativistic mass in the nine most popular college physics textbooks. Concludes that only two textbooks give a correct interpretation of relativistic mass and only one text gives a correct discussion of Newton's first law.

phy, mat, alf (PS)

Settlage, John, Jr. (1996). Portfolios within an elementary methods course: The evolution of personal efforts at implementation. *Journal of Science Teacher Education*, 7(1), 59-73.

Article describes the implementation and refinement of portfolio assessment in an elementary science methods course. Findings were that preservice teachers were initially uncomfortable with the level of self-reflection required in the portfolios, and that the assessment techniques were not readily generalizable to the elementary classroom.

asm, tpd (TE, EL)

Scantlebury, Kathryn; et al. (1996). Beginning the cycle of equitable teaching: The pivotal role of cooperating teachers. *Research in Science Education*, 26(3), 271-81.

Presents a study of science teachers (n=5) who serve as cooperating teachers. Discusses the impact of gender-sensitive cooperating teachers on student teachers' teaching strategies, questioning patterns, and interactions during their teaching practicum.

tpd, cht (TE)

Schneider, Rebecca M.; Lumpe, Andrew T. (1996). The nature of student science projects in comparison to educational goals for science. *Ohio Journal of Science*, 96(4-5), 81-88.

Discusses the results of research designed to determine if student science projects in Ohio meet the goals for science education as recommended by the American Association for the Advancement of Science (AAAS), the National Science Teachers Association (NSTA), and the Ohio Department of Education.

ref, cur (K-12)

Shapiro, Bonnie L. (1996). A case study of change in elementary student teacher thinking during an independent investigation in science: Learning about the "face of science that does not yet know". *Science Education*, 80(5), 535-60.

Explores the changes in one student teacher's thinking about the nature of scientific investigations during her participation in an elementary science methods course assignment.

bft, nas, cht (TE)

Shepardson, Daniel P. (1996). Social interactions and the mediation of science learning in two small groups of first-graders. *Journal of Research in Science Teaching*, 33(2), 159-78.

Investigates the nature of small-group social interactions in the mediation of children's science learning. Reports that the teacher mediated the children's small-group science learning through discourse that negotiated children's status, actions, and meaning.

cid, cpl, lrg, ped (EC)

Shepardson, Daniel P.; Adams, Paul E. (1996). Coming to know and understand alternative assessment in science. *Journal of Science Teacher Education*, 7(4), 267-282.

The Integrating Laboratory Instruction and Assessment (INLAB) project for changing teacher practice is described. Twenty-seven of thirty participants in the project were shown to have changed their assessment practices or understandings. Authors found that the establishment of an intellectual community of learners was important to the success of the project.

asm, tpd, ntw (TE)

Shroyer, M. Gail; et al. (1996). An innovative model for collaborative reform in elementary school science teaching. *Journal of Science Teacher Education*, 7(3), 151-168.

Article describes the development of a research-based model of preservice and inservice elementary teacher preparation for enhanced science, mathematics and technology teaching. The creation of collaborative partnerships, development of science and mathematics courses, selection of professional development schools, and project outcomes are discussed.

tpd, cur, ref, ntw, int (TE, EL)

Simmons, Deborah. (1996). Teaching in natural areas: What urban teachers feel is most appropriate. *Environmental Education Research*, 2(2), 149-58.

Discusses a study of (n=59) urban teachers' perceptions of the use of various natural settings for environmental education. Teachers examined a set of black and white photographs depicting four different natural settings, and made a judgment as to whether particular subjects / lessons could be taught there.

ene, fsd, bft (TE)

Simpson, Barbara. (1996). Science majors— aptitude, interest, and commitment. *GATES*, 3(1), 19-24.

Presents a 10-year study of 6,205 students at Gustavus Adolphus College showing that female science majors enter college well-prepared, are strongly career

oriented, and report that they are content in their major, well-adjusted, and satisfied with their lives.

car, gen, chs (PS)

Sobolewski, Stanley J.; Doran, Rodney J. (1996). Replication of a path analysis model of secondary physics enrollments: 20 years later. *Journal of Research in Science Teaching*, 33(5), 501-12.

Duplicates an analysis conducted 20 years ago on physics enrollment in New York State in an attempt to verify the exploratory percentage enrollment in physics path analysis model using data gathered for the 1990-91 school year.

asm, car (HS)

Speering, Wendy; Rennie, Leonie. (1996). Students' perceptions about science: The impact of transition from primary to secondary school. *Research in Science Education*, 26(3), 283-98.

Reports on a longitudinal study which mapped the transition between primary and secondary school from a student perspective. Explores how this transition impacts the way students think about, learn, and enjoy science at school.

ats, bkg, lrg (MS)

Spencer, Harry E. (1996). Mathematical SAT test scores and college chemistry grades. *Journal of Chemical Education*, 73(12), 1150-53.

Explores the comparative performance of various segments of the student sample in general chemistry courses relative to their scores on the mathematical SAT test. Results indicate that mathematical skill measured by the SAT scores is an important factor in determining grades.

ach, che, gen (PS)

Sprod, Tim; Jones, Brian. (1996). Throwing light on teaching science. *Australian Science Teachers Journal*, 42(4), 21-25.

Reports on research into the cognitive basis of children's alternative conceptions regarding light and sight. Highlights three factors that were found to interfere with effective teaching in science and suggests ways teachers can modify their approaches to circumvent them. Discusses ambiguity and the role of language, experience and concepts, and everyday knowledge versus school knowledge.

alf, ccg, ped, kns (K-12)

Stofflett, Rene T., Stefanon, Laurie. (1996). Elementary teacher candidates' conceptions of successful conceptual change teaching. *Journal of Elementary Science Education*, 8(2), 1-20.

Examines preservice elementary teachers' constructs for analyzing their own conceptual change classroom practice. Reports that the candidates used six student-oriented and seven teacher-oriented evaluation criteria and the five most frequent categories were all student-oriented.

knt, ped, ccg, asm (TE)

Stohr-Hunt, Patricia M. (1996). An analysis of frequency of hands-on experience and science achievement. *Journal of Research in Science Teaching*, 33(1), 101-09.

Performed a variance analysis of the relation between the amount of time students spend experiencing hands-on science and science achievement. Reports that students who engaged in hands-on activities frequently scored significantly higher on a standardized test.

hos, ach (SE)

Stalheim-Smith, Ann; Scharmann, Lawrence C. (1996). General biology: Creating a positive learning environment for elementary education majors. *Journal of Science Teacher Education*, 7(3), 169-178.

Achievement of elementary education majors in a Principles of Biology course was significantly improved when a recitation section was designed to provide an environment more conducive to personal needs, learning styles, and interest orientations of the students.

ach, ped, lrg, bio, lsy (PS, TE)

Stratford, Steven J.; Finkel, Elizabeth A. (1996). The impact of science ware and foundations on students' attitudes towards science and science classes. *Journal of Science Education and Technology*, 5(1), 59-67.

