WHAT CURRENTLY EXISTS IN EARTHQUAKE EDUCATION

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ABSTRACT

May, 1988, an education project was initiated at the National Center for Earthquake Engineering Research. An initial focus of this project was the initiation of a survey of state education departments to see who was offering earthquake education. In addition to discerning whether a state or particular school was offering earthquake education, surveyed programs were also asked the following: whether FEMA's Guidebook for Developing a School Earthquake Safety Program (December, 1985) was being used, what natural hazards curricula was being implemented, and if there was a school or classroom with a model natural hazards program. Throughout the time of the survey, copies of and information about earthquake education curricula, related software, and supplemental informational materials and books was collected and compiled. The result of this was a bibliography of earthquake education materials. This presentation will present a general overview of earthquake education curricula, highlighting differences in curricular emphases.

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Ms. Katharyn E.K. Ross joined the National Center for Earthquake Engineering Research (NCEER) at the State University of New York at Buffalo after many years as a teacher and developer of programs for children, primarily for those who are developmentally disabled. Educated at the State University of New York College at Buffalo, she is currently Education Specialist at NCEER where she is responsible for the development and oversight of earthquake education programs created by the Center.

Earthquake education curricula, as well as its implementation, has had varying emphases. It has been a part of science, safety, social studies, and even integrated throughout the curriculum.

Some curriculum developers feel it is important to fully understand the science to appreciate the hazard and thereby consistently respond appropriately in an earthquake. Other curriculum developers emphasize that all students need to know is what to do in the event of an earthquake. As a result, some materials focus primarily on earthquake science while others emphasize earthquake safety.

Busy teachers do not have time to debate where earthquake education belongs in the existing curriculum. Their time is compromised by other demands. They need to be given quality materials that fit comfortably into their existing curricula. It is hoped that conferences such as this one will provide a forum in which to discuss the benefits of varying curricula and implementation techniques so that conflicting focuses or approaches will not interfere with the integration of earthquake education into the school program.

The following is a brief overview of the existing curricula:

CALEEP Curriculum **For grades 4-8**

Lawrence Hall of Science
University of California
at Berkeley
Berkeley, CA 94720
* More information can be found:

1. Dr. William Ritz
   Science & Math Institute
   CSU
   Long Beach, CA 90840
2. Dr. Bonnie Brunckhorst
   Associate Professor of Science Education
   CSU
   San Bernardino, CA 92407

"Mini-Kit" consists of 14 Hands-On earthquake education activities:

a. Teacher's Guide - including blackline masters
b. Computer Disk - (Apple II+ and/or IIe with disk drive)
   Quake: A Computer Simulation and
   Survival: A Computer Simulation Game
c. Filmstrip
d. Audio Cassette Tape - disc jockey, Mr. Pate,
   experiencing 1964 Alaska Earthquake
e. AAA map California

Can purchase Quake BINGO, Await the Quake game and Simulator Kit separately.
The Complete CALEEP Kit contains 22 activities.

I Can Make A The Difference
Chair
Emergency Preparedness Committee
Utah State PTA
1037 E. South Temple
Salt Lake City, UT 84102
* Mrs. Patty Sandstrom

For Primary Grades, written at 4th grade reading level.

This contains a series of units on a number of areas involving emergency preparedness: fire, earthquake, flood, nuclear war, and weather problems. Each unit is organized according to the same format and includes: a picture of a house in the student's community which becomes a home when each child imagines he lives there; an introductory poem; "What Would I Do" exercises; "Things I Should Know;" and games and puzzles. The earthquake section includes a map showing Utah earthquakes, an earthquake work hunt, and safety rules crossword puzzle.

Crustal Evolution Education Project
available from:
Ward's Natural Science Establishment, Inc.
5100 W. Henrietta Rd.
P.O. Box 92912
Rochester, NY 14692-9012
(p. 111-116)
1-800-962-2660

Designed primarily **for grades 7-12**

This consists of 33 individual activity modules designed to provide students with an understanding "of the concepts behind plate tectonics and the physical Earth." Each module is individual, self-contained and designed for the Earth Science classroom. Modules include: "Locating Active Plate Boundaries by Earthquake Data," "Earthquakes and Plate Boundaries," "Plate Boundaries and Earthquake Prediction," "Hot Spots in the Earth's Crust," "Volcanoes: Where and Why?" and "Quake Estate," a board game to be played by two to four students at a time and whose goal is, "to achieve success in net income based on accuracy of assessing earthquake risks" (copyright, 1979).
The CEEP is not intended to be a complete curriculum but designed to adapt to any teacher's curriculum.

