George Mason University
College of Education and Human Development
Graduate School of Education

Curriculum Development and Evaluation in Science Education
EDCI 683

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1 hour after class or
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Fall 2005 - Spring 2006: Fourth Saturday of the month 10:00 AM - 3:00 PM, A412 Robinson

Course Description

Prerequisite: EDCI 663 or permission of the instructor. EDCI 683 is a 3-credit graduate course for experienced science teachers pursuing a master’s degree in science education. The course focuses on curriculum, instruction, and evaluation in K-12 science education. Students will build on their own school experiences, expand their knowledge of K-12 science curricular materials, and analyze research on effective learning and teaching.

Goals

The science education master’s degree students will:
• Explore science education curriculum and evaluation resources to become familiar with K-12 products and materials available for use in the classroom;
• Evaluate curriculum research, policies, and trends in science education at the national, state, and local levels;
• Evaluate resources on their merits as teaching tools;
• Implement research-based curriculum materials and strategies in teaching; and
• Work collaboratively with peers to investigate science and science teaching reform.

Online Syllabus and Resources: [http://blackboard.gmu.edu](http://blackboard.gmu.edu)

Reading Materials and Online Resources

At bookstore
Virginia Standards Online Resources


Online Reports

- American Association for the Advancement of Science, Textbook Evaluations - http://www.project2061.org/research/textbook/

Science Kits and Textbooks

- Elementary - AIMS, FOSS, GEMS, Insights, STC. etc
- Middle School - FAST, McDougal-Littell, STMS, etc
- High School – BSCS, ChemCom, Modeling Instruction in Physics, etc

Professional Organization

- NSTA membership (http://www.nsta.org) or your content area society

Relationship to Program Goals and Professional Organizations

EDCI 683 is part of the three-year sequence of courses for master’s degree students in the Science Education Leadership program and the Advanced Studies in Teaching and Learning program. The course builds on students’ knowledge from their own teaching and previous courses to inform their practice as teachers and leaders. The course focuses on curriculum development issues that affect science education at the local, state, and national levels as outlined by National Council for Accreditation of Teacher Education (NCATE), the National Science Teachers Association (NSTA), the National Board of Professional Teaching Standards (NBPTS), the Interstate School Leaders Licensure Consortium (ISSLC), and National Association for Research in Science Teaching (NARST). EDCI 683 introduces students to curriculum materials and methods that they will need to become effective leaders in science education.

Nature of Course Delivery

Seminars are interactive sessions with all participants actively participating in cooperative or collaborative group activities. Advanced preparation for each seminar through reading, writing, and reflecting contributes to the success of the session and shows respect for your classmates. The sessions are an opportunity to share your knowledge and to learn from others.
CEHD Syllabus Statements of Expectations

The College of Education and Human Development (CEHD) expects that all students abide by the following:

Students are expected to exhibit professional behavior and dispositions. See http://gse.gmu.edu/facultystaffres/profdisp.htm for a listing of these dispositions.

Students must follow the guidelines of the University Honor Code. See http://www.gmu.edu/catalog/apolicies/#Anchor12 for the full honor code.

Students must agree to abide by the university policy for Responsible Use of Computing. See http://www.gmu.edu/facstaff/policy/newpolicy/1301gen.html.

Students with disabilities who seek accommodations in a course must be registered with the GMU Disability Resource Center (DRC) and inform the instructor, in writing, at the beginning of the semester. See http://www.gmu.edu/student/drc/ or call 703-993-2474 to access the DRC.

Postponement of Class

When inclement weather or other unforeseen events causes the class to be cancelled or the university to close, the class session will be postponed one week. Please check to confirm the date, time, and place of the makeup session.

Grading

Since this is a graduate level course, professional quality work is expected on all assignments and in class. Attendance at all classes for the entire class is a course expectation. All assignments must be completed to receive a passing grade in this course. Assessment will be based half on fulfilling the specified criteria for the project and half on the quality of work. All assignments are due at the beginning of class on the day they are due. Assignments that are late will automatically receive a ten percent grade reduction (one full letter grade lower). In the event a class is missed the student will develop with the approval of the instructor an additional assignment that relates to the work being missed.

