EDST 610: Current Issues and Research in Science (Three Credits)—Fall, 2003

Instructor: Joseph Keating, Ph.D. Associate Professor of Science Education, Single Subject Program Co-Coordinator in the College of Education
Class Schedule: All classes meet Thursday from and 6:00-8:45
Room: UH 442
Office Hours: UH 309 by appt.
Phone: 760-7504321
email: jkeating@csusm.edu
fax: 760-7503237

California State University San Marcos
COLLEGE OF EDUCATION

Mission Statement

The mission of the College of Education Community is to collaboratively transform public education by preparing thoughtful educators and advancing professional practices. We are committed to diversity, educational equity, and social justice, exemplified through reflective teaching, life-long learning, innovative research, and ongoing service. Our practices demonstrate a commitment to student-centered education, diversity, collaboration, professionalism, and shared governance.

Description: The description and the course objectives/ schedule may be subject to adjustment, additions or subtraction based on student and teacher input before, during and after completion of this course. The purpose of the course should serve multiple purposes all related to the understanding and the challenges of teaching science in today's schools. One purpose is to familiarize the student with the major issues in science education at the state, national and international levels and the corresponding research as evidenced through readings, discussion and lectures. A second purpose is to use this focus, to personalize the inquiry by a proposing and implementing a more formal inquiry/investigation in their own classroom or school. The model that will be taught and used for this is called action research. An additional benefit to this project is that it will (or may) also involve multiple forms of technology (and math) to design, implement, analyze, present and disseminate their findings. Many of these processes also serve as models for the National Board requirements and are also examples of applications of National Technology Standards for Teachers. For example, three aspects of National Board requirements that will be integrated include: 1) applying action research to the analysis of a classroom issue or problem; 2) the use of edited digital video and still photography to document some aspect of the teaching/learning process and 3) dissemination of these findings to school personnel and parents. The National Technology standards for teachers that will be utilized (Standards I-VI p.306) 'that will improve curriculum, teaching and learning, assessment and evaluation, and productivity and professional practice' include as a minimum knowledge and application of word processing, statistical software programs, databases, internet web searches, scanning, using and editing digital film and multimedia presentations. A third purpose of the course is to investigate the use of the dominant model in science (the Inquiry Model) by sharing and critiquing inquiry-

based lessons from teacher participants. The fourth purpose is to investigate the nature and source of science knowledge in its origins as the more universal process than is widely presented in the media and texts used today.

Required Texts:
"Issues in Science Education" (1997) Edited by Jack Rhoton and Patricia Bowers. NSTA Publications. ISBN 0-87355-137-0
"Lost Discoveries..The Ancient Roots of Modern Science" (2002) by Dick Teresi. Simon and Schuster. ISBN 0-684-83718-8
"Cases in Middle and Secondary Science Education" by Koballa and Tippins.. Second Edition. Pearson Merrill Prentice Hall ISBN O-13-112798-5

Supplemental: (parts to be provided or in some cases downloaded)
1)"Research within Reach: Science Education—A Research-Guided Response to the Concerns of Educators" (1995) Edited by David Holdzkom and Pamela Lutz. NSTA ISBN None found.
2)" What We Know About How People Learn"(2002) California Journal of Science Education. Volume II, Issue 2. CSTA.
3)National Educational Technology Standards for Teachers. (2002). International Society for Technology in Education Press. ISBN 1-56484-173-1
4) "Classroom Instruction that Works—Research Based Strategies for Increasing Student Achievement" (2001) McREL Labs: Robert Marzano, Debra Pickering and Jane Pollock. ASCD.
5) "Scoring Rubrics In the Classroom—Using Performance Criteria for Assessing and Improving Student Performance" (2001). Edited by Judith Arter and Jay McTighe. Corwin Press.
6) "How The Brain Learns" (2001) David Sousa. Corwin Press.

Objectives: upon completion of this course the student will be able to demonstrate knowledge, understanding, appreciation and (or) practical skills for applying.....
1) knowledge of the major issues in science education at the state, national and international level.
2) action research design to ones' own practice (as related directly or indirectly to one of these major issues).
3) a more multicultural, Universalist approach to the understanding of science investigation and knowledge
4) a variety of technological skills in the design, implementation, analysis and presentation of the action research project as well as in other aspects of the course.
5) effective means to disseminate one's research information to school personnel and parents.
6) the inquiry, constructivist problem solving model of teaching through a hands-on, interactive presentation.

