CALIFORNIA STATE UNIVERSITY, NORTHRIDGE
Integrated Teacher Education Program (ITEP)

LRS 200F Liberal Studies Seminar: Science Learning
Fall 2017

Course Description

How do children learn and do science? Is it very different from the way adult, professional scientists themselves do science? LRS 200F will begin with the idea that although often we need to make crucial interventions to guide children to think scientifically, recent empirical research reveals that there are important similarities between the way scientists and children reason and learn. We will then look at how children can engage in some important facets of 'doing science': observing, explaining, hypothesizing, modeling, and so on. This seminar is designed to provide aspiring teachers with an understanding of learning in young children and how that can be applied to teaching science. We will look at the source and nature of students' alternative conceptions and how they can impact teaching, and strategies for assessing children's existing beliefs. Finally in LRS 200 F you will develop skills needed to interview young children to gain insights into their scientific conceptions, and analyze the resulting empirical data. Students enrolled in the course complete two major assignments, one autobiographical sketch of their experiences as a science learner in elementary through college level, and a small-scale research study related to elementary/middle school students' conceptions of natural phenomena. The latter will take the form of a ~15-hour field experience as part of course requirements.

Course Objectives

As a student in this course, you will:

1. Connect an understanding of how science works to elementary classroom teaching, by
    a) Drawing parallels between how children learn and how practicing scientists reason
    b) Examining how common vehicles of reasoning used by scientists can effectively be used in the elementary classroom (including experiments, models, and explanations)
    c) Examining the implications of ideas from philosophy of science, cognitive science, and history of science to children's learning in the sciences
    d) Looking into the influence of culture and teachers' science-learning and science-teaching identities on science education

2. Make observations about how people learn science, by
    a) Reflecting on your own experiences as a science learner at the elementary, middle, and high school levels
    b) Reflecting on your own experiences as an adult learner of science
    c) Investigating children's scientific thinking using individual clinical interviews

3. Explore theories of how people learn science, by
    a) Identifying common ideas students have about the way the world works (which are often called 'alternative conceptions' when these ideas differ from the standard scientific explanation).

b) Examining the implications of children's existing ideas on how to effectively teach science

4. Developing research skills related to:
    a) Reading scholarly work
    b) Doing literature searches related to theory and research on learners' conceptions
    c) Conducting clinical interviews and analyzing interview data

Required Readings

Readings (and assignments) for this class will be linked online to the Moodle site established for this class.

Activities/ Exercises

1. In-class presentations
2. Whole-class and small group discussions
3. Field experiences: ~15 hours devoted to individual library research, designing and implementing interview study, and reporting results in writing.

Evaluation

1. Class participation (presentation and article summaries included) – 25%
2. Science learning autobiography – 25%
3. Interview project – 50%

Grading

A rubric will be used in evaluating assignments submitted for this course. Final grade will be determined on a percentage basis according to the following scale:

A	95-100%	B+	87-89%	B-	80-82%	C	73-76%	D+	67-69%	D-	60-62%
A-	90-94	B	83-86%	C+	77-79%	C-	70-72%	D	63-66%	F	< 60%

Description of Assignments

1. Presentations, Summaries, Participation – 25%

Presentations and summaries: Students will give short (10 – 15 minute) group presentations every week on the articles assigned. (One group per week.) The presentation must summarize the main theoretical and empirical findings and conclusions of the articles, critically engage with them – i.e. ask if they are well substantiated, if there are ways in which the study could be improved, if some ideas were helpful/ problematic/ interesting etc., and **include 3-5 questions to kick-start class discussion**. Presentations will be graded individually and not as a group, on the basis of clarity, quality, and effectiveness of articulating main points, and critical engagement with the material. (Whatever your role is in the group, do it effectively.) Turn in a half to one page written document to go with your presentation, due the week *after* you present – this should include key lessons from the readings, and also incorporate in it points that may have come up in class discussion following your presentation. The reports will also be graded individually. This component is worth 20% of the overall grade.

