EDCI 754
Mathematics and Science Education Policy, Professional Development and Teacher Preparation

Fall 2014, Section 0101
Mondays 4:15 – 7:00 p.m.
Room 2121 Benjamin Building
Office hours by appointment

Dr. Patricia F. Campbell
Room 2226 G Benjamin
patc@umd.edu
Office hours by appointment 301-405-3129

Prerequisite: Admission to the doctoral program in mathematics or science education or permission of TLPL department.

Course Description, Goals and Expectations

General Description of the Course

The doctoral programs in mathematics education and science education at the University of Maryland are committed to the proposition that mathematics education and science education should focus on helping students develop deep, broad, and connected understandings of the subject matter of mathematics/science. In order to improve the educational system’s ability to accomplish this goal, mathematics and science educators must understand how the essential elements of the system contribute to students’ understanding of the subject matter of mathematics and science—elements such as how students learn, how teachers teach, and how the curriculum affects the learning environment. Mathematics educators and science educators must also understand how the domains of curriculum, instruction, and learning connect in the reality of practice, and how the impact of and relationship between these connected domains, teacher preparation, professional development, and policy influence the design and conduct of efforts to implement and study of both mathematics education and science education. This course considers teacher education (both teacher preparation and professional development) and policy as agents of reform while drawing on prior understandings regarding mathematics and science curriculum, teaching, learning, and assessment.

Course Goals and Activities

The primary goal of this course is to introduce you to research examining efforts to improve mathematics education and science education as well as policies and research addressing both pre-service and in-service mathematics and science education. This course may serve as a starting point should you decide to define or carry out research encompassing reform in school mathematics or school science. This course addresses variables that you should consider when carrying out education research addressing other contexts of mathematics and science learning, including equity, curriculum, teaching, and assessment. This course aims to further develop your understanding across these domains:

• Critiquing research literature addressing professional development and teacher preparation in mathematics and science education;

• Examining exemplars of educational policy and educational policy research as well as studies of educational policy and practice, inferring implications for mathematics and science education efforts that seek to improve the teaching and learning of mathematics and science;

• Defining and critiquing methods for impacting and studying reform in mathematics education and in science education as well as for impacting and studying professional development and/or teacher preparation in mathematics and in science; and
• Recognizing leadership and teacher change as critical factors that influence implementation efforts to improve school curriculum, instruction, and student achievement and considering the implications of their influence for such efforts.

The course will engage you in: reading and critiquing relevant research literature; examining cases; critiquing reports presenting reform data; engaging in local discussions; completing aspects of an evaluation; proposing an educational initiative; and examining assumptions about the teaching and learning of mathematics and the teaching and learning of science.

Student Expectations and Evaluations

The following are brief descriptions of the responsibilities and assignments that will help you meet the goals of this course. You will be given more detail about these assignments during class sessions and on the Canvas website. As we progress through the course, additional clarification and mid-course modifications may occur. If there are any changes, they will occur in advance of the assignment due dates.

1. Class Participation. This course will be taught as a seminar where participants share and critique ideas, defending their analysis by referencing readings. Because all participants are expected to make informed contributions to the class discussion, sharing ideas and questions as well as responding to those offered by other students, thoughtful preparation is required. You always will be expected to prepare for class by critically and analytically reading and thinking about a few documents. There are multiple sources that address the topics in this course, but you are only required to read some of these in anticipation of class activity (see semester schedule). You are encouraged to pursue other sources that will enrich your understanding, but these are not required for class discussion. While most class sessions will emphasize discussion, some class sessions will use the required readings as a starting point as you engage in a “hands-on” activity during some portion of the class. Class participation will constitute 20% of your final grade (60 possible points).