Describes changes in students' ideas about science classes, attitudes about science, and motivations for studying science in a classroom designed to support project-based science learning. Results suggest that providing students with the opportunities to collect and analyze their own data results in a change in students' ideas.

ats, bfs, ped (SE)

Summerfield, John. (1996). Resourcing practical science: Some issues for primary school science coordinators. *Primary Science Review*, (44), 21-23.

Investigates different perceptions of resource provision, management, and use to support

investigative and other practical science. Findings indicate that overall schools are building up an increasingly broad resource base, reflecting the range of content required in the National Curriculum.

cur, mat, ref (K-12)

Taber, Keith S. (1996). Chlorine is an oxide, heat causes molecules to melt, and sodium reacts badly in chlorine: A survey of the background knowledge of one A-level chemistry class. *School Science Review*, 78(282), 39-48.

Argues that surveying what new students understand about the basics of a subject can be illuminating. Presents a case study of A-level chemistry students and suggests that although the details of what was uncovered are idiosyncratic, the paucity of understanding of fundamental concepts may be common.

alf, kns (SE)

Tarsitani, Carlo; Vicentini, Matilde. (1996). Scientific mental representations of thermodynamics. *Science and Education*, 5(1), 51-68.

Analyzes textbooks on thermodynamics with the aim of showing that several mental representations of this subject matter are present in scientific literature. Outlines divergent attitudes towards the definition of fundamental concepts and also towards the epistemological status of thermodynamics.

mat, phy, rem, nas, phe (SE)

Tobias, Sheila; Raphael, Jacqueline B. (1996). In-class examinations in college-level science: New theory, new practice. *Journal of Science Education and Technology*, 5(4), 311-20.

Discusses innovations in testing methods in college-level science. Highlights previous efforts at reform, new thinking, new practices, and computer-generated exams and scoring systems. Reports on focus group interviews.

asm, ref (PS)

Tobin, Kenneth; McRobbie, Campbell J. (1996). Significance of limited English proficiency and cultural capital to the performance in science of Chinese-Australians. *Journal of Research in Science Teaching*, 33(3), 265-82.

Investigates Chinese-Australian students' learning of chemistry. Reports that despite students' efforts to learn chemistry with understanding, difficulties in speaking and writing English were factors that limited performance.

che, mce, lrg (SE)

Tobin, Kenneth; McRobbie, Campbell J. (1996). Cultural myths as constraints to the enacted science curriculum. *Science Education*, 80(2), 223-41.

This study of the teaching of grade 11 chemistry indicates how an experienced teacher made sense of his teaching roles in terms of four cultural myths related to transmission of knowledge, being efficient, maintaining the rigor of the curriculum, and preparing students to be successful on examinations.

bft, phe, ped (HS)

Tobin, Kenneth; Tippins, Deborah J. (1996). Metaphors as seeds for conceptual change and the improvement of science teaching. *Science Education*, 80(6), 711-30.

Reviews research on the relationships between teacher metaphors and the teaching and learning of science. Portrays metaphors as a way in which knowledge about science teaching can be re-presented and as potential foci for discussions about enacted science curricula.

ped, res, tpd, ceg (K-12)

Tomanek, Debra. (1996). Creating interest in teaching: Science classroom experiences for academically talented college science majors. *Journal of Science Teacher Education*, 7(3), 213-225.

Article describes a project designed to recruit successful science majors into secondary science teacher education programs. Project methods, a participant case study, and a summary of how the project has informed efforts to recruit academically talented science majors into precollege teaching are presented.

car, tpd, chs (PS, TE)

Trumper, Ricardo. (1996). A survey of Israeli physics students' conceptions of energy in pre-service training for high school teachers. *Research in Science and Technological Education*, 14(2), 179-92.

Analyzes conceptions of energy of physics students in a pre-service teacher training program. Findings indicate that the students are considerably anthropocentric in their associations, their choice of pictures, and their alternative conceptions.

knt, alf, phy (PS, TE)

Trumper, Ricardo; Gorsky, Paul. (1996). A cross-college age study about physics students' conceptions of force in pre-service training for high school teachers. *Physics Education*, 31(4), 227-36.

Examines student teachers' understanding of the concept of force using a two-part written

questionnaire. Findings indicate that there is a serious discrepancy between student teachers' understanding of force and the accepted scientific view.

knt, alf, phy (TE)

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

Explores the differences of problem-solving procedures and thinking structures between science and nonscience Chinese graduate students. Discusses differences in designing experiments, exploring new questions, planning, assumptions, and validity.

pbs, kns, car, lsy (PS)

Tunnicliffe, Sue Dale. (1996). The relationship between pupils' age and the content of conversations generated at three types of animal exhibits. *Research in Science Education*, 26(4), 461-80.

Reports on a study designed to reveal the contents of the conversations of two main age groups of primary children who visited three types of animal exhibits: (1) at a museum; (2) live animals at the zoo; and (3) animated dinosaurs and preserved animals. The results raise concerns about whether effective science teaching is occurring in these settings.

nfd, cid, lrg (EC)

Varelas, Maria. (1996). Between theory and data in a seventh-grade science class. *Journal of Research in Science Teaching*, 33(3), 229-63.

Presents and analyzes data focusing on: (a) how teacher and students moved between theory and data in a unit designed to engage seventh-grade students mostly in the deductive direction of scientific activity; and (b) how the dialectic of education was played out in the classroom.

pbs, ped, cid, nas (MS)

Vaz, Arnaldo; Watts, Mike. (1996). A clash of cultures: Physics and the primary scientist. *Early Child Development and Care*, 117, 99-112.

Uses writings of Paulo Freire to discuss situation of British primary teachers required to teach science without specialized training. Cites interviews with teachers that point to cultural clashes between National Curriculum physics and primary practice. Conflicts exist between facilitating child-centered discovery learning and teaching, and children's developmental stages and piecemeal teaching.

bft, ref, lrg, ped (EC)

Vaz, M.; et al. (1996). Student perspectives on the role of formative assessment in physiology. *Medical Teacher*, 18(4), 324-26.

Describes a study of pre-clinical students (n=91) that explored their reactions to formative assessment. Results indicate that the majority of the students reacted positively to the assessment explaining that it enabled them to self evaluate.

asm, ats (PS)

Viglietta, Luisa. (1996). Science education journals: From theory to practice. *Science Education*, 80(4), 367-94.

Surveyed a sample of science education journals based on information provided by their editors about standing policy and practice with regard to publications. Focused on the problem of communication within and between the different sectors of the science education community from researchers to teachers.

res, mat, ntw (PS, TE)

Wade, Kimberly S. (1996). EE teacher inservice education: The need for new perspectives. *Journal of Environmental Education*, 27(2), 11-17.