Earthquake Awareness and Preparedness Curriculum
Junior League of Oakland-East Bay
3730 Mt. Diablo Blvd.
Suite 310
Lafayette, CA 94549
* Linda Grandt
Patricia Monson

For grades Pre-K-6; has been used with students up to 8th grade.

This is a 1 hour curriculum that anyone can pick up and do. It is aimed at elementary students. There is a curriculum guide that provides lessons for each grade level, an Instructor's Guide from Environmental Volunteers, Inc., and role playing situations from CALEEP. There are also supporting videotapes that show each level of the curriculum that were prepared by JLOEB, the Albany Unified School District, and the Audubon Nature Training Society: preschool level, middle school, high school-adult (not included in the curriculum), and "School Facilitation." These can be borrowed from BAREPP.

Earthquakes: A Teacher's Package for K-6/FEMA 159 **For grades: K-6**

Federal Emergency Management Agency
Earthquakes and Natural Hazards
Programs Division
500 C Street, S.W.
Washington, DC 20472

This 250 page curriculum includes background material; sets of lessons and classroom activities on earthquake science and safety topics for each of three grade levels (K-2, 3-4, 5-6); scope and sequence charts depicting multidisciplinary connections; masters for reproduction; references; and resources. This package is designed for teachers who have little or no science background.

Earthquakes (Module) **For grades: 8-10**

"Minorities in Engineering" Project
Currently used by MESA
University of Washington
353 Loew Hall, FH-18
Seattle, WA 98195
* Dr. Tom Liau
SUNY at Stony Brook

This is a module designed to interest students in earthquakes through activities, modeling, engineering applications, and simulation strategies. Has 12 lessons: 1-5 introduce students to earthquakes; 6-9 talks about observed precursors of earthquakes and introduces seismograms; and 10-12 try to make earthquake investigation relevant to students. Includes directions for making related items and doing experiments, i.e. making your own tiltmeter, creepmeter, shoebox model of a fault simulator, liquefaction simulation, resonating building demonstration, and earthquake simulation. Includes reproducible charts and maps. Can be used in part or total in an earth science or general science course. NCEER has been given permission to reproduce copies of this module on request.

Guidebook for Developing a School Earthquake Safety Program/ FEMA 88
Federal Emergency Management Agency
P.O. Box 70274
Washington, DC 20024
* Marilyn P. MacCabe

Designed to assist school community to develop and tailor an earthquake safety program for the school.

This is a 60-page guide plus appendices that include reprints of FEMA 46, 48, and 113.
The Guidebook includes:
"The Planning Process"
"Hazard Identification"
"Earthquake Drills"
"Immediate Response and Care Requirements"
"Communication"
"Post-Earthquake Shelter Planning"

Appendices include: "Teacher's Package On Earthquake Drills," an example of an earthquake safety program plan; sections on "Children and Disasters" and "Non-Structural Earthquake Damage."
This is designed mainly as a guidebook, not a curriculum. It allows the school to be its own planner. It is included in this listing because many districts noted that it was the curriculum they were using.

Hands-On Earthquake Learning Package **For grades: K - 12**
Environmental Volunteers
2448 Watson Court
Palo Alto, CA 94303
(415) 424-8035

1. **Instructor's Guide**
   a. 17 illustrated, plastic-protected Activity Folders
   b. 16 information/activity inserts (including quake myths, games, puzzles, math activity, "tremor tales").
   c. Illustrated text on basic earthquake geology: The Story of the Earth
   d. Red Cross' Safety and Survival in an Earthquake
   e. "Getting Ready for a Big Quake" - Sunset magazine
   f. Complete guide to school earthquake planning
   g. Neighborhood Preparedness Guide
   h. "Plans for the Teaching Materials"

