

**CALIFORNIA STATE UNIVERSITY, SAN MARCOS
COLLEGE OF EDUCATION
EDST 613A: Literature Review in Science Education
Alvin Dunn Elementary School
Thursdays 5.30 – 8.15 P.M.**

General Information:

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Other times are also available by appointment so please feel free to call or e-mail me to set up a convenient time to meet.

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.

Required Reading Material:

There will be several readings selected from educational journals, electronic journals, websites and other periodicals that will be assigned throughout the semester. Students will be required to contribute journal articles of particular relevance and interest to the class as the semester progresses.

This process will involve regular use of the library. Electronic access to the University library is required since journals are only available electronically through the library. Students will be encouraged to build an electronic binder of the readings.

Course Objectives:

The goal of this course is to introduce students to current areas of research in the field of science education. Students will be introduced to a broad spectrum of science education literature from diverse sources. The aim is to increase student's knowledge of:

- The foundations of science education research
- Research implications in science teaching
- Various research methods as they are applied in science education research
- Critical areas of science education that have been informed by scholarly inquiry
- How to synthesize the results of multiple research studies
- Implications that can be drawn from science education research
- How investigators conceptualize their work
- How to develop a line of scholarly inquiry
- The skills of collaboration and debate about research findings and interpretations
- Strategies for making effective presentations that synthesize research findings from multiple sources.

Course Description:

This course will be largely discussion based. Each weekly class session will begin with students spending time discussing their interpretations of the assigned articles in a small group format. Students will spend 45 minutes to one hour of each class period discussing the day's assigned readings with their group. The instructor will move from one group to another to provide guidance and assistance with the discussions as well as pose questions for each of the groups to consider during their discussions.

During the small group discussions, each member of the group will serve as a discussion leader. The group will need to set up a schedule for equally sharing this role. Beyond the role of "moderator," discussion leaders are responsible for suggesting topics and questions for the same group discussion. They should also accept a special responsibility of helping members of their group to understand the articles being discussed. This will require extra preparation. Each member of the group will be asked to rate his or her peers in terms of their effectiveness as group discussion leaders.

The remaining portion of the class will be spent as a large group forum where each of the small group moderators will share the outcomes of their conversations about the articles. Students who took responsibility for contributing to the articles set for that night's class will serve as the large group discussion leaders during this part of the evening. Each student will have an opportunity to lead the all class discussion at least once in the semester. Sign up dates will be available in class.

On selected occasions during the semester, quest researchers will visit the class and give presentations on their work followed by question and answer session. During these special events, students will be required to spend the first portion of the class developing a list of questions to ask the quest during his or her quest presentation based on assigned articles for that evening.

COE Attendance Policy

Due to the dynamic and interactive nature of courses in the College of Education, all students are expected to attend all classes and participate actively. At a minimum,

students must attend more than 80% of class time, or s/he may not receive a passing grade for the course at the discretion of the instructor. Individual instructors may adopt more stringent attendance requirements. Should the student have extenuating circumstances, s/he should contact the instructor as soon as possible.

For this class, each day you are absent from class drops your maximum final grade by one letter grade. If you are absent for a day your highest possible score will be A- if you are absent twice your highest possible score will be B+ etc. If you are absent more than two days your highest possible grade is a B, which means you may not receive a passing grade for this course. Late arrivals and early departures will affect your final grade. Absences do not change assignment due dates.

Writing

In keeping with the All-University Writing Requirement, all courses must have a writing component of at least 2,500 words (approximately 10 pages), which can be administered in a variety of ways.

Students with Disabilities Requiring Reasonable Accommodations

Students must be approved for services by providing appropriate and recent documentation to the Office of Disable Student Services (DSS). This office is located in Craven Hall 5205, and can be contacted by phone at (760) 750-4905, or TTY (760) 750-4909. Students authorized by DSS to receive reasonable accommodations should meet with their instructor during office hours or, in order to ensure confidentiality, in a more private setting.

CSUSM Academic Honesty Policy

“Students will be expected to adhere to standards of academic honesty and integrity, as outlined in the Student Academic Honesty Policy. All written work and oral assignments must be original work. All ideas/materials that are borrowed from other sources must have appropriate references to the original sources. Any quoted material should give credit to the source and be punctuated with quotation marks.