Reports on a survey that investigated inservice teacher education (K-12). Results indicate that professional development in environmental education is dominated by activity-based curricula, is primarily science-oriented rather than interdisciplinary, and is concerned more with environmental content than educational context.

ene, tpd, cur, int (TE)

Wang, Jianjun; Staver, John R. (1996). An empirical approach toward the prediction of students' science achievement in the United States and Hubei, China. *Journal of Research in Science Teaching*, 33(3), 283-301.

Explores a possible model for the prediction of students' science achievement in China and the United States based on the ninth-grade data base from Phase II of the Second IEA (International Association for the Evaluation of Science Achievement) Science Study (SISS).

ach, asm, cul (K-12)

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.

tec, cid, ntw, edt (PS)

Whiteley, Peter. (1996). The gender balance of physics textbooks: Caribbean and British books, 1985-91. *Physics Education*, 31(3), 169-74.

Survey of 7 physics textbooks in use in the Caribbean and Britain found a gender imbalance showing frequent depiction of males, particularly as adults, which may have an adverse effect on the numbers of girls continuing their studies in physics.

gen, mat, eqt, phy (HS)

Wilson, Jan. (1996). Concept maps about chemical equilibrium and students' achievement scores. *Research in Science Education*. 26(2), 169-85.

Examines relationships between structural characteristics of students' concept maps about chemical equilibrium and independent measures of their achievement in chemistry. Results indicate significant relationships between multidimensional scaling coordinates and test scores.

kns, ach (SE)

Wilson, Ruth A.; Smith, Jodie. (1996). Environmental education and the education literature. *Journal of Environmental Education*. 27(2), 40-42.

Explores the extent to which current professional education literature is publishing material on environmental education in the school curriculum. Results indicate that readers will not readily find information on how to infuse environmental education into the curriculum.

ene, res int, cur (K-12)

Wong, Angela F.; Fraser, Barry J. (1996). Environment-attitude associations in the chemistry laboratory classroom. *Research in Science and Technological Education*, 14(1), 91-102.

Explores associations between students' (n=1592) perceptions of their chemistry laboratory classroom environment and their attitudes towards chemistry. Findings indicate significant associations between the nature of the chemistry laboratory classroom environment and the students' attitudinal outcome.

bfs, ats, lab, che (SE)

Woodrow, Janice E.J.; et al. (1996). The impact of technology-enhanced science instruction on pedagogical beliefs and practices. *Journal of Science Education and Technology*, 5(3), 241-52.

Presents a qualitative case study of the Technology-Enhanced Secondary Science Instruction (TESSI) model. Reports that implementation resulted in significant changes in the educational beliefs and the teaching and learning practices of those involved.

bft, tec, phe, cur, ped (HS)

Woolnough, Brian E. (1996). Changing pupils' attitudes to careers in science. *Physics Education*, 31(5), 301-08.

Analyzes the attitudes of students from age 11 to 16 (n=654) towards science careers and the effect of school science on those attitudes. Discusses the implications for teaching in the context of motivational factors.

car, ats, ped (SE)

Yager, Robert E. (1996). Science-technology-society: A reform appropriate for students with disabilities. *Journal of Science for Persons with Disabilities*, 4(1), 14-19.

Describes the Science-Technology-Society (STS) movement and the Iowa Chautauqua Model. Discusses the results of studies in Iowa that looked at the effect of STS upon students with learning disabilities. Results indicate that most students with learning disabilities are better served in classes employing the STS approach than they are in textbook-dominated classes.

sts, chs, cur (K-12)

Yager, Robert E.; et al. (1996). Do national standards indicate the need for reform in science teacher education? *Journal of Science Teacher Education*, 7(2), 85-94.

Concludes that science teacher education has changed little in 30 years and describes fur factors integral to future reform in science teacher education: defining leadership; forming partnerships; using what we know from research about learning, instruction and teaching; and building collaboratives.

tpd, ref, res, ntw, lth (TE)

Zeegers, Petrus; Giles, Lynne. (1996). Essay writing in biology: An example of effective student learning. *Research in Science Education*, 26(4), 437-59.

The views of first-year biology students on an essay writing assignment were evaluated through a

questionnaire. Makes a series of recommendations to help students develop improved writing strategies, minimize the possible difficulties encountered, and allow the writing exercise to be an integral part of learning.

sks, bio, ats, ped (PS)

Zimmerman, Laura K. (1996). Knowledge, affect, and the environment: 15 years of research (1979-1993). *Journal of Environmental Education*, 27(3), 41-44.

Discusses research on classroom-type settings and applications. Results indicate an association between knowledge and affect along with prominent gender differences.

res, cid, gen, ene, his (SE)

Zohar, Anat. (1996). Transfer and retention of reasoning strategies taught in biological contexts. *Research in Science and Technological Education*, 14(2), 205-19.

Describes students' initial thinking strategies and investigates the influence of learning environments on progress, transfer, and retention of students' thinking strategies.

kns, lsy, bio, bkg (SE)

Zoller, Uri. (1996). The use of examinations for revealing and distinguishing between students' misconceptions, misunderstandings and "no conceptions" in college chemistry. *Research in Science Education*, 26(3), 317-26.

Describes a study of freshman science majors (n=50) that explores the role of higher-order cognitive skills examinations in identifying misconceptions in chemistry. Discusses the use of such examinations in remediation via appropriate modification of teaching strategies.

alf, asm, lth, ped (PS)

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.

Describes a study that explored the attitudes of students (n=501) and teachers (n=53) toward computers. 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.

ats, att, tec, cur (HS)

Zwick, Thomas T.; Miller, Kenneth W. (1996). A comparison of integrated outdoor education activities and traditional science learning with American Indian students. *Journal of American Indian Education*, 35(2), 1-9.

Comparison of a culturally-sensitive activity-based outdoor science curriculum with a traditional textbook and classroom approach found that fourth-grade American Indian students in the activity-based group had significantly higher science achievement scores than those in the control group. There were no significant differences between Indian and non-Indian students receiving activity-based instruction.

eth, cur, fsd, ene, ach, mee (EC)