2. Online Discussion. Because time during the class period is limited, continuing discussion of the readings and the issues raised during the class seminar session will persist through a class Discussion Board on the Canvas website. You are expected to contribute to the Discussion Board at least once every two weeks. Your posts to the Discussion Board are expected to be clear and thoughtful, offering insights and raising questions or issues that extend the conversation and invite further comment. For the Discussion Board to be successful, your posts should make connections, building on the posts of others or referencing assigned readings in order to advance critical and analytic understanding among class members. To access this site, log onto www.elms.umd.edu using your UMD username and password, clicking on the link to EDCI 754. In addition to the discussion board, all course documents and information will be available at this location. Blackboard participation will constitute 20% of your final grade (60 possible points).

3. Leading a Class Discussion. In order to engage you in synthesizing ideas across the readings, each participant will be expected to sign up as a discussion leader for one week. You will read the materials for “your week” in advance and then meet with me 10-12 days prior to the date assigned for class discussion of those readings. At our meeting, you will highlight the key ideas that you feel are critical to discussion of the assigned readings, presenting written questions that raise those ideas. We may then discuss aspects of the readings and the intent of your questions, including why you feel those questions frame the intended discussion. In our meeting, we may address re-crafting the questions. You will then prepare a hard copy of the finalized questions and distribute them to all other participants
during the class that is scheduled one week in advance of the readings’ assigned discussion date. You are then expected to lead the class discussion of those readings, which may or may not include a “hands-on” activity springing from those readings. Question preparation/discussion and class leadership/facilitation will constitute 20% of your final grade (60 possible points).

4. **Implementing, Analyzing and Informing Policy that Impacts Practice.** Multiple contexts, that are themselves confounded and variable, impact the practice of both mathematics and science education. This presents a dilemma when designing, implementing, and studying efforts to improve practice. It also presents a dilemma when attempting to study the implications of educational policy. To engage you in grappling with this dilemma, you are to select one of the two following tasks.

   a. While the results of a summative evaluation frequently frame the target of decision makers, it is essential to collect and interpret data via on-going formative evaluations in order to maximize effect during research and development studies. In order to broaden your perception of what it means to conduct formative evaluation within practice, you will collect and interpret qualitative data from either a professional development session or a class session within a pre-service mathematics education or science course. In particular, your written assessment should intersect what you have learned from teacher education literature with your observation and yield both an evaluation and recommendations.

   Or

   b. Educational policies do not simply materialize. Policies are developed because there is the intent to address a critical problem or need, and the policy is viewed as a guide for targeting solutions. In order to broaden your perception of the scope of policy derivation, content, implementation, and evaluation, you will examine a policy from a data-driven perspective, clarifying its origin and intent, analyzing its effects, and characterizing the limitations of your analysis. Your written report should intersect what you have learned from education literature and yield both an evaluation and recommendations.

Your written report on this project will be due by October 27. This report should be submitted electronically as a docx attachment sent to patc@umd.edu. Your report will constitute 20% of your final grade (60 possible points).

4. **Writing a Proposal Narrative to Seek Funding: Faculty Early Career Development (CAREER) Program.** This course addresses contexts that have implications for reform, with a particular emphasis on teacher education and policy. Each of you has either participated in or contributed to pre-service and/or in-service mathematics/science education. Each of you has been impacted by educational policy in K-12 mathematics or science education as a teacher, a student, and/or an informed taxpayer. Further, in your prior coursework and experience, you have developed a perception of mathematics/science curriculum, instruction, and assessment that will initially frame your view of implementation and research addressing either mathematics education or science education reform. The readings, discussion, and activity in this course should impact your perception of mathematics and science education reform. But efforts to catalyze and support change in mathematics and science education require, at the minimum, a written description of goals and rationale, work plan, and expected product(s) as well as an evaluation plan. Funding to pursue such efforts may be sought through responses to official requests for proposals. To initiate you into this realm, your final project for this course is a proposal narrative that addresses the National Science Foundation Program Solicitation NSF 14-532. The proposal narrative (no budget) is due on December
In order to share some of the insights you gain from this assignment, as well as to provide you with some collegial feedback, the last day of class (December 8) will be devoted to 10-15 minute oral presentations of submitted proposals, with some time for class