

MORAVIAN COLLEGE
Education Department

EDU 228B - SCIENCE IN THE ELEMENTARY SCHOOL
FALL 2006

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Office hours: Tuesday 2:00 - 4:00 p.m.
Wednesday 2:00 - 4:00 p.m.
and by appointment.

Overview

A course designed to help prospective teachers interpret children's science experiences and guide their development of scientific concepts. The course involves a study of science content material, modern elementary science curricula, and techniques that are helpful in the teaching of science in the elementary school. *Prerequisites:* F4. QPA of 2.70.

Course Objectives

The student will be able to:

1. Appreciate the importance of science and of teaching science in elementary school.
2. Explain and apply the concepts and processes of earth, life, and physical science in elementary school curricula.
3. Apply teaching strategies that promote students' scientific inquiry, active involvement, and higher order thinking.
4. Demonstrate creating and teaching science lessons, including effective teaching methods, feedback, and appropriate resources/materials.

Required Texts

Victor, E., & Kellough, R. D. (2004). *Science K-8: An integrated approach* (10th ed.). Upper Saddle River, NJ: Merrill Prentice Hall.

Friedl, A. E., & Koontz, T. Y. (2005). *Teaching science to children: An inquiry approach* (6th ed.). Boston: McGraw Hill.

Resources

Blackboard

Important information about our class will be posted on our Blackboard site at <http://blackboard.moravian.edu>. Announcements will inform you of any changes. The Discussion Forum will enable us to exchange ideas, insights, and resources about various topics throughout the semester. Information about logging in and using the site will be given in class.

Websites

The Victor and Kellough text has a website at www.prenhall.com/victor. The site has annotated links for web resources pertaining to science in the elementary school.

The Friedl and Koontz text has a website at www.mhhe.com/friedl6e. The site has chapter links and multiple-choice quizzes, and a glossary.

Assignments

Reading Assignments

Reading assignments will include chapters in the texts and materials on reserve in Reeves Library. As part of each reading assignment, consider these questions and be prepared to discuss them in class:

- What is my understanding of the science concepts and processes?
- What is my understanding of the science teaching methods?

Written Assignments

You will complete several kinds of written assignments. Written assignments may include use of outside texts and journals; these will serve to extend your understanding of teaching concepts and familiarize you with educational resources. All written work is to be prepared using a word processor. All assignments should be professional in appearance and should not have errors in spelling or grammar. Reading and written assignments are expected during the class session on the due date. Grades on late assignments will be reduced.

Classroom assignments. There will be short assignments that you will complete individually or with your group, where you will be exploring content in various ways. They may require work during class or outside of class, and will involve presentation to and discussion with the class. These assignments will be graded as acceptable, marginal, or unacceptable. To be acceptable, the assignment must be complete, demonstrate effort, and, where appropriate, creativity in preparation.

Piagetian interview. You will interview an elementary school child to gain insight into his/her scientific thought processes. You will tape record and transcribe the interview. You will analyze your interview in light of cognitive learning theories. You will submit the tape, transcript, and analysis. (Use a standard size recording tape.)

Blackboard Discussion Forum. The Discussion Forum is organized around the major science topics of the elementary curriculum. You will post three substantive questions/issues during the semester to the Discussion forum, and you will post substantive responses to three questions/issues posed by classmates.

Identifying resources. There are extensive resources available to support your mastery of content and method. During the semester, report on four references: one from a website, one from a book, and one from a journal (actual paper journal), and one that is a current event. You may describe them either in your Blackboard posts or submit as a document. In each case, cite the resource specifically and what within the resource was useful to you.

Examinations, There will be a midterm exam and a final exam. Exams will include science content and processes, and pedagogy concepts.

Teaching Assignments

Teaching assignments should focus on a scientific concept and a scientific process. The objective of the lesson should require thinking above the knowledge level.

Microteaching, You will prepare lesson plans for and present two micro-teaching sessions to the class. This will give you an opportunity to implement the methods that you are learning. One lesson will be directed at K-4 grade students, and one at 5-6 grade students. Each lesson will focus on one of the major areas of science (physical, life, earth). One of the lessons should

integrate language arts (specific guidelines will be given), and the second lesson should integrate another content area (e.g. mathematics, social studies, art, music). Students must be actively involved in both lessons, and one of the lessons should include a demonstration or experiment. Lessons will be 10 minutes in length.

The lesson plan must include the objective of the lesson. The cognitive level of the lesson (according to Bloom's taxonomy) must be indicated. In addition, indicate the Pennsylvania science standard addressed; identify it by number and write it out in words. At least one lesson should involve higher order thinking, at the application or analysis level, and may be constructivist in nature. Follow the Moravian College lesson plan format. Write out the procedure in outline or bulleted form.