Journals Searched

Academic Medicine (1)
American Biology Teacher (6)
American Journal of Physics (2)
Australian Science Teachers Journal (7)
AWIS Magazine (2)
BioScience (20
Bulletin of Science, Technology and Society (1)
Computers & Education (1)
Computers in the Schools (1)
Curator (1)
Early Child Development and Care (1)
Environmental Education (2)
Environmental Education Research (2)
Environmentalist (1)
European Journal of Engineering Education (1)
European Journal of Psychology of Education (1)
GATES (2)
Gifted Education International (1)
Higher Education (1)
International Journal of Environmental Education and Information (2)
Journal of American Indian Education (1)
Journal of Chemical Education (8)
Journal of College Science Teaching (7)
Journal of Computer Assisted Learning (1)
Journal of Computers in Mathematics and Science Teaching (4)
Journal of Computing in Teacher Education (1)
Journal of Educational Computing Research (1)
Journal of Elementary Science Education (6)
Journal of Environmental Education (10)
Journal of Natural Resources and Life Sciences Education (1)
Journal of Research in Science Teaching (35)
Journal of Science Education and Technology (13)
Journal of Science for Persons with Disabilities (1)
Journal of Science Teacher Education (17)
Journal of Special Education (1)
Medical Teacher (1)
NASSP Bulletin (1)
New Schools, New Communities (1)
Ohio Journal of Science (2)
Physics Education (4)
Physics Teacher (2)
Primary Science Review (4)
Research in Science and Technological Education (11)
Research in Science Education (23)
School Science and Mathematics (8)
School Science Review (5)
Science and Children (1)
Science and Education (1)
Science Communication (1)
Science Education (18)
Science Education International (1)
T.H.E. Journal (1)
Teaching Learning Issues (1)

Research Papers and Monographs Produced in 1996

Andrea K. Balas, *The Ohio State University*

This section lists 76 papers and monographs in science education research that were produced in 1996 and abstracted for the ERIC database by the end of July, 1997. Each entry is coded (see Key to Codes) with one to three major codes (in bold type) and up to three minor codes, as well as the grade level (in parentheses). Studies related to preservice or inservice teacher education are indicated by the the code for "teacher professional development" (tpd). The level designation that accompanies the teacher professional development varies, depending on the focus of the research. A general code, "TE," is used if the research focuses strictly on issues related to teacher educatio, but a second level code is added when appropriate to indicate the grade level(s) at which the intern or teacher participants teach. All entries are indexed by major codes at the end of the volume (see page 149).

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

TIMSS collected information about pupils' knowledge and understanding of mathematics and science, curricula, and teaching and learning practices. Data collection instruments included tests and questionnaires completed by schools, teachers, and pupils. This report summarizes the TIMSS results for Secondary 1 and Secondary 2 pupils.

res, kns, cur, ped, ach, gen (K-12, TE)

Anderman, Eric M. (1996). *The middle school experience: Effects on the math and science achievement of learning disabled adolescents.* Paper presented at the Biennial Meeting of the Society for Research on Adolescence (Boston, MA, March 7-10, 1996). [ED 397 617]

This study examined the relationship between transition from elementary to middle school and achievement gaps in math and science in eighth graders with (n=296) and without (n=1608) learning disabilities.

chs, ach, bkg (MS, HS)

Arena, Carolyn B. (1996). *Academic research instruments: Expenditures 1993 and needs 1994.* Arlington, VA: National Science Foundation. [SE 059 785]

This report analyzes overall instrumentation issues and trends in all the fields covered by the survey: agriculture, biology, chemistry, computer science, environmental sciences, physics/astronomy, and engineering.

res, asm, bio, che, phy (PS)

Bell, Beverley; Gilbert, John. (1996). *Teacher development: A model from science education.* Bristol, PA: Falmer Press, Taylor and Francis, Inc. [SE 058 122]

This book documents a three-year science teacher research project that employed new teaching activities to respond to students' thinking, constructivist views of learning, and alternative conceptions. The theme is that teaching is practiced in a public arena and governed by rules and norms.

tpd, skt, ped, cns, cur (TE)

Campbell, Jay R.; et al. (1996). *NAEP 1994 trends in academic progress. Achievement of U.S. students in science, 1969 to 1994; mathematics, 1973 to 1994; reading, 1971 to 1994; writing, 1984 to 1994.* Washington, DC: National Center for Education Statistics. [ED 403 328]

This report presents results of the National Assessment of Educational Progress (NAEP) 1994 trend assessments in science, mathematics, reading, and writing. NAEP used a 0 to 500 scale for each subject area. Comparisons of average scale scores are provided across the years in which trend assessments have been administered and among subpopulations of students.

ach, res, eth, bkg (K-12)

Chambers, Jack A., (Ed.) (1996). *Selected Papers from the National Conference on College Teaching and Learning* (7th, Jacksonville, Florida, March 20-23, 1996). [ED 401 867]

This collection of 20 papers is centered on the theme "Teaching, Learning, and Technology—Strategies to Motivate Life Long Learning."

res, sts, cht, lsy, tpd, ref (PS, TE, ALL)

Chang, Wen-Hua. (April, 1996). *Introducing philosophy of science through an activity for in-service teachers to experience social constructing of knowledge.* Paper presented at the National Association for Research in Science Teaching Conference. (69th, St. Louis, MO, April 2, 1996). [SE 058 310]

In this study teachers experienced the social construction of knowledge in a learning cycle activity. They agreed about the importance of the learners' preconceptions in learning science. In a survey conducted four months later, they described constructivism in terms of learners' preconceptions in science teaching.

tpd, cns, ped. lrg, phe, lth (TE)

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 445 Wellesley College (Massachusetts) women students matriculating in 1991 through their college years to isolate factors associated with persistence in math and science. Data were gathered through three surveys (at orientation, at the end of the sophomore year, and before graduation) and in focus groups over the 4 years of the study.

car, gen, ats. chs (PS)

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

The implementation trial involved selection of curriculum priorities for assessing mathematics and science. This report details methods and results of an evaluation of the implementation trial. Sources of information included interviews, questionnaires, log sheets, and reports.

cur, asm, tec. ntw (TE, EL)

Davis, Cinda-Sue.; et al. (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. Critical issues facing women in these disciplines are addressed.

car, gen, eqt. cur (ALL, TE)

Dodge, Elizabeth.; Mulvey, Patrick J. (1996). *Graduate student report, 1995.* American Institute of Physics, Education and Employment Statistics Division, College Park, MD. [ED 399 915]

An annual study of physical science graduate students' background characteristics and degree recipients' employment outcomes was conducted for 1995. The total pool of 1994-95 physics graduate students was 13,285 with non-U.S. citizens making up 43 percent.

chs, phy, car. eth, gen (PS)

Dong, Yu Ren. (1996). *A cross-cultural relationship between the advisor and the advisee: Dissertation writing supervision in science.* Paper presented at the Annual Meeting of the Teachers of English to Speakers of Other Languages (30th, Chicago, IL, March 1996). [ED 394 331]

A study examined the supervisory relationship between a non-native English-speaking doctoral student and a native English-speaking advisor, particularly in science, focusing on factors leading to effective or ineffective supervision, advisee response to advisor guidance and assistance, and the roles played by the two participants.

ats, att, eth. mce, bkg (PS, TE)

Driver, Rosalind; et al. (1996). *Young people's images of science.* United Kingdom. [SE 058 006]

This research project was undertaken to elicit and to describe the range and nature of school students' understandings of the nature of science. The study was a cross age study of three student age groups: 9, 12, and 16 years. Data from four different interview probes are presented and discussed.

kns, nas (K-12)