Students are responsible for honest completion of their work including examinations. There will be no tolerance for infractions. If you believe there has been an infraction by someone in the class, please bring it to the instructor’s attention. The instructor reserves the right to discipline any student for academic dishonesty in accordance with the general rules and regulations of the university. Disciplinary action may include the lowering of grades and/or the assignment of a failing grade for an exam, assignment, or the class as a whole.”

National Board for Professional Teaching Standards (NBPTS)

All courses within the CSUSM masters program are intended to provide a comprehensive professional development experience. Teachers pursuing National Board Certification will find the COE assessment process, including requirements for portfolio completion, particularly helpful. Regardless of whether or not National Board Certification is sought

and achieved, by the time teachers complete the program they will have made and documented significant accomplishments, which will be reflected in their practice.

The National Board for Professional Teaching Standards' (NBPTS) five core propositions that are reflected in the COE masters program course syllabi. The concepts in the five propositions are the heart of the National Board's perspective on what teachers should know and be able to do. They help frame the core experiences and activities that enable teachers to demonstrate a high level of knowledge, skills, dispositions, and commitments described by these propositions. They provide the foundation for all standards and assessment. These propositions are: 1) Teachers are committed to students and their learning; 2) Teachers know the subjects they teach and how to teach those subjects to students; 3) Teachers are responsible for managing and monitoring student learning; 4) Teachers think systematically about their practice and learn from experience; and 5) Teachers are members of learning communities.

CSUSM masters students will be supported in meeting the National Board's high and rigorous standards through the completion of assignments for program courses. Through their portfolios that provide evidence of teaching practice, through student work samples, through videotapes of classroom interaction, and through written commentaries that document and reflect their actions. These sources of evidence serve as a lens to what teachers do and how they think about their practice.

While the larger part of EDST 613 course activities focus on research implications to science teaching and learning, in class activities and assignments are designed such that students will demonstrate their knowledge by responding to topics, assignments and readings that address critical issues of change and through the development of professional growth planning and reflective thinking. Course objectives that align with (NBPTS) indicate that all students will show evidence of the following:

- A commitment to students and their learning.
- Knowledge of the subjects they teach and how to teach them.
- The demonstration of management and monitoring of student learning.
- Thinking systematically about their practice and learning from experience.
- Involvement as members of learning communities.

CRITERIA FOR GRADING ASSIGNMENTS

- A 90-100%: Outstanding work on assignment, excellent syntheses of information and experiences, great insight and application, and excellent writing.
- B 80-89%: Completion of assignment in good form with good syntheses and application of information and experiences; writing is good.

- C 70-79% : Completion of assignment, adequate effort, adequate synthesis of information and application of information and experiences, writing is adequate.
- D 60-69%: Incomplete assignment, inadequate effort and synthesis of information, writing is less than adequate.

Grades will be determined by points earned:

A = 93-100	C+ = 77-79
A- = 90-92	C = 73-76
B+ = 87-89	C- = 70-72
B = 83-86	D = 60-69
B- = 80-82	F = 0-59

Major Assignments:

There are 5 major assignments in this course. Each assignment carries 20% of the overall grade.

1. Leadership and Participation in Class Discussion – 20%

Apart from the journals and readings identified by the instructor, students will have an opportunity to select readings that are of interest to them. Each student will choose two sets of articles for reading about a given theme/topic for a given week. (You will sign up for the topic and day in class). On the day when your journals are read and discussed in class you will also take the responsibility of leading a whole class discussion. During this time you will lead the whole class in summarizing the main points from the small group discussions and in a discussion about the implications of the readings to classroom practice. The instructor will lead the discussion for the first several classes before students can take on leadership roles of the discussions.

Readings will be chosen from the university library online journals listed at the end of this syllabus. Other readings may be chosen from other journals or sources. However, should you choose a reading out of the online journals, then you will take the responsibility of making enough copies for everyone in class.

Each student is expected to participate fully in all of the class activities and discussions. This includes small group discussions, as well as the open seminar discussion with the entire class. During select class meetings, invited guests will participate in the seminar through research presentations and/or interactive videoconferences. Active and thoughtful student participation in all of these sessions is expected. Participation will be strongly considered when determining a student's final grade.

2. Points of Most Significance (POMS) – 20%

Small group discussions are central to this course. Hence, for the course to succeed, it is critical that each student comes to class having thoroughly studied the material to be dealt with by your group and prepared to contribute to an insightful discussion of it. Doing this should involve more than carefully reading the material. You will need to prepare statements of what, in your eyes, are the “Points of Most Significance” (POMS) that are made by the authors of given readings, or that you make about the relations between different authors points or that you think are implied by one or more author’s ideas.