Course Schedule(and related Readings):

Session Tentative Topic Readings and Assignments Due

#1 September 4 Introduction/ Overview of Syllabus/ Assignments/ Teaching Issues

#2 September 11 Science Education Reform (pp1-48): Discussion/Questions
Action Research Model and Examples
TIMMS Study Summary and McREL Lab Findings (Keating)

#3 September 18 Science Education Research (pp 73-95) Discussion/Questions
"Research findings on the importance of teacher affect (teacher dispositions) on effective teaching" (Keating)
Presentation of a Inquiry based model : Discrepant Event (The Mystery Box) ( Keating)

#4 September 25 Science Assessment and Evaluation (pp96-129)
Action Research Proposal Presentations

#5 October 2 Science Education Leadership (pp 130-161)
Designing Rubrics for Performance Assessments (Keating)
Demonstration of Collaborative Inquiry model (2 pairs)

#6 October 9 Effecting Change in Science Education ( pp.162-191)
Demonstration of Collaborative Inquiry model (2 pairs)

#7 October 16 (No Class—Credit/ Substitute iMovie2 Workshop in Joan Hanor's class)

#8 October 23 Professional Development in Science Education (pp. 192-227)
Demonstration of Collaborative Inquiry model (2 pairs)
"Factors That Effect Success of Navajo Students" (Keating)

#9 October 30 Jigsaw of Cases…(all Ch 1 As a Pedagogical and Research Tool)
Grant Writing Workshop (or "Find me the Money")
Brain Research on Learning 1: Biorhythms and Sleep Deprivation (Keating)

#10 November 6 Cases: Ch 2 Adolescent Learners in Science and Ch 3 Reform and Science Curriculum
Book of the Month Meeting (Discoveries Ch 1-3)
Demonstration of Collaborative Discrepant Event (2 pairs)

#11 November 13 Cases: Ch 4 Planning for Science Instruction and Ch 5 Organizing a Positive Learning Environment

Brain Research on Learning 2; Multiple Intelligences and how people best learn Science (Keating)

Demonstration of Collaborative Discrepant Event (2 pairs)

#12 November 20 Cases: Ch 6 Learning in the Science Classroom and Ch 7 Learning in the Laboratory and Informal Settings

Book of the Month Meeting (Discoveries Ch 4-6) (Keating)

Demonstration of Collaborative Discrepant Event (2 pairs)

#13 November 27 (no class Thanksgiving)

#14 December 4 Cases: Ch 8 Controversial Issues in the Science Classroom and Ch 9 The Role of Technology in Science Teaching…

Presentation Dr Moses Ochanji "Science Education in Kenya"

Book of the Month Meeting (Discoveries Ch 7-8) (Keating)

#15 December 11 Cases: Ch 10 Assessments in Science and Ch 11 Student Teaching and Mentoring

(Final) Presentation of Action Research and Supporting Video

#16 December 18 Ch 12 Cased Based Instruction (Use a real situation to present in pairs: an open case with written solution and written response (by partner) to the open case and present in class)

Presentation of Action Research and Supporting Video

Instructor Evaluations/ Course Overview

**Overview of Assignments**:

- Expectations are that all assignments will be professionally done (i.e. typed and at the highest quality level representative of graduate work)
- Citations should always be used when utilizing information from another source as well as quotations if direct quotes are used
- punctuality and attendance is essential and missed assignments and classes will be excused only for highly unusual circumstances. Any assignments that could be made up from missed days (not all could since they are group and interactive) will only count a maximum of 1/2 since discussion/reflection of these assignments in class is an essential part of the process.

**List and Value of Assignments**

1) Reflections/comments on each reading assignment (self assessment) 1pts@13=13pts
2) Attendance and Participation in discussion/evaluations = 2pts@16=32pts
3) Science Discrepant Event/Inquiry Presentation 10pts
4) Action Research Proposal/Final Draft Part 1 ( 5+5)=10 pts
5) Action Research Presentation and Video Documentary 15 pts
6) Jigsaw of "Lost Discoveries"5 pts
7) Jigsaw of "Cases in Middle and Secondary Science Education" and presentation of open case 5 + 5= 10pts

Total = 100 pts. Possible

A = 90-100 (A or A-)
B = 80-89 (B+, B or B-)
C = 70-79 (C+, C or C-) repeat course for less than C+
D = 60-69 repeat course
F = < 60 repeat course