Ediger, Marlow. (1996). *Science achievement and the pupil.* [SE 058 611]

This document is a collection of four papers dealing with science achievement and teaching and learning strategies. They include Quality in the Science Curriculum, Reading Achievement in Science, Portfolios and the Pupil, and Improving the Science Curriculum.

ach, ped. lsy, asm, cur (K-12)

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. [SE 058 962]

This study provides research into the reform in school curriculum programs in Iowa for mathematics and science, as being implemented by the National Council of Teachers of Mathematics and the National Research Council.

cur, ref, att. cht (TE, K-12)

Federal science and engineering support to universities, colleges, and nonprofit institutions: Fiscal year 1994. (1996). Arlington, VA: National Science Foundation. [SE 059 060]

The data presented in the statistical tables in this document represent all categories of direct federal science and engineering support to institutions of higher education in the United States. The 15 federal agencies included provided virtually all funding for S&E research and development at universities and colleges.

res, mat (PS)

Fensham, Peter J. (1996). *Science and technology education in the post-compulsory years.* Melbourne, Victoria, Australia: Australian Council for Educational Research, Ltd. [SE 057 859]

This book highlights the importance of science and technology education in the post-compulsory years. It contains an account of the changes in the societal and educational contexts that have led to post-compulsory education being conceived as a distinctive stage in the formal educational provision.

sts, cur, bkg, sks (TE, PS, AD)

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 Initiative in Mathematics and Science (GIMS) Atlanta, GA, 1996. [SE 059 503]

An analysis of data reveals that with respect to curriculum there are no substandard schools; however, there are significant differences in teacher qualifications and teacher attitudes. The author's reflections on life as a middle-school science teacher are presented along with a discussion of the goals and activities of GIMS.

eth, gen, cur, att, ref, tpd (ALL, TE)

Fleer, Marilyn, (Ed.) (1996). *Play through the profiles: Profiles through play.* Watson, Australia: Australian Early Childhood Association, Inc. [ED 399 050]

Recognizing the perceived conflict between a belief in the value of play to early childhood development and a commitment to an early childhood pedagogical framework, this book attempts to validate play as a fundamental component of learning and an avenue through which learning outcomes can be identified and confirmed.

cur, asm, nfd, tec, ene (EC)

FY 96 awards. *Teacher preparation and NSF collaboratives for excellence in teacher preparation. (1996).* Arlington, VA: National Science Foundation. [SE 060 144]

This book provides project descriptions of exciting programs in teacher education that have the potential for significant national impact. They are rich in content, current in pedagogy, serve a diverse set of students and institutions, and respond to the call for new directions.

tpd, ref, ped, tec, knt (ALL, TE)

Gardner, Paul L. (1996). *Technology Education in Australia: National Policy and State Implementation.* Paper presented at the Jerusalem International Science and Technology Education Conference (2nd, Jerusalem, Israel, January, 1996). [SE 058 382]

Models of the technology curriculum which have influenced local curriculum design are described and characteristics which distinguish the new curricula from previous forms of technical education are identified. The paper ends by identifying some of the practical problems that have emerged as educational systems attempt to implement technology studies.

tec, cur, ref, sts (HS)

Ginns, Ian S.; Watters, James J. (1996). *The professional growth of a primary school teacher engaged in an innovative primary science trial curriculum development project utilizing satellite broadcasting.* Paper presented at the Annual Conference of the Australasian Science Education Research Association (Canberra, Australian Capital Territory, Australia, July 1996). [ED 398 907]

This paper reports the involvement of a grade 4 teacher in the project and analyzes her professional growth in the areas of self-efficacy and motivation. The subject showed no quantitative changes in self-efficacy; however, her pedagogical content knowledge and confidence to teach science in the concept areas covered by the broadcast were enhanced.

tpd, knt, cht, cur, tec (TE, EL)

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

car, cur, bkg, tec (PS)

Hammrich, Penny L. (1996). *Biology graduate teaching assistants' conceptions about the nature of teaching.* Pennsylvania. [SE 059 281]

An open-ended questionnaire was used to explore how graduate students define the teaching of science. Results indicated that after the seminar graduate teaching assistants changed their conceptions of good science teaching to include knowing pedagogical strategies.

bft, ped, bio, skt, phe (TE, PS)

Hammrich, Penny L. (1996). *The resilience of girls in science: A framework.* Arlington, VA: National Science Foundation. [SE 059 282]

This framework provides an overview of the emerging literature on the gender gap in science and seeks to contribute to the growing body of research emphasizing factors that have been shown to enhance women's ways of knowing in science; thereby, transcending gender stereotypes in science.

gen, chs, bkg, lrg, ach (ALL)

Haslam, M. Bruce; et al. (1996). *Evaluation of the Dwight D. Eisenhower Mathematics and Science Regional Consortiums Program: First interim report, 1996.* Washington, DC: U.S. Dept. of Education. [SE 058 712]

This report provides a description of the Dwight D. Eisenhower Mathematics and Science Regional Consortium Program's early operations. In this first round of evaluation, the report seeks to describe the federal formulation of the program's purpose, early organization of the Consortia, and work of the Consortia.

cur, tpd, ref (K-12)

Heidari, Farzin. (1996). *Laboratory barriers in science, engineering, and mathematics for students with disabilities.* Regional Alliance for Science, Engineering, and Mathematics; New Mexico State University. [ED 397 583]

This report addresses the barriers college students with disabilities face in the laboratory setting. The characteristics that should be considered for the design of innovative tools or for modifying existing equipment in the laboratory settings are examined. Factors are highlighted that should be considered before the modification of laboratories.

chs, lab, mat, cur (PS)

Herbster, Douglas L.; et al. (1996). *Comparing university students and community college students learning styles and Myers-Briggs Type Indicator (MBTI) preferences.* Paper presented at the Annual Meeting of the Association of Teacher Educators (St. Louis, MO, February 24-28, 1996). [ED 395 907]

This is a study to determine if there is a pattern between specific learning styles and Myers-Briggs Type Indicator preferences. The learning style inventory used for the study, "The Teaching and Learning Styles Survey for Adolescents (TLC)," is based on Jungian style preferences.

lsy, asm, chs (PS)

Hess-Quimbita, Grace.; Pavel, Michael. (1996). *Assessing an environmental attitude development model: Factors influencing the environmental attitudes of college students.* Paper presented at the Annual Meeting of the American Educational Research Association (New York, NY, April 8-12, 1996). [ED 394 438]

A study investigated factors affecting the development of positive attitudes toward environmental issues among college students, focusing on the direct and indirect effects of student background characteristics, institutional characteristics, and college experience and outcomes variables.

ats, gen, ene, bkg, cur, chs (PS)

Higbee, Jeanne L., (Ed.); Dwinell, Patricia L., (Ed.). (1996). *Defining developmental education: Theory, research, & pedagogy.* Monograph. National Association for Developmental Education. [ED 394 415]