Specifically, a POMS can either one of the for following 3 types: 1) State a particular significant idea contained in an individual reading within the day’s set 2) state how you think significant ideas in two or more of the reprints in the day’s set of readings relate to each other or state how you think significant ideas contained in one or more of the day’s readings relate to significant ideas in one or more the readings dealt with earlier in the course; 3) state an implication for science teaching and/or learning that you draw (exclusive of those drawn by authors) from a significant idea about science that is contained in the day’s readings set. You should typically bring a draft of your POMS for the day to your group discussion. You should put the following information on your POMS cards:

- a) Your name
- b) Type of POMS (e.g. Type I, Type II, or Type III)
- c) The date indicating when the paper readings were discussed in class
- d) The last name of the authors(s) should follow the POMS statement in parenthesis along with the date of the publication (e.g. Ochanji, 2000)

When POMS are submitted for a grade, a maximum of forty points can be earned by a POMS in the first of the three categories above. A maximum of 50 points can be earned by POMS that fall in the other two categories. POMS cards will be collected 4 times through the semester. The best 3 of the POMS will contribute to the final grade.

Your POMS statements should be carefully formulated and then thoroughly reviewed for clarity and for sense (a matter of whether the statement says what you want it to say and whether what you want to say makes sense) before you bring them to class. This will help to make sure that your thoughts about the readings are clear before you join in your group’s discussion. Writing POMS should be considered, first and foremost, preparation for a profitable discussion and only second as a case of writing what may become a graded POMS. Unless there is a very good reason, you should never come to class without having prepared POMS for the set of articles that are to be discussed that day.

When POMS are collected for a grade, they will not be accepted after the first few minutes of class. If you miss class, or are late, on the day that POMS are collected you will not be able to turn in your POMS. If you know in advance that it will be necessary for you to be absent from class, you may give your pack of POMS cards to the instructor

at some time before class so that you are protected against missing one of the four collection dates.

The POMS for a given day (Maximum of 3) are to be legible printed or typewritten on one 3x5- index card with your name on the card's face, in the upper hand corner. You do not have to create a POMS for each individual article, and only one of your POMS will be submitted for the specified set of articles. You will decide which POMS you think is the strongest and turn that one in to be graded. Each POMS is to be no more than 50 words long. You may use both sides of the index card if necessary. Your pack of POMS card will need to be brought with you to class each time so that you are prepared when POMS are collected.

The purpose of small group discussions is to improve the understanding that you and your fellow group-members have of the course readings. This improvement should be reflected in improved POMS (and thereby higher grades). How your group conducts this discussion is left largely to you and other group members to decide. However, prior to each discussion, the discussion leader should state the gist of the readings and his/her ideas as to how they might best be discussed. Other members of the group should feel free to differ with regard to either. Also, it is suggested that some time be provided for a) the consideration of "understanding questions" and expression of opinions and, b) the discussion of each other's POMS.

If these tasks are to be accomplished, each member of the group must be ready, able and willing to participate fully when the group convenes. Students who have broken the class rule and come to class without having prepared POMS will be jeopardizing the quality of their group's discussion and jeopardizing the grades that group members will ultimately earn.

In the case of these four collected POMS, neither the set of readings for which POMS are to be collected, nor the day when they are to be collected will be announced ahead of time. However, the POMS for a given set of readings will never be collected until the next set of readings listed on the course syllabus has been discussed. Only the three highest of the four scores earned on these graded POMS will be used in calculating final grades.

3. Interview an Author Assignment – 20%

Each student will be required to select an author of one or more of the literature articles read in the course and interview him/her about their research. More specifically, each student will need to develop a set of interview questions that address the author's work in relation to the research design, the meaning of the results, and the author's theoretical framework concerning the topic area written about.

The author interview should be relatively brief and may be completed via email, phone or in person depending upon which format the author prefers. The goal is to better understand how the author conceptualizes the research and identifies ways to investigate the topic.

Students will be required to type up a transcript of the interview and provide a short (1 page maximum) commentary on the comments provided by the author. It is important that no one author is interviewed by more than one student from the course to avoid burdening that individual. A list of student-author interview assignments will be maintained by the instructor to avoid any duplication of effort. This assignment should be submitted to the instructor electronically through WebCT on the date indicated in the syllabus.