25% Curriculum Exploration Comparison Table
25% Effective Curricula Research Report
25% Classroom Implementation Project
10% Web Demos and Science in the News
5% Interviews
10% Conference

Your final grade for the course will be determined from your assignment grades and will be A ≥ 94%, A- ≥ 90%, B+ ≥ 87%, B ≥ 83%, B- ≥ 80%, C ≥ 73%, F < 73%.
Assignments

Collaboration on assignments is encouraged and in most cases part of the assignment. All written assignments are to be word-processed. On the cover page include your name/team members’ names, date, course title, and project title. Staple all pages in one assignment together.

Curriculum Exploration Comparison Table

The goal of the Curriculum Exploration Comparison Table is to add to your breadth and depth of knowledge of the most effective science resources. The project will be compiled throughout the entire year as you explore curricular materials for elementary, middle, and high school. See the schedule at the end of this syllabus for due dates for drafts in progress and final projects. During this project you will explore science resources individually and in small groups. You are to identify and evaluate high quality materials for use in the classroom.

Resources to be reviewed are materials including but not limited to AIMS, FOSS, GEMS, and STC for elementary school; FAST, McDougal-Littell, and STMS for middle school; and BSCS, ChemCom, and Modeling Physics Instruction for high school. For the school level you teach, you will include in your review the curriculum materials you use. Materials are available online, in class, and in the schools.

To compare and contrast curricular materials, you will each create three sets of multi-page tables (using the tables function of your word processor) for elementary, middle, and high school. To enhance the usefulness of your comparison table, use many small, well-targeted categories to describe, evaluate, and compare the curriculum materials you analyze. For materials you review, some categories for comparison are the originators, dates of creation, costs, ordering information, description of student and teacher materials, assessment, strengths, weaknesses, appropriateness for classroom use, and comparison to other similar resources. On your table, you are to identify the most effective materials you have found at elementary, middle, and high school and explain why in your opinion they are the most effective. See rubric posted on Blackboard.

Effective Curricula Research Report

The Effective Curricula Research Report will be assembled throughout the entire year as you analyze, evaluate, and synthesize what you have learned about research and curricular materials. The project has two parts, (1) 4 short research summaries shared in class during the year and (2) a final research synthesis report.

During the year, you will read and critique at least 4 research-based curriculum reports and books (see schedule). Each report or book will be analyzed by you, written up in a 1-2 page synopsis (25% summary and 75% critique), and shared in class. In the schedule two of the research reports (online) are specified and their URL is listed at the beginning of this syllabus under reading materials and online resources. In addition to these two online resources, you will read two books - How People Learn and Understanding by Design.
At the end of the year you will use the four research reports summaries to write a paper synthesizing your own opinion and what research indicates about effective curricula. You will give specific examples to illustrate your main points and cite (in APA format) relevant research in your report. You will turn in the 4 synopses and the synthesis paper. See rubric posted on Blackboard.

**Classroom Implementation Project**

While reviewing and analyzing curriculum materials, you will select and implement with your students a series of curriculum reform activities or strategies that you have not used before. These activities or strategies will take about a week and can be implemented all at one time or spread over the year. You will turn in a one-page proposal outlining what you intend to implement prior to implementation. The proposal will include (1) what class and with what students you intend to implement the activities or strategies, (2) what you intend to implement, (3) why you selected these activities or strategies, (4) how these activities or strategies are supported by research, and (5) how you will evaluate the success of the activities or strategies.

At the conclusion of your project, you will turn in a tabbed three-ring notebook that includes (1) the proposal; (2) a summary of the week’s worth of activities or strategies that you implemented highlighting the connections to the SOL, student handouts you created or used, and how the activities or strategies are intended to connect and build student understanding; (3) samples of student work (one each from the top, middle, and bottom third of the class); (4) assessment of student learning including assessment instruments, scoring rubrics, and data analysis that is both qualitative and quantitative; and (5) an evaluation summary discussing the pros, cons, and improvements for the activities or strategies implemented plus student evaluations of the activities and strategies. See rubric posted on Blackboard.

**Web Demos and Science in the News**

Web demos are in-class demonstrations of curriculum related websites such as GEMS, AIMS, STC, FOSS, and Insights for elementary school. Most demonstrations are 15-minutes and include time for questions from the audience and distribution of one informational one-page handout including the URL to all classmates. You will conduct three web demos during the year, one each for elementary, middle, and high school.