This monograph presents seven papers on the research, and pedagogical aspects of developmental education and implications for a definition of developmental education.

ref, res, lrg, eth, gen, cpl (PS)

Hill, Susan T. (1996). *Science and engineering degrees, by race/ethnicity of recipients: 1987-94.* Arlington, VA: National Science Foundation. [SE 059 901]

This publication is based on data obtained by the National Center for Education Statistics from all accredited institutions of higher education. Findings indicate that the number of bachelor's degrees in science and engineering fields awarded to minority students showed robust growth in the early 1990s.

car, eth (PS)

Hirzy, Ellen Cochran. (1996). *True needs, true partners: Museums and schools transforming education.* Washington, DC: Institute of Museum Services. [SE 059 557]

Fifteen museum school projects are described, all of which received Museum Leadership Initiatives grants in 1994. The chapter "Conditions for Partnerships" describes factors that should form the foundation for partnership between museum educators and school educators.

nfd, ntw, cur, ped (TE)

Humphrey, Daniel C.; et al. (1996). *Evaluation of the Dwight D. Eisenhower Mathematics and Science State Curriculum Frameworks Projects: First interim report, 1996.* Washington, DC: U.S. Dept. of Education. [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.

cur, tpd, ref (K-12, TE)

Improving student achievement in science. (1996). Arlington, VA: Educational Research Service. [SE 059 715]

The handbook is based on the idea that efforts to improve instruction must focus on the existing knowledge base about effective teaching and learning. It gives school administrators and teachers a ready source of authoritative, practitioner-based information about research on effective teaching and learning.

ped, lsy, lth, ach, knt (K-12, TE)

Jewett, Thomas O. (1996). *"And they is us": Gender issues in the instruction of science.* Illinois. [SE 059 543]

This paper reviews research concerning women's negative or ambivalent attitude toward science and how that attitude is often reinforced by teachers. Research concerning the topic points to two main factors: parental and societal perceptions and teacher behavior and expectations.

gen, bkg, ats, bft (ALL, TE)

Johnson, Jean M. (1996). *Human resources for science and technology: The European region.* Arlington, VA: National Science Foundation. [SE 059 732]

This report has been prepared to provide as consistent a database as possible on human resources for science in the specified European countries. Additionally, it provides data on population, education, and science and technology personnel.

tec, ntw, bkg (PS)

Koballa, Thomas R.; et al. (1996). *WOWBugs: Materials development and classroom implementation of a novel organism.* Arlington, VA: National Science Foundation. [SE 059 641]

Middle school teachers were introduced to and practiced with prototype activities for use in life science classes. Preliminary results indicate that they recognized few barriers to teaching life science concepts in the areas of animal behavior and reproduction and life cycles using the WOWBug.

bio, cur, ped, hos (MS, TE)

Koballa, Thomas R. Jr.; et al. (1996). *Science education for the 21st century: Creating a culture for collaboration.* Final program and abstracts, 1996 NARST annual meeting. [SE 058 198]

This document contains the final program and abstracts of the 1996 National Association for Research in Science Teaching (NARST) Annual Meeting held in St. Louis, Missouri. The presentations are classified in strands. First authors' addresses and a participant index are also included.

res (K-12, TE)

Layman, John W.; et al. (1996). *Inquiry and learning: Realizing science standards in the classroom.* New York: College Board. [SE 059 658]

This book provides responses to the questions: How does standards-based science instruction look? and How can teachers verify that students have attained learning? Answers emerge from data of the work of science teachers, research findings in student cognition/learning, and the Standards.

ped, ref, asm, lth, kns (TE, K-12)

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

This monograph contains a description of the procedures used and results obtained from the study of Population 2 which included the two adjacent grade levels containing the largest proportion of thirteen-year-old students at the time of testing.

ach, asm (SE)

Mason, Diana. (April, 1996). *Life after ChemCom: Do they succeed in university-level chemistry courses?* Paper presented at the Annual Meeting of the National Association for Research in Science Teaching (69th, St. Louis, MO, April 2, 1996.) [SE 058 246]

The purpose of this study was to identify students enrolled in a university-level chemistry course designed for the nonscience major who had experienced the ChemCom curriculum in high school and to evaluate their success. ChemCom group did not exhibit a statistically significant difference.

cur, ach, sts, che (HS, PS)

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. [SE 059 190]

This document concluded that SMSO and TIMSS offer an important opportunity to learn more about international variations in curriculum and instructional practice in mathematics and science. This data provide a rare opportunity in discourse about mathematics and science education, its analysis, and improvement.

res, cul, ref, ped, phe (K-12)

Mathematics and science education around the world: What can we learn? (1996). Arlington, VA: National Science Foundation. [SE 059 261]

This brochure outlines what such international studies can help us learn, how this study was conducted, and what the United States and other countries might be able to glean from TIMSS. Included are a timeline for the release of the TIMSS data and directions about whom to contact for further information.

res, asm, ref, kns (TE, K-12)

Minicucci, Catherine. (1996). *Learning science and English: How school reform advances scientific learning for limited English proficient middle school students.* Educational practice report: 17. Santa Cruz, CA: 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.

mce, cur (MS, HS)

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 details about Minnesota eighth grade achievement results compared to the results of the United States and other nations by mathematics and science content areas.

ach, asm, cul (K-12)

Murray, Frank B., (Ed.). (1996). *The teacher educator's handbook: Building a knowledge base for the preparation of teachers.* San Francisco, CA: Jossey-Bass Publishers. [ED 394 902]

In this book, leading scholars address a range of issues, ideas, and research findings in the field of teacher education, examining specific disciplines, social foundations, and program structures, as well as school reform and diversity.

tpd, cur, phe, ref, bkg (K-12, TE)

NSTA awareness kit for the National Science Education Standards: Teachers' workshop manual. (1996). Washington, DC: The Annenberg/CPB Project. [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. The Guide was developed to share information about the ways in which schools, districts, and states are approaching mathematics and science education.

ref, cur, ntw, mat (K-12)

Pace, C. Robert. (1996). *Contrasts between science and humanities majors in undergraduate outcomes and activities.* Paper presented at the Annual Meeting of the Association for the Study of Higher Education (Memphis, TN, October 31 - November 3, 1996). [ED 402 833]

The study found some differences between science and humanities majors, although not as great as those

reflected in C. P. Snow's study of eminent physical scientists and literary intellectuals. The study did find that science majors reported greater progress in analytical skills while humanities majors report greater progress in interpersonal skills.

sks, chs, car (PS)

Pugach, Marleen C.; Warger, Cynthia L., (Eds.) (1996). *Curriculum trends, special education, and reform: Refocusing the conversation.* New York: Teachers College Press. [ED 400 656]

The impact of major trends is considered in the context of special education programming and the current reform movement, followed by a closer look at specific curriculum trends in major academic subject areas and their potential impact on special education. Each curriculum chapter is followed by a series of commentaries.

