California State University San Marcos
College of Education
EDMS 545
Science Education in Elementary Schools

Fall , 2002 3 credits, Multisubject Cohorts

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

Students with Disabilities Requiring Reasonable Accommodations. Students are approved for services through the Disabled Student Services Office (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.

Required Texts:

Keating. Science Methods
Keating. Use of Discrepant Events for Teaching Science
Sections of the California State Science Framework and Standards-photocopied

Optional Texts:

Chancer, et. al. Moon Journals
Keating. Invention Convention for K-6 Teachers
Sae. Chemical Magic from the Grocery Store

Purpose and Goals:

The main purpose of this course is to help you become a better teacher of science while increasing your enthusiasm, interest and confidence in effective teaching methods. You will model and practice ways in which science can be naturally integrated into all the other disciplines. There will be a special emphasis on a student centered, problem solving and divergent interdisciplinary approach to learning. Techniques for infusing multicultural aspects of science and adapting lessons to meet individual needs will also be addressed. As a result of this experience, we hope that as a teacher at the elementary level you will feel comfortable teaching science, teaming with teachers who are specialists in this field, and utilizing science methods in your other disciplines.

Objectives:

On completion of this course, students will be able to demonstrate the following:

1. knowledge of the California Framework and Standards in science;
2. understanding of how to integrate science into other curriculum areas;
3. awareness of the multitude of community resources available to teachers and the ways in which these resources can be used to strengthen the science program;
4. the ability to write lesson plans and implement them into an integrated unit based on an appropriate grade-level course of content;
5. the ability to design curricula which reflect a variety of instructional strategies and develop children's higher-level thinking skills;
6. an understanding and appreciation for the processes of science
7. including all children in science instruction

Grading Policy:

Final grades for EDMS 545 will be computed on a scale of 200 points

A = 184 points or more
A- = 180 - 183.5 points
B = 164 - 179.5 points
B- = 160 - 163.5 points
C+ = 155 - 159.5 points
C = 144 – 154.5 points
C- = 140 – 143.5 points
(Anything less than a C+ does not count toward a California Teaching Credential)

Prompt and consistent attendance is vital to success in this class. Attendance will be taken and class will start on time. For each absence, five points will be deducted. For each tardy, one or two points will be deducted, depending on how late you are. You'll also lose one or two points if you leave early. If a serious problem arises, which is beyond your control, please talk to Josephine.

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 then 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.

Due Dates:

When you come to class, we expect you to have the readings already done for that class. Assignments must be turned in at the start of class, otherwise they will be considered tardy. Late assignments will lose ten percent of their points for each day they are late. After one week, they will receive no credit. IF FOR SOME REASON YOU MUST TURN IN AN ASSIGNMENT LATE, TALK WITH JOSEPHINE AND MAKE SURE AN AGREEMENT IS NOTED ON THE GRADESHEET. Please DO NOT submit assignments by email. The best way to submit is to turn them in to the envelope during class, or you can put them in the pocket near Josephine's desk in UH 321.

Please Also Note: Any evidence of cheating (including plagiarism--presenting the words or ideas of others as you own) will result in a failing grade for that assignment and possibly a failing grade for the course. Some assignments will include comments and suggestions on appropriate referencing. If you have modified an already existing lesson plan or unit, please include a copy of the original lesson plan. See one of us if you have any questions about what exactly constitutes plagiarism.

Attribution and Avoiding Plagiarism

> **pla-gia-rize**
>
> 1. to use and pass off as one's own (the ideas and writings of another)
> 2. to appropriate for use as one's own passages or ideas from (another)
>
> The American Heritage Dictionary of the English Language
> Third Edition

Proper attribution is an important concept for teachers. Giving credit where credit is due is only fair and ethical. It also advances learning by accurately tracking the path of ideas and information as they pass from person to person, often being enhanced and modified along the way. Teachers have a special responsibility to identify their sources in their own work, and to teach students to do the same.

Such attribution can be formal or informal. Formal attribution usually consists of footnotes and bibliographies which follow guidelines such as those published by the APA. Teachers and elementary students are more likely to use informal attribution, for instance giving the original source of a lesson plan that you have adapted. Even a second grader writing a paragraph about an animal can tell where the information came from.

Example: I watched the classroom guinea pig for five minutes a day for five days and read the book Guinea Pigs by Joe Blow.

The Two Commandments of Attribution

1. When you use someone else's ideas, thoughts, or information, you must give credit to the source, and do so in a way that clearly identifies the source and makes it possible for other persons to find the original source for themselves.
2. When you use someone else's exact words, you must put those words in quotes. Commandment #1 still applies.

Science Ed Assignments – Fall, 2002
Josephine Keating, Instructor

The following are assignment prompts. Each prompt will be scored using a likert scale: no response (0) to exceptional (maximum possible points for that assignment) to total a possible 200 points. Due dates are on the timeline.

The criteria for grading are:

- Fully addressing the prompt.
- Clear, coherent writing. (If I have to re-read what you've written three times before I can make heads or tails of it, you will lose points.)
- Correct spelling and grammar on final drafts. You are going to be a model for children on this, and need to get used to paying attention. Note: just running a spellcheck isn't always enough – it may miss homophones.

Assignment 1 – recipe lesson plan

Spirit of the assignment: to develop a hands-on lesson that is based on a recipe. You are to think through the complex elements of hands on-minds-on learning. You will do a rough draft of your lesson plan, discuss your draft in a small group with the instructor, then revise it and turn in a final draft. This should be two full pages or more when it is finished.

1a. Recipe lesson plan – rough draft I 20 points

- Sign up for a small group discussion time
- Decide which grade level you want your lesson plan to be appropriate for.
- Choose a recipe (from a cookbook, the internet, write out a recipe your know, etc.)
- Look at the Survival Tips for Hands-On Learning and the cover sheet for this assignment.
- Write a lesson plan that addresses all the elements on the cover sheet. This can be rough, but it should look like a lesson plan, not just miscellaneous notes.
- Come to your one-hour small group discussion, bringing your lesson plan, the recipe, and a blank copy of the cover sheet. You are going to hand your cover sheet and your lesson plan to the instructor during the discussion. Then you will get them right back.

1b. Recipe lesson plan – final draft I 20 points

- Revise your lesson plan to incorporate what was discussed in the small group.
- Turn in your lesson plan AND the same cover sheet you brought to the group. (It will have the instructor's notes on it.)

Assignment 2 – California Science Framework and Standards

Spirit of the assignment: to read a portion of the California Science Framework and the Standard for a particular grade. You will write your individual response to the readings. Then you will work with your grade level team to prepare and do a presentation to the class. It's important that you do the reading and the writeups BEFORE you meet with your team.

2a. Framework summary response I 10 points

- Read the first part of the California Science Framework, up to page 20. This includes Board Policy, the Introduction and Chapters One and Two.
- Think about the reading holistically.
- Write about a page, in your own words, that answers these questions: What do you think are the most important ideas addressed in the reading? Were there any ideas in the reading which were very new to you, or which disagreed with something you thought?

2b. Grade level Science standard response I 10 points

- Using the standard for your chosen grade, pick a line item from physical science, life science, and earth science. For each one, come up with a brief description of an activity that children in that grade can do that also addresses one of the Investigation and Experimentation standards for the grade.
- You should end up with three sections, each of which includes a content line (physical, life, or earth science), an Investigation and Experimentation line, and a one or two sentence description of an activity that combines the two. The whole thing should be about a page.

3b. Team preparation and presentation T 10 points

- Get together with your team. Look at the activities that everyone wrote up for Assignment 2b. Choose one.
- As a team, write up a lesson plan for the activity (with objectives, assessment, the works). Put it on chart paper or an overhead transparency so it can be easily presented to the class.
- As a team, think about the entire set of standards for the grade. If you only had time, as a teacher, to do half of it with your kids, which half would you do, and why? Make a list to present to the class, and be prepared to give your reasons for your choices.
- In 8 minutes or less, present your lesson plan and standards choices. Be prepared to explain why your lesson plan represents really good science for kids, and why your chose the particular lines or sections from the standards to teach.

Assignment 3 – Discrepant Event

Spirit of the Assignment: to develop and teach a particular kind of a science inquiry lesson that teaches both science thought processes and science content. You will practice your discrepant event on at least one school-age child and reflect on the child's responses and what they indicate about how much he/she understood. Working by yourself or with a partner you will actually present your discrepant event to the class and give a copy of the lesson plan to each class member. After all the discrepant events have been presented, you will take a quiz to demonstrate that you personally learned the important science concepts that were presented.

3a. Discrepant Event Lesson Plan and Presentation I or P 20 points

- Working by yourself, or with a partner, find a discrepant event to do. You can get one from Discrepant Events, by Keating, or go to a bookstore or the children's section of the library and look for books on Science Tricks, or Science Magic.
- Get together the materials needed for the discrepant event. (If you can't get certain things, look for another event to do.)
- Practice doing the event. (If you can't get it to work, you may need to find another event to do.)
- Make sure you understand the science behind the event. If you got it from an internet website, there may be background info on the site. Another good place to look: the children's section of the public library. Find children's books on the topic in addition to or even preferably to books for adults. The children's books will explain things simply and will use the appropriate vocabulary for you to use with your students. Remember, you don't have to have a college-level understanding of the topic, just have good, accurate information at your students' level.
- Do your discrepant event with at least one school-age child and take careful notes on the child's responses. (This ties in with Assignment 3b.)
- Fill in the discrepant event cover sheet, including the two questions.
- On your assigned day, bring in your materials and equipment and do your discrepant event for/with the class. You are limited to 15 minutes presentation time.
- After presenting your event, give each member of the class a copy of the lesson plan.
- Turn in your lesson plan, the cover sheet and your individual journal.

3b. Discrepant event journal I 10 points

- After you have done your discrepant event with a child or children, look at your notes and think about how it went. (You may realize that your event needs to be modified before you do it with the class.)
- Write a description of what happened, with special attention to what the child said and did. Analyze the child's response: what portions of the event, and to what extent, did the child understand what was happening? Why or why not?

3c. Discrepant event quiz I 10 points

Assignment 4 – Community resource report I 10 points

We are accustomed to thinking of resources in terms of museums, state parks, the Zoo, and so on. These places are set up for dealing with school groups – they have websites and docents and sometimes even ready-made packets of lesson plans. The spirit of this assignment is to think of other kinds of resources that are out there in the community for you and your students to use.

- Think of a resource that is <u>not</u> customarily used by schools. (Examples: parents, or other family members of children in your class, local businesses, empty lots).
- Visit the place or speak with the person. See what kinds of objects/expertise are available.
- Write a report that includes at least the following information:

    1. Your name
    2. Name of the resource. If it's a parent, or someone who wants their name to be kept confidential, you can just write a short description (ex. The grandfather of one of my students.)
    3. Description of the resource and its usefulness.
    4. If applicable, how can this resource be contacted?
    5. How did you learn about, or discover, this resource?
    6. Does it cost anything?
    7. At least one science topic for which this resource could be appropriately used.
    8. An example of an activity using this resource.

Make a copy of your report for everyone in the class, plus one to turn in.

Assignment 5 – Observation/art/writing

The spirit of this assignment is for you to observe something using all your senses, then use what you have observed to do a writing and an art activity from the book Moon Journals. You can use any kind of an experience for this: a walk on the beach, playing basketball, bathing a baby. Immediate experience is very important, so even it's something you've done many times before, do it again for this assignment. DON'T DO IT FROM MEMORY.

5a. Observation I 10 points

- Sign up for a particular day, from 1 to 28 in the Moon Journals book. Look at the Art Invitation and the Writing Invitation for your particular day. If you didn't buy the book, borrow it from the Moon Journals director and copy the relevant pages.
- Observe a natural event and take notes. You will need at least five specific details for each sense. Your notes can be in any format, and can be handwritten, as long as they are legible. If there is one sense that can't be used for your observation, give the reason why.) You will turn in your notes.

5b. Art and Writing I 10 points

- Follow the directions in the Moon Journals book to the writing and art activities for your assigned day. Connect them to your observation for assignment 5a. If either the writing or the art won't work, see the instructor.
- Look in the Timeline for Art/Writing. On that day, bring your response to the Art and Writing Invitations to class for Show and Tell.

Assignment 6 – Inclusive Science

The spirit of this assignment is for you to explore ways for you to make sure that every child you teach is welcomed and able to participate fully in all science activities. Through reading and internet research you will increase your awareness and gather information on issues/situations that can lead some children to be excluded. With your team, you will prepare and present a skit that illuminates one particular issue.

- Read the Chapter "Including All Children in Science" in Keating, Science Methods
- Join a group. Each group will address one of the following topics:
  Limited English
  Cultural Issues
  Gender issues
  Physical disability
  Cognitive disabilities and emotional disturbances

6**a. Internet research** **I** **10 points**

- Find resources on the internet (articles, websites) that are relevant to your group's topic. Make this material available to the other members of your group.
- Choose one website to report on. Consider the following items:

1. Your name
2. Site name and site address
3. Your group's topic
4. How did you learn about this site?
5. Brief description of the site
6. Approximate time necessary to access and download desired information
7. Can kids use this site? If so, how?
8. Is the content in the site correct and accurate/
9. Is it from an authoritative source?
10. Is it free from stereotypes and bias?
11. Is this the best medium for this information?
12. Do the images enhance the content?
13. Is the information useful to teachers?
14. Does the site respond to questions, or can you share results?
15. Is the site easy to navigate?
16. Are all the links current?
17. Is the home page concise and quick to view?
18. Are lengthy picture files saved for later pages?
19. Is the menu clear, informative and current?

Add whatever comments you feel are appropriate on the usefulness of the site.
Make a copy of your report for everyone in the class, and turn in a copy.

6b. Team presentation (skit and discussion) T 10 points

- Within your group, share material gathered on the internet
- Discuss the importance/main points/implications of your reading and research
- Use this as a context to develop a short skit (approximately fiveminutes followed by a two-three minute question and discussion period) that presents a scenario that:
  a. demonstrates a student in a science class having difficulty with the content and/or with a teacher strategy
  b. demonstrates a teacher alleviating the difficulty by modeling at least one effective practice or strategy. At least two others should be either shown or discussed.
  c. At least three references to the readings/research (these references can be shown or discussed)
  d. Concludes with a discussion facilitated by the group. This discussion should assess the audience's understanding of the issues presented. Your group should develop some questions or other assessment device.

The team will be graded on the presentation and discussion, according to these criteria:

- Was the scenario interesting (simple props, costumes, charts, sound effects, etc.)
- Was the dialogue lively?
- Was it humorous, or did it otherwise engage the emotions of the audience?
- Was it memorable? Did the class understand the important concepts, and will the class remember them?

7. Science lesson observation I 20 points

Spirit of the assignment: to intelligently observe a science lesson. During your observation/participation time you will find a teacher who is teaching science (this may or may not be your own master teacher). You will interview the teacher before and after the lesson. If possible, it's good to also talk with some of the children after the lesson. You will put those responses together with your own observations and conclusions to write your report.

BEFORE (Interview)

- How did the teacher come to do this lesson?
- How did he/she pick the topic?
- Where did the materials come from?
- In general, how does the teacher think the children will respond to the lesson?
- Name three children in the class who will like this lesson and do well on it.
- Name three children who might have difficulty, either cognitive or behavioral and describe the problems they are likely to have.

DURING (observation)

- Is there a written or unwritten plan for this lesson?
- What are the objectives (if this/these are unstated, you will have to figure them out)
- How does the teacher know that the objectives were met at the end of the lesson?
- How does the teacher know as the lesson is going on whether the kids are getting it? (checking for understanding)
- Does the teacher make any adaptations to address the needs of the children who might have difficulty?
- Can you clearly follow the procedures the teacher is using and do they relate directly to the objectives?

AFTER (interview teacher, and if possible, some kids)

- How did the lesson go?
- Did the teacher correctly predict the performance of specific children?
- Did the adaptations (if there were any) work?
- How about the class as a whole – were the children engaged?
- Did they learn the skills or content? Did they get it?
- How does the teacher know whether they got it or not?
- Were there any logistical problems?

If you taught this lesson, how would you change it? (Include as many things as you can think of. Even if the lesson was wonderful, come up with at least one modification of your own.) Remember, there is no such thing as a perfect lesson.

8. Integrated project

Spirit of the assignment: This is a skeleton of a unit, intended to demonstrate that you can integrate hands-on science teaching across the curriculum. It will center around a hands-on science lesson plan that addresses a *physical science, life science, or earth science* standard for a particular grade. You will first write a proposal, that will be shared with other students in class, then submit the final outline of your project.

8a. Integrated science project proposal I 10 points

- Start with a hands-on science lesson plan. This can come from any source, but should have a clearly stated objective(s) and assessment and clear procedures. This will be the only complete lesson plan that will be used in this assignment.
- Write a *one-page* proposal that includes the following:

    1. grade level
    2. line from physical science, life science, or earth science standard for the grade
    3. at least two children's books that address the science topic
    4. ideas for three lessons from other subject areas that are connected to the science topic

On the designated day, you will bring your Project Proposal to class to share with other students.

8b. Integrated science project I 10 points

- Look at the Cover Sheet for the Integrated Project
- Use what you already have from your proposal and the comments you got from other students.
- Add things as necessary to address all areas on the Cover Sheet IN ORDER
- When you turn this in, make sure you include:

    1. The lesson plan (again)
    2. The Cover Sheet for the Integrated Project
    3. Your proposal, which should come to one or two pages. You can even write it out, LEGIBLY, on the Cover Sheet itself.