4. Literature review, Synthesis & Presentation – 20%

As a final project for the course, each student will be required to develop a literature review in preparation for a symposium presentation. The literature review will be a synthesis of relevant research that has been published on a narrowly defined topic area in science education. Students must select a literature topic and have it approved by the instructor prior to the start of the project.

Literature review should present a comprehensive analysis of both seminal research in the topic area, as well as the most current work that has been published. A minimum of 15-20 literature citations is expected depending on the scope of work that has been carried out on a particular area of science education. Particular emphasis should be placed on incorporating the results of key research studies to enhance the literature review and help the audience better interpret the significance of the overall topic for classroom practice. Students are asked to use APA format in preparing the symposium presentation and citing articles. A list of possible journals that will prove useful in completing this review is included as an appendix. This assignment is due at the end of the semester; however, students should begin working on this assignment much earlier in the course.

At the end of the course the entire class will participate in a university symposium in which they will present their literature review to the audience of local educators. Each student will develop a 15-20 minute PowerPoint presentation based on the comprehensive literature review carried out for the final paper assignment. Students will present their work during one of the several concurrent sessions held during the symposium on campus. Audience from the university and local community will be invited to this symposium.

NOTE: There is no paper required to be submitted for this assignment. However each student must submit through WebCT the list of references used for the literature review. A CD copy of the PowerPoint will be submitted to the instructor after the presentation for grading.

5. Research Application in your classroom – 20%

The goal of this assignment is to give students an opportunity to analyze the implications of research findings in their own classrooms. From your literature review in assignment (4) above, you will identify some specific implications to your class. You will then analyze how the implications play in your class through videotaping and sharing. You will videotape at least 3 lessons from your own class and analyze the video to find out how the research finding of your literature review come to play in your class. Select about 15 minutes of video clips that will illustrate how the implications from research come to play in your classroom.

For example, if your literature review focuses on multiple intelligences and your literature review reveals that students exhibit multiple intelligences as learning tools but on the other hand some intelligences are more dominant than others implying that different students will learn best when the most dominant intelligence is utilized. You will demonstrate a case of this implication in your classroom through a 15 minute video that could either focus on one student or several students. The video case does not necessarily have to agree with the literature. However, your analysis should address any discrepancies if they exist.

You will then present this video in class. In your presentation give a brief overview of the research and its implications as well as a brief description of background information about the lesson in the video.

EDST 613A: Class Schedule

For each day some readings are listed. These are the readings for that day's discussion. Discussion leaders for each day will select two more readings for the day they are designated to lead the discussion.

1/20/05 - 1st th Class Session WK1): Syllabus Review, Library Orientation, Leadership signups

1/27/05 - 2nd Class Session (WK2) - Learning Theories: Research and Application

Howe, A. C. (1996). Development of science concepts within a Vygotskian framework. *Science Education*, 80(1): 35-51.

Novak, J. (2002). Meaningful Learning: The essential factor for conceptual change in limited or inappropriate propositional hierarchies leading to empowerment of learners. *Science Education* 86(4): 548-571.

Osborne, J. (1996). Beyond constructivism. *Science Education*, 80(1), 53-82.

2/03/05 - 3rd Class session (WK3): Nature of Science

American Association for the Advancement of Science (1989). *Science for all Americans* (pp. 25-31). Washington, DC: AAAS.

American Association for the Advancement of Science (1993). *Benchmarks for scientific literacy* (pp. 3-20). New York, NY: Oxford University Press

Ogawa, M. (1995). Science education in a multiscience perspective. *Science Education*, 79:583-593.

Smith, M. U. & Scharmann, L. C. (1999). Defining versus describing the nature of science: A pragmatic analysis for classroom teachers and science educators. *Science Education*, 83: 493-509.

Aikenhead, G. (1997). Toward a first nations cross-cultural science and technology curriculum. *Science Education*, 81: 217-238.

Coburn, W., & Loving, C. (2000) Defining "Science" in a multicultural world: Implications for science education. *Science Education*, 85:50-67.

2/10/05 - 4th Class Session (WK4): Access to Science

Stanley, W. & Brickhouse, N. (2000). Teaching sciences: The multicultural question revisited. *Science Education*, 85: 35-49.