ref, chs, cur, eqt (EC, K-12)

Pushkin, David B. (1996). *Paradigms and postmodernism in science and science education.* Paper presented at the National Science Teachers Association Global Summit Conference (San Francisco, CA, December, 1996). [SE 059 176]

This paper discusses four themes: the evolution of physics, the evolution of chemistry, the evolution of science education, and the impact of postmodernism on science education. The need for emancipation from the modernistic paradigm is highlighted in order to foster critical thinking and greater scientific literacy.

nas, phe, his, ref (K-12, TE)

Reckase, Mark D. (1996). *The design and field test of the ACT portfolio system.* Paper presented at the Annual Meeting of the National Council on Measurement in Education (New York, NY, April 8-12, 1996). [ED 400 313]

The field test is designed to determine whether it is possible to implement a portfolio assessment model on a national level that will result in scores that are of sufficient reliability and validity that they can be used for decisions at the student level. An early decision by the ACT was to develop the assessment with the direct collaboration of teachers.

asm, res (HS, TE)

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

This project brings faculty together from all sectors of higher education across disciplinary lines with their administrative colleagues to explore what works in strong undergraduate programs. It includes information about the project, the institutions and people involved, important issues and activities, and future plans.

ntw, ref, cur (TE, PS)

Rhoton, Jack ; Bowers, Patricia, (Eds.). (1996). *Issues in science education.* Arlington, VA: National Science Teachers Association. [SE 060 471]

This publication addresses issues and practical approaches needed for science educators. It shares ideas, insights, and experiences of individuals representing science education. Examples illustrate the utility of topics and address general issues and perspectives related to science education reform.

ped, tpd, ref (TE, K-12)

Roberts, Lily; et al. (1996). *Local assessment moderation in SEPUP.* Paper presented at the Annual Meeting of the American Educational Research Association (New York, NY, April 8-12, 1996). [ED 402 322]

Local teams of teachers met to score student work, discuss and resolve discrepancies in scoring, and reach consensus on exemplars of work for each score level. Discussions explore the way moderation meetings were intended to function and the ways they did function in reality.

asm, tpd, ntw, knt (MS, TE)

Robinson, Scott; DiNizo, Tricia. (1996). *Magical memories and rejuvenation through reflection: Stories of the development of a preservice secondary science teacher.* Paper presented at the Annual Meeting of the National Science Teachers Association Southern Area Convention (Atlanta, GA, October 31-November 3, 1996). [SE 059 204]

The paper examines the motives and interests of a female preservice science teacher and it contains her autobiographical stories. The themes that emerge from the stories—effective teachers, her own teaching, and gender—are also discussed.

gen, bft, cht, ped, tpd (TE, HS)

Rubba, Peter A., (Ed.); et al. (1996). *Proceedings of the 1996 annual international conference of the Association for the Education of Teachers in Science.* Pensacola, FL: Association for the Education of Teachers in Science. [SE 058 617]

These conference proceedings include papers presented and summaries of presentations made at the

1996 Annual International Conference of the Association for the Education of Teachers in Science (AETS) held at Charleston, West Virginia.

res, tpd (K-12, TE)

Russell, Robert. (1996). *Science and mathematics education reform: What do parents need to know to get involved?* Washington, DC: American Association for the Advancement of Science. [SE 059 004]

This report summarizes the findings of focus groups in seven cites across the country, including the key findings of the literature review on parent involvement, and key recommendations for involving parents in science education.

res, bkg, ref (K-12)

Sanders, Jo. (1996). *Institutionalizing gender equity in teacher education.* Paper presented at the Annual Meeting of the American Association of Colleges for Teacher Education (48th, Chicago, IL, February 21-24, 1996). [ED 392 779]

Teacher Education Equity Project was designed to bring gender equity to teacher education. Early results indicate that the percentage of participants whose syllabi mentioned gender equity doubled, while those whose syllabi specifically targeted gender equity increased sevenfold.

gen, knt, eqt, ref, tpd (TE, ALL)

Schiel, Jeff.; et al. (1996). *Factors associated with longitudinal educational achievement, as measured by PLAN and ACT assessment cores.* Iowa City, IO: American College Testing Program. [ED 403 298]

The findings show that, in a typical high school, eleventh- and twelfth-grade students who took upper-level mathematics or science courses had higher ACT mathematics, science reasoning, and composite scores than those who did not take these courses.

sks, ach, bkg, eth, gen (HS)

Science and Engineering degrees: 1966-94. (1996). Arlington, VA: National Science Foundation. [SE 059 201]

This report provides information on science and engineering degrees conferred in the aggregate United States over the period 1966-1994. Degree data are compiled for a 12-month period. Data are classified by total number of degrees, gender, major field, and age.

his, car, chs, gen (PS)

Selected data on science and engineering doctorate awards: 1995. (1996). Arlington, VA: National Science Foundation. [SE 058 602]

The data presented show trends in doctorate awards by science engineering field and recipient characteristics, institutions awarding doctorates, and post-graduation plans of recipients. The source of the data is the Survey of Earned Doctorates.

car, chs (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 is the final report of an intensive review of the state of undergraduate education in science, mathematics, engineering and technology (SME&T) in America. The year-long review has revealed that significant change is occurring and that important and measurable improvements have been achieved in the past decade.

ref, cur, asm, ach (PS)

Shepardson, Daniel P.; Adams, Paul E. (1996). *Perspectives on assessment in science: Voices from the field.* Paper presented at the Annual Meeting of the National Association for Research in Science Teaching (St. Louis, MO, March 1996). [ED 399 266]

This study was conducted to investigate the perspectives of science teachers on classroom assessment. It was grounded in a socioconstructivist theory that posits that teachers construct personal understandings and beliefs within the contexts of their school cultures.

asm, bft, cns, tpd, bkg (TE, K-12)

Shim, Mee-Hye. (1996). *Teaching about the history of science and technology in history classrooms: A new direction in STS education.* [ED 402 252]

A quick review of research on the purpose of history of science education reveals a general consensus that it should support citizenship education and the inculcation of democratic principles. STS instruction satisfies these requirements through its focus on individual initiative, social responsibility, and the interdependence between society and technology.

cur, his, phe, res (K-12)

Shinohara, Mayumi, (Ed.); et al. (1996). *Tales from the electronic frontier: First-hand experiences of teachers and students using the internet in K-12 math and*

science. Washington, DC: Office of Educational Research and Improvement. [ED 400 776]

This document presents first-hand experiences of teachers and students using the Internet in K-12 math and science.

tec, ped, ats, [illegible] (K-12, TE)

Stassenberg, Arnold A. (1996). *Perspective on reform in mathematics and science education, monograph #3.* Arlington, VA: National Science Teachers Association. [SE 058 544]