2. **Hands-On Teaching Materials**
   a. Plate Tectonics Globe (removable plates)
   b. Earth Hemisphere Model

c. Plate Puzzle map (ocean floor features)
d. Wood Plate/Fault Blocks
e. 9 ft. sq. plate tectonics rug (pattern also available)
f. Sea Floor Basalt rock sample
g. Sea Floor spreading box
h. Time cards, markers and time-tape
i. Continental Drift film (computer-generated)
j. Fault Zone Model
k. Magni-tube Model
l. Motor driven shaking table and accessories

I - Science Mate Program (Integrating Math, Science and Technology) **For grades: K-6**

Math Science Nucleus
3710 Yale Way
Fremont, CA 94538
* Dr. Joyce Blueford

Plate Tectonic Cycle - The Earth on the Move (part of a master science curriculum consisting of six master themes and 24 subthemes).

1. Lab manuals for grades 2-6
2. Shaker tables (made of cardboard, marbles, wood, etc.)
3. Lessons/with experiments and worksheets for grades K-6. Plate Tectonics Cycle includes: Volcanoes, Earthquakes, Plate Tectonics, and Hazards. NCEER has copies of the lessons, experiments, and worksheets from K-6 and some books used in the lessons.
4. Also available from Math Science Nucleus:
   a. Historical Earthquake Slides
   b. Recent Earthquake Slides
   c. Inflatable globe
   d. Glue Balls - to illustrate faults have memory
   e. Physiographic Relief Globe

K-12 Earthquake Science Curriculum **For grades: K-12**

Los Angeles Unified School District
Office of Emergency Services
Room G-314
450 North Grand Avenue
Los Angeles, CA 90012
* Jerry Kurilich

Teachers receive an 8 hour inservice and then are given either an elementary (K-6) or secondary (7-12) guide; also have a resource kit. This curriculum is currently waiting for Board approval and funding for completion and distribution.

Plan to Live

For Secondary grades;
written at 11th grade reading level

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Emergency Preparedness Committee
Utah State PTA
1037 E. South Temple
Salt Lake City, UT 84102
* Mrs. Joy Bossi

This includes a series of lessons on various natural and manmade hazards, including earthquakes. Earthquake related lessons include: "What to Do in Case of an Earthquake," "How to Prepare for an Earthquake," and "Information You Should Know About Earthquakes." Test questions are included at the end of each lesson.

Project Quake

For grades K-6

* Linda Noson

This "is an interdisciplinary, supplementary, environmental and safety program emphasizing the impact of earthquakes on the human physical, social and emotional environment." (p. 1)
It consists of 2 parts: a curriculum package and facilities package. The curriculum package has 4 goals: 1. Awareness 2. Understanding 3. Preparedness in the schools 4. Preparedness in the community. Section #4 has not been developed.
* Since our bibliography was completed, "Project Quake" is no longer at the Washington state legislature. It was not funded for further development through the state. Currently it exists as a preliminary curriculum and it will be reviewed by the Pacific Science Center for a trainer's workshop along with other earthquake materials. In that workshop they will select activities to include in an instructor's guide and develop activities where there are curriculum gaps, such as in the area of seismic design.

Teaching Earthquake Safety in the Elementary Classroom

For grades: K-3

Utah Museum of Natural History
University of Utah
Salt Lake City, UT 84112
* Deedee O'Brien

A 1/2 hour session gives children basic earthquake information utilizing simple activities, myths and factual information. It includes the Kamchatka Myth poster (originally obtained from CALEEP), Wasatach Fault poster and five follow-up activities (adapted from CALEEP to reflect the Utah scene). A Fault Blockset available from NASCO science is recommended. This curriculum is easily adaptable for general use outside of Utah. Note: Utah Museum of Natural History currently only source for CALEEP's Kamchatka Myth Posters.

Utah Geologic Hazards

For Grades 4 - Senior High School

Utah Museum of Natural History
University of Utah
Salt Lake City, UT 84112
* Deedee O'Brien

This includes a two-part slide presentation and a two foot square model of a section of the Wasatch Front. Part I - mountain leveling processes of rockfall, landslide, mudflow, flood, and lake level rises. Part II - mountain building process-earthquake. It gives a general explanation of earthquakes, reviews the situation in Utah and what could happen in a major earthquake. This is followed by an earthquake safety session. Follow-up activities on earthquake safety are left with the classroom teacher. These were adapted from CALEEP materials to reflect the Utah scene.

* Notes principle author