Chinn, P. (2002). Asian and Pacific Islander women scientists and engineers: A narrative exploration of model minority, gender, and racial stereotypes. *Journal of Research in Science Teaching*, 39(4): 302-323.

Brand, B. & Glasson, G. (2004). Crossing cultural borders into science teaching: Early life experiences, racial and ethnic identities, and beliefs about diversity. *Journal of Research in Science Teaching*, 41: 119-141.

Gilbert, A. & Yerrick, R. (2001). Same school, separate worlds: A sociocultural study of identity, resistance, and negotiation in a rural, lower track science classroom. *Journal of Research in Science Teaching*, 38(5): 574-598.

2/17/05 - 5th Class Session (WK5): Assessment: Interview an Author Tasks – No class meeting

2/24/05 - 6th Class Session (WK6): Teaching Strategies & Learning in the Content areas

Girod, M., Rau, C., & Schepige, A. (2003). Appreciating the beauty of science ideas: Teaching for aesthetic understanding. *Science Education* 87: 574-587.

Eilam, B. (2002). Strata of comprehending ecology: Looking through the prism of feeding relationships. *Science Education*, 86: 645-671,

Rowe, M.B. (1986). Wait-time: Slowing down may be a way of speeding up. *Journal of Teacher Education*, January-February issue

Hogan, K. (2002). Small groups' ecological reasoning while making an environmental management decision. *Journal of Research in Science Teaching* 39: 341-368.

3/03/05 - 7th Class Session (WK7): Assessment

Everyone reads: Assessment in Science Education which is Chapter 5 in the National Science Education Standards available online at:
<http://www.nap.edu/readingroom/books/nses/html/5.html>

Bell, B. & Cowie, B. (2001). The characteristics of formative assessment in science education. *Science Education*, 85:536-553.

Solano-Flores, G. & Nelson-Barber, S. (2001). On the cultural validity of science assessments. *Journal of Research in Science Teaching*, 38(5): 553-573.

Novak, J. (1991). Clarify with concept maps. *The Science Teacher*, October, pp. 45-49.

Fusco, D. & Barton, A.C. (2001) Representing student achievements in science. *Journal of Research in Science Teaching*, 38(3): 337-354.

Jorgenson, O. & Vanosdall, R. (2002). The death of science? What we risk in our rush toward standardized testing the the three R's. *Phi Delta Kappan*, April, pp. 601-605.

3/10/05 - 8th Class Session: Informal Science Education

Linda, R. (1997). Learning science beyond the classroom. *Elementary School Journal*, 97 (4), 433-451

3/17/05 - 9th Class Session: Educational Technology

Woolsey, K. & Bellamy, R. (1997). Science education and technology: Opportunities to enhance student learning. *Elementary School Journal*, 97(4), 385-400

3/24/05 - 10th Class Session: Science Teaching

Tsai, C (2002). Nested epistemologies: Science teachers' beliefs of teaching, learning and science. *International Journal of Science Education*, 24(8), 771-783

3/31/04 - WEEK 11 – Spring Break

4/ 07/05 - 11th Class Session: (WK12): Writing to Learn/Scientific Literacy

Due: Interview An Author Assignment

Hurd, P. D. (1998). Scientific literacy: New minds for a changing world *Science Education*, 82: 407-416

4/14/05 - 12th Class Session (WK 13): Inclusive Science Education

Cunningham, C. M. & Helms, J. V. (1998). Sociology of science as a means to a more authentic, inclusive science education. *Journal of Research in Science Teaching*, 35(5), 483-499.

4/21/05 - 13th Class Session (WK 14): Video Presentations

4/28/05 - 14th Class Session (WK15): Science Symposium

5/05/05 - 15th Class Session (WK 16): Closing

Major Journals and Article Sources for Science Education

1. Educational Researcher
2. Elementary School Journal
3. International Journal of Science and Mathematics Education
4. International Journal of Science Education
5. Journal for Science Education and Technology
6. Journal of Curriculum Studies
7. Journal of Education
8. Journal of Research in Science Teaching
9. Journal of Science Teacher Education
10. Journal of Teacher Education (In print only)
11. Handbook of Research on Science Teaching and Learning
12. Handbook of Research on Teacher Education (In print only)
13. Phi Delta Kappan
14. Review of Educational Research (Microform version only)
15. Science & Education
16. Science Education
17. The Science Teacher
18. Science Scope