The document describes the basic premise on which the Scope, Sequence and Curriculum project was built. It describes the programs at various sites, ongoing efforts and results.

ref, phe, cur (K-12, TE)

Stecher, Brian M.; Klein, Stephen P. (1996). *Performance assessments in science: Hands-on tasks and scoring guides*. Santa Monica, CA: RAND. [SE 058 395]

The project goals were to assess the reliability and validity of hands-on science testing and to investigate the cost and practicality of these measures for large-scale assessment. These measures provide researchers with a basic set of tasks for studying student performance.

hos, asm, ach, kns, sks (K-12)

Sykes, Robert C.; et al. (1996). *Scaling polychotomous items that have been scored by two raters.* Paper presented at the Annual Meeting of the National Council on Measurement in Education (New York, NY, April 9-11, 1996). [ED 400 318]

This study evaluated the effect of summing as opposed to averaging ratings in situations when both polychotomous constructed-response and dichotomous selected-response (multiple choice) items were used to measure one construct and then placed on a common scale.

asm (HS)

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. Also highlighted are the research questions that guided TIMSS.

res, asm, phe (K-12)

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

The underlying theme of this book illustrates how constructivist ideas can be used by science and mathematics educators for research and the further improvement of educational practice. Authors from various parts of the world describe their work investigating students' conceptions, improving teaching and curricula, and enhancing teacher education in science and mathematics contexts.

cns, ped, alf, tpd, ref (K-12, TE)

Turner, Jeannine. (1996). *Final report on the NSF grant to the Science Academy of Austin, 1994.* Publication Number 94.04. Arlington, VA: National Science Foundation. [ED 403 318]

This evaluation report covers the fourth, and last, year of the grant's implementation. The new curriculum aimed to improve teaching skills in kindergarten through grade 12 with technology tools that are available but underutilized and to increase student performance in science using holistic interdisciplinary approaches with opportunities to apply concepts in real-world settings.

ach, tec, skt, int, ped (K-12)

Tutt, Betty.; 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 (48th, Chicago, IL, February 21-24, 1996). [ED395912]

The teacher education program at William Woods University (WWU) in central Missouri has developed five partnership projects that have served as the impetus for the gradual restructuring of the university's education program into a more holistic, interdisciplinary experience for the preservice teacher.

tpd, ntw, int, ref (TE, EL)

Vos, Kenneth E. (Ed.) (1996). *A perspective on reform in mathematics and science education, monograph #1.* Washington, DC: U.S. Dept. of Education. [SE 058 713]

The document describes the basic premises on which the SS&C project is built, the programs at various sites that have been part of the project's implementation, and the results and ongoing efforts at those sites. It also offers advice about how to implement and overcome major obstacles of an SS&C program.

ref, phe, cur (K-12)

What schools can do to improve math and science achievement by minority and female students. (1996). Washington, DC: Department of Education. [SE 059 538]

This pamphlet reviews survey data concerning the representation of minority and female students in math and science courses at the elementary and secondary level and attainment of postsecondary degrees in these academic disciplines. Information for improving interest and achievement in math and science is included.

car, eth, gen, ach, ats (ALL)

Yen, Chi-Lin; et al. (1996). *Proceedings of the National Science Council, Republic of China part D: Mathematics, science, and technology education, vol. 6, no.1-2, January-July 1996.* Taipei, Taiwan, Republic of China: Taiwan National Science Council [SE 058 925]

These proceedings include 13 papers in the areas of: mathematics, chemistry, physics, biology, and technology education, science education theory, science curriculum and instructional materials, science teaching methods and learning environments, evaluation and assessment in science, and science teacher professional development.

res (TE, ALL)

Young, Barbara N.; Hoffman, Lyubov. (1996). *Discovery lab in the chemistry lecture room: Design and evaluation of audio-visual constructivist methodology of teaching descriptive inorganic chemistry.* Paper presented at the Annual Meeting of the American Association of Colleges for Teacher Education (Chicago, IL, February 21-24, 1996). [SE 059 154]

This study concluded that audio-visual discovery lab experiments can be used in teaching descriptive inorganic chemistry, but further research needs to be done to improve the quality and methodological design of audio-visual presentations. Data were collected for quantitative and qualitative analysis.

edt, lab, ach, ats, che (SE)

Index

Every dissertation, journal article, paper, and monograph listed in the preceding three sections has been categorized by one to three major codes. Each publication is indexed here according to the major codes, and the complete set of major codes for each publication is listed after each entry.

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Blough,Roger cbi, ped, ach
Bronson, Janet Ruth cbi, ats, att
Cavalier, Jamie Carolyn ped, cbi, ach
Coulter, Robert W. cbi, kns, phe
Franson, Bruce Allan cbi, ccg
Hakerem, Gita Dvora cbi, lrg
Hale, Patricia Lauren cbi, cpl, cid
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Meadows, George R. ccg, cbi
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Everett, K. G., et al. gen, car, che
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Park, Sunghye asm, chs
Schroeder, Patricia Gayle chs, kns, cpl
Shields, Lynne Marie cid, ped, chs
Smist, Julianne Marie chs, ats, gen
Verna, Marilyn Ann bkg, chs, ach
Webb, Evelyn E. J. chs, ach
Whittley, Ruby Sue gen, cpl, chs

Articles

Carlisle & Chang ats, att, chs
Hays,Timothy A. chs, cbi, lrg
Lee & Brophy ats, ccg, chs
Lunt, Barry M. ach, chs
Maitra & Kumari bfs, car, chs
Meece & Jones gen, chs, lsy
Palmer, David kns, bio, chs
Paterson, Craig C. bio, ach, chs
Simpson, Barbara car, gen, chs
Tomanek, Debra car, tpd, chs
Yager, Robert E. sts, chs

Papers

Anderman, Eric M. chs, ach
Dodge & Mulvey chs, phy, car
Hammrich, Penny L. gen, chs, bkg
Heidari, Farzin chs, lab, mat
Herbster, D. L., et al. lsy, asm, chs
Pace, C. Robert sks, chs, car
Pugach & Warger (Eds.) ref, chs, cur
Science and engineering his, car, chs
Selected data on science... car, chs

Teacher Characteristics (cht)

Dissertations

Kiviet, Agnes M. cht, att, bft
Mahyoub, Ahmed A. chs, cht, lrg
Martof, Norma M. bft, cht, bkg
Morey, Marilyn ach, ped, cht
Poe, Peggy M. att, bft, cht
Priestley, Holly D. lab, ped, cht
Schinzel, Dan D. cur, cht

Articles

Bradford & Dana bft, cht, skt
Cannon &Scharmann cht, cpl, ped
Hardy, Garry R., et al. mat, cht
Lane, Jennie, et al. ene, cht, att
Leask, Marilyn, et al. cht, eth, bkg
Lindauer & Queitzsch cht, bkg, bio
Morais & Miranda asm, bkg, cht