MORAVIAN COLLEGE
Education Department

EDU 228B - SCIENCE IN THE ELEMENTARY SCHOOL
FALL 2007

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Office hours: Tuesday 2:00 - 4:00 p.m.
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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., & Tai, R. H. (2007). *Science K-8: An integrated approach* (11th 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

"Information is an undigested burden unless it is understood. It is knowledge only as its material is comprehended. And understanding, comprehension means that the various parts of the information are grasped in their relations to one another—a result that is attained only when acquisition is accompanied by constant reflection upon the meaning of what is studied" (Dewey, How We Think, 177).

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 will require work during class and outside of class, and will involve presentation to and discussion with the class. All group members must be involved in researching, preparing, and presenting the assignments. These assignments will be graded as excellent (A), satisfactory (B), or unacceptable (F). To be excellent, the assignment must be complete, demonstrate effort, and be creative. Your presentation of the assignment to the class must be accurate and interesting.

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. To receive full credit, you must complete at least three posts by October 15, and six posts by November 16.

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. To receive full credit, you must complete your resources by November 16.

Examinations. There will be three one-hour exams during the semester. Exams will include science content and processes, and pedagogy concepts.

Final project. You will design a thematic unit plan focusing on a science topic.
Select a science topic (theme) and list the science standards that the unit will address. Select the grade level. Design the curriculum for the unit, which must integrate literacy, social studies, mathematics, and music or art.
Write the detailed lesson plans for five science lessons, all of which include inquiry activities where students are actively involved. Give the science content for each lesson in a detailed outline form that demonstrates your understanding of the content. Label each lesson objective with its cognitive taxonomy level. All lessons must include an objective at the application level or higher. List the multiple intelligences and the science processes that are included, and explain each item on your list.
Describe how the other content areas will be included. Use the Science-Literacy Framework for planning the lesson that integrates literacy.
Lessons follow the Moravian College lesson plan format.
Note: This project is your final examination.

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 a literature book (specific guidelines will be given for designing this lesson), 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. At least one activity must involve higher order thinking.

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, contact me to tell me the reason. If you have not contacted me, your absence will be recorded as unexcused. 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 or a health professional. Lateness or partial class attendance will count toward absence. Each unexcused absence will lower your final grade.

A missed class cannot truly be made up because of the critical role that discussion plays in each class session. Even so, you are responsible for the missed work. You may be asked to complete a written assignment to ensure that you comprehend the objectives of missed class time.

Be prepared for each class session by completing the assignments and considering ideas and questions that emerge from the assignments. During class, remain actively involved by paying attention and sharing your relevant and thoughtful responses and questions. Class participation on a regular basis is expected to ensure grasp of textual materials and important concepts. Participation will be assessed on evidence of your completion of the assigned work, the relevance and quality of responses, the questions and comments made during class sessions, and your voluntary contributions that enrich class discussions.

Be present in class, and stay with the class. Inattention or focus on work unrelated to class activities is not acceptable. Side conversations distract classmates and display disrespect to the speaker. Be sure your cell phone is turned off during class. Lack of appropriate participation or inappropriate participation will lower your grade.

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	15%
Microteaching lessons	20%
Learning Center	10%
Piagetian Interview	10%
Blackboard	10%
Examinations	20%
Final Project	15%

A	=	93 - 100
A-	=	90 - 92
B+	=	87 - 89
B	=	83 - 86
B-	=	80 - 82
C+	=	77 - 79
C	=	73 - 76
C-	=	70 - 72
D+	=	67 - 69
D	=	63 - 66
D-	=	60 - 62
F	=	below 60

The Moravian College policy on academic honesty as stated in the College catalog 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.

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

Course Schedule

WEEK	TOPIC AND ASSIGNMENT
8/27	Introduction due: Friedl - Ch. 1, 2
9/3	Universe due: Victor - Ch. 2, 9 Friedl - Ch. 14 (through p. 274) no class 9/3 - Labor Day
9/10	Earth due: Victor - Ch. 10 no class 9/14
9/17	Universe and Earth due: Friedl - Ch. 11 (through 215), 15 (274 - end)
9/24	Water, Weather, Climate due: Victor - Ch. 3, 11 Friedl - Ch. 12, 16 Exam on 9/28
10/1	Plants due: Victor - Ch. 12 Friedl - Ch. 18
10/8	Animals due: Victor - Ch. 14 Friedl - Ch. 19 no class 10/8 Fall Recess
10/15	Human Body due Victor - Ch. 14 Friedl - Ch. 19 due Piagetian interview 10/15
10/22	Microteaching 10/22 and 10/24 no class 10/26
10/29	Matter and Energy due: Victor - Ch. 16 Friedl - Ch. 3, 4 Exam on 10/29
11/5	Friction and Machines due: Victor - Ch. 17 Heat, Fire, Fuels due: Victor - Ch. 18 Friedl - Ch. 5
11/12	Sound due: Victor - Ch. 19 Friedl - Ch. 8 Micro-teaching 11/14 and 11/16
11/19	Light due: Victor - Ch. 20 Friedl - Ch. 9 no class 11/21 and 11/23 Thanksgiving
11/26	Magnetism and Electricity due: Victor - Ch. 21 Friedl - Ch. 6 Exam on 11/26
12/3	Environment due: Friedl - Ch. 17 Exam on 12/3 Learning Centers 12/5
12/10	Summary due: Final Project

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