Learning center. You will create a learning center that explores a science topic or concept and provides related science activities for students (you may select the grade level). The content will focus on the major area of science (physical, life, earth) not used for microteaching. The center should be complete with all materials and instructions and contain at least three activities.

Note: There will be a sign-up sheet of topics within content areas for each teaching assignment.

Attendance and Class Participation

Attendance in every class is expected, as it is essential for your comprehension of the concepts covered. Arrive on time and remain for the entire class session. If you are absent, call me to tell me the reason. It is your responsibility to make up all work. Absence because of illness will be excused if you bring a note from the Health Center. Lateness or partial class attendance will count toward absence. Absences will lower your grade. Be present during class; turn off your cell phone for the duration of the class.

Be prepared for each class session by completing the reading and other assigned work. During class, remain actively involved by paying attention, taking notes, and participating. By contributing to class discussions, and asking or answering questions, you ensure that you comprehend the material. Participation will be assessed on evidence of your completion of the assigned work, the relevance and quality of responses, and the questions and comments made during class sessions. Participation on a regular basis is expected. Lack of participation will reduce your overall grade.

The Moravian College policy on academic honesty will be followed. Collaboration with peers can be valuable in enabling your understanding of various aspects of your work. However, the work you submit must be the result of your individual effort, apart from the collaborative process. You may use paper and on-line resources as you develop your work. Here, too, the work you submit must be the result of your individual effort, apart from the resources. In all cases, cite sources that you used.

You can expect to work 6-9 hours per week outside of class preparing for this class. Students with disabilities who believe that they may need accommodations in this class are encouraged to contact the Learning Services Office as soon as possible to enhance the likelihood that such accommodations are implemented in a timely fashion.

Grading

Each assignment will be graded based on specific criteria. You will receive the criteria during the discussion of each assignment.

Classroom Assignments	20%	A	=	93 - 100
Microteaching lessons	20%	A-	=	90 - 92
Learning Center	10%	B+	=	87 - 89
Piagetian Interview	10%	B	=	83 - 86
Blackboard	10%	B-	=	80 - 82
Midterm exam	15%	C+	=	77 - 79
Final exam	15%	C	=	73 - 76
		C-	=	70 - 72
		D+	=	67 - 69
		D	=	63 - 66
		D-	=	60 - 62
		F	=	below 60

Course Outline

I. Introduction

Concepts of effective teaching

II. The Nature of Science

Science as a process of inquiry

Scientific processes

III. Science Content

Physical Science

Life Science

Earth/Space Science

Environmental and Ethical Issues

NSTA and Pennsylvania Science Standards

IV. Science Pedagogy

Objectives, Standards, and Lesson Plans

Inquiry, Cooperative Learning, and Problem Based Learning

Constructivist approach

Questioning and feedback

Higher order thinking skills

Class management and safety

Assessing student performance by various means

Integrating the curriculum

Adapting to needs and individual differences of students

Problem posing, problem solving, peer persuasion

V. Resources

Curriculum projects

Models

Instructional technology - computer, Internet sites

Current events

Schedule

8/28	Introduction due: Friedl - Ch. 1, 2
9/4	Universe due: Victor - Ch. 2, 9 Friedl - Ch. 14 no class 9/4 - Labor Day
9/11	Earth due: Victor - Ch. 10 Friedl - Ch. 11 (through 215), 15
9/18	Water, Weather, Climate due: Victor - Ch. 3, 11 Friedl - Ch. 12, 16
9/25	Plants due: Victor - Ch. 12 Friedl - Ch. 18 Piagetian interview due 9/25
10/2	Animals due: Victor - Ch. 14 Friedl - Ch. 19 Midterm examination 10/4 no class 10/2
10/9	Human Body due: Victor - Ch. 15 Friedl - Ch. 20, 21 no class 10/9 Fall Recess
10/16	Matter and Energy due: Victor - Ch. 16 Friedl - Ch. 3, 4
10/23	Friction and Machines due: Victor - Ch. 17 Microteaching 10/23 and 10/25 no class 10/27
10/30	Heat, Fire, Fuels due: Victor - Ch. 18 Friedl - Ch. 5
11/6	Sound due: Victor - Ch. 19 Friedl - Ch. 8
11/13	Light due: Victor - Ch. 20 Friedl - Ch. 9 Micro-teaching 11/13 and 11/15
11/20	Magnetism and Electricity due: Victor - Ch. 21 Friedl - Ch. 6 no class 11/22 and 11/24 Thanksgiving
11/27	Environment due: Friedl - Ch. 17
12/4	Learning Centers 12/4
12/11	Summary

Note: This schedule is tentative and will be modified as necessary.