You will be responsible for sharing Science in the News several times during the year. For the months you are assigned to you will informally share major news events in science that have occurred or been released between the time of the last class session and the day you are presenting.

**Elementary/Middle/Secondary Science Teacher Interviews**

To build on your understanding of science curricula issues and concerns at different school levels, conduct two interviews with two different school system curriculum specialists or teachers. These specialists/teachers should be at two different school levels (elementary, middle, or secondary) and not at the level you are teaching. Interview the most knowledgeable or
influential person to which you have access. The purpose of the interviews is to (1) understand the criteria and process for curricula selection and (2) expand your knowledge of school system and teachers’ concerns about curricular materials at different school levels. Each interview will last about 30-minutes and be reported in class.

A one-page summary and analysis of major issues and concerns will be turned in for each interview. Use appropriate headings to help organize your paper. Include the name and background of the person you interviewed and describe what you learned.

State or National Conference

Attend one conference, the Virginia Association of Science Teachers (VAST) conference in Roanoke Nov 18-19; a national conference such as the National Science Teachers Association (NSTA) in Anaheim, California April 6-9; or a regional NSTA conference such as Hartford, CT October 20-22, Chicago, IL November 10 - 12, or Nashville, TN December 1 - 3. While at the conference, focus on curriculum related materials and issues. A one-page write up of your reaction to the conference will be shared in class. Include your reactions to sessions, speakers, vendors, etc. Discuss what you learned about curriculum materials and your recommendations about the pros, cons, improvements, and extensions for the conference.

School or District Curriculum Committee – optional substitute assignment

Some of you will have the opportunity to serve on curriculum committees at your school or for your school district. This can be extremely informative for you and the group as you share your experiences. If you have the opportunity to serve on a curriculum committee, I will negotiate with you to accept your service on the committee for part or all of the interview assignment. The extent and level of involvement with the committee will determine the extent to which you are released from the interview assignment.
## Tentative EDCI 683 Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Assignment Due*</th>
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| Aug 27   | K-5 Who is creating effective elementary curriculum? Who is conducting curriculum research?  
No Child Left Behind  
SOL K-5 - ID feeder SOL topic to your subject  
TIMSS Findings - overview  
Overview -AIMS, FOSS, GEMS, Insights (EDC), STC  
BSCS, Macmillian/McGraw-Hill, Scott Foresman |                                                      |
| Sept 24  | K-5 What does research suggest about effective curriculum?  
TIMSS videos 1 – US, Japan, Germany  
(Research -TIMSS)  
(Research -Understanding by Design)  
(Elementary Table) |
| Oct 22   | K-5 What elementary curricula are most effective and why?  
How are award winning programs evaluated?  
TIMSS videos 2 – US, Japan, Germany  
Evaluate - AIMS, FOSS, GEMS, Insights, STC BSCS, Macmillian/McGraw-Hill, Scott Foresman | Elementary Table  
(Research – Understanding by Design) |
| Nov 18-19 | VAST Conference - Roanoke, VA                                          |                                                      |
| Dec 10   | K-5 What middle school curricula are most effective and why?  
Research – How People Learn  
Curriculum Maps, Atlas for Science Literacy - AAAS  
Evaluate - FAST, STMS, Science 2000, Science + Other Middle School textbooks | Web Demos – ms  
Interview – 1  
(Research -AAAS)  
(Middle Sch Table) |
| Jan 28   | 6-8 How are textbooks evaluated?  
SOL 6-8  
Compare - FAST, STMS, Science 2000, Science + Other Middle School textbooks | Middle School Table  
(Research – How People Learn) |
| Feb 25   | 9-12 What high school curricula are most effective and why?  
SOL 9-12  
Research HS textbooks  
Compare-ChemCom, Modeling Instruction Physics | Web Demos – hs  
Interview – 2  
(Res Report - draft)  
(High School Chart) |
| Mar 27   | 9-12 What is effective curriculum according to research?  
Curriculum Research  
Evaluate-ChemCom, Modeling Instruction Physics | Research Report  
High School Chart |
| Apr 6-9  | K-12 What curricula are most effective and why?  
What does your implementation research suggest? | Curriculum Tables  
Implementation |
| Apr 22   | K-12 What curricula are most effective and why?  
What does your implementation research suggest? |                                                      |