Class participation apart from presentation: Students will be evaluated during each class session for their a) preparation, b) participation, and c) attitude. A perfect score in participation translates to maintaining a cheerful, professional, constructive attitude; contributing substantively and positively to group and class dynamics; participating enthusiastically in whole class activities, small group activities, and collegial presentations; and offering relevant, insightful, and constructive comments during class, while not dominating discussions. This component is worth 5% of your overall grade.

myCSUNtablet Note: This is an iPad class. In-class activities that count towards participation credit such as group and class discussions will frequently involve use of the iPad and hence students are required to bring it with them every class. We will likely use the application 'Socrative'.

2. Learning Autobiography – 25% TPE 6.1

- Reflect upon your experiences as a science learner at the elementary, middle/junior high school, high school, and college levels.
- Construct a well-written history of your experiences to date and discuss the influences of these experiences on your present understanding of science, knowledge and abilities in the sciences, and your attitudes towards science.

Please refer to the specific course assignment description in completing this assignment. Guiding questions related to this assignment are provided.

3. Interview Project – 50%

- Conduct a small-scale research study of elementary/middle school students' understanding of natural phenomena. The project will include the following elements:
  - ✓ Research of the science education literature on students' understanding of concepts related to an identified topic in science.
  - ✓ Design the methodology whereby you will inquire into the conceptions children hold and conduct the study.
  - ✓ Discuss your interview questions with school teachers and get their feedback TPE 4.6
  - ✓ Analyze data and formulate conclusions based on the data collected in the study.
  - ✓ Discuss the implications of your findings to teaching science.

Please refer to the specific course assignment description in completing this assignment. Please consult the table below for relevant dates.

Note: This course has a field component that requires some combination of observation and/or participation with students in K-5 classrooms. The Department of Elementary Education has worked with the Liberal Studies Program to ensure a diverse representation of students across the trajectory of your field experiences. We have a cadre of contracted schools with whom we work that will welcome you to their sites so that you can gain experiences with a wide variety of diverse populations.

Attendance

Students will be allowed one (1) unexcused absence this semester. Students with more than one unexcused absence will have their final grade lowered half a letter grade. An unexcused absence is an absence without documentation and due to reasons other than a personal or family illness or emergency.

There will be no penalty for absences due to legitimate reasons as long as there is documentation. Do talk to me if you are not able to produce documentation.
While there is a penalty for having more than one unexcused absence, there is no credit for attending class since it is a basic requirement.

Email

I will frequently communicate important information to you via (CSUN) email. It is therefore important that you check your (CSUN) email regularly. If you want to email me, please do so from your CSUN email address only.

Policy on Academic Honesty

California State University, Northridge expects honesty and integrity from all members of its community. All acts of dishonesty – cheating on assignments or examinations, plagiarism, forgery of signature or falsification of data, unauthorized access to University computer accounts or files, and removal, mutilation, or deliberate concealment of materials belonging to the University library will be dealt with appropriately.

I expect high standards of academic integrity from future teachers. I will refer all cases of academic dishonesty (including copying, allowing others to copy your work, plagiarism, failing to cite your source, copying/pasting text from the internet even with modifications, misrepresentation of others' work as your own, violations of the collaboration policy below, etc.) to the VP of Student Affairs' office for arbitration and possible disciplinary action. The first offense will result in, *at minimum*, the reduction of your final grade by one partial letter grade (A- becomes B+), the second offense will result in an F for the class."

In addition, students enrolled in credential or licensing programs may be suspended, dismissed, or denied recommendation for the credential or license for any violation of the published code of ethics for the professional group.

For a detailed information on CSUN policy on academic dishonesty, please refer to catalog: http://www.csun.edu/catalog/appendices.html#E2.

Late Assignments

Assignments are considered on time when they are submitted at or before the time specified on the syllabus. In general, late assignments receive a score reduction of 10% for each day that the assignment is late, and are not accepted after one week has passed since the due date. If the policy for late submission on a particular assignment is different from this, information on it will be included in the assignment.

Accommodations

Students with special needs who need reasonable modifications, special assistance, or accommodations in this course should direct their request to the instructor. The instructor can direct students to the appropriate office on campus for assistance. Please be sure to contact me if you need any assistance or accommodation *as early as possible*.

Fine Print

It is the responsibility of each student in this course to know and follow all written guidance given by the instructor.

Unforeseen circumstances during the semester might require changes to the syllabus. In this event, a revised syllabus will be posted to Moodle at least one week in advance of the implementation of the change. The original syllabus will remain and the revised syllabus will identified by the date of the revision as part of the file name. Dates of projects will never be moved forward.

Course Schedule follows…

Week	Topic	Readings/Assignments
1	Introductions; overview of the fieldwork component; assignment of groups for class presentations	_____
2	1. Interview guidelines and protocol: what backgrounds are your interviewees coming from and how does that shape their science understanding? How to interact with teachers and use them as a resource? 2. Children as natural scientists TPEs 1.1, 4.6, 6.3; PS 1	Gopnik: Scientific Thinking in Young Children (*Science*)
3	Explanations in science: by children and for children TPE 1.1	1. Legare: The Contributions of Explanation and Exploration to Children's Scientific Reasoning (*Child Development Perspectives*) 2. Gagnon and Abell: Explaining Science (*Science and Children*)
4	No class	Use this time to work on interview questions with your group or by yourself/ review interview questions with me/ the actual fieldwork/ the final report.
5	Children's models and teachers' models in science teaching and learning TPE 1.1	1. Vosniadou: Mental Models in Conceptual Development (*Model-Based Reasoning: Science, Technology, Values*) 2. Frazier: Rethinking Models (*Science and Children*)
6	Observation in science: teaching lessons TPE 1.1	1. Eberbach and Crowley: From Everyday to Scientific Observation: How Children Learn to Observe the Biologist's World (*Review of Educational Research*) 2. Coffey and Sterling: It's a Frog's Life (*Science and Children*)
7	Activity and discussion: What to make of a physical science demonstration: Observation, Questioning, Critical thinking TPE 1.5	Piaget's water-level test; the "Cookie Crumble" demonstration **Science learning autobiography, Part 1 due by 5 pm on Moodle** TPE 6.1

8	Reflection and synthesis: What have you learned so far in this course? Reflecting on your autobiography assignment: how have your science learning experiences shaped you? What kind of a science teacher do they make you? (Bring iPad with Socrative app for discussion and quiz) TPEs 2.2, 4.8, 6.1 TPE 6.1	No reading, but come to class having gone through and reflected on the readings done so far.
9	Relations between children's conceptions, the history of science, and science education TPEs 1.1, PS 1	Driver et al: Some Features of Children's Ideas and their Implications for Teaching (*Children's Ideas in Science*)
10	No class	Use this time to work on interview questions with your group by yourself/ the actual fieldwork/ start working on the final report.
11	Video: A Private Universe/ Minds of Our Own	Discussion **No presentations** **Learning Autobiographies – Parts 2 & 3 due by 5 pm on Moodle** TPE 6.1
12	Debrief/ reflecting on interviews and observations: Similarities and differences in children's backgrounds and scientific conceptions and experiences in different science classrooms in the community (Share your responses with the class via the Socrative iPad app) TPEs 2.2, 4.6, 4.8, 6.3 TPE 4.6	Come prepared to discuss your interview experience and ideas on writing your interview report
13	Teachers' science-teaching Identities TPE 2.2	Wallace and Brooks: Learning to Teach Elementary Science in an Experiential, Informal Context: Culture, Learning, and Identity (*Science Education*)
14	No class	Group/ individual work on interview reports
15	Reflection and Synthesis: What have we learned in LRS 200F? (Bring iPad with Socrative app for discussion and quiz) TPE 4.8	Discussion **Interview reports due at start of class** TPE 4.6

There is no final exam for this course.

Note: This syllabus is tentative and may be revised. Such revisions (if any) will be announced in advance and posted to Moodle. However, due dates for assignments will never be advanced.

LRS 200 Model Syllabus-- Linking

TPE 1 Engaging and Supporting All Students in Learning

1.1- pages I: 5, 6
1.5- pages I: 5

TPE 2 Creating and Maintaining Effective Environments

2.2- pages I: 6

TPE 4 Planning Instruction and Designing Learning Experiences for All Students

4.6- pages I: 5, 6; P: 3, 6
4.8- pages I: 6

TPE 6 Developing as a Professional Educator

6.1- pages I: 6; P: 3, 5, 6
6.3- pages I: 5, 6

Program Standard 1

Human Learning Theory- pages I: 5, 6
Subject-specific pedagogy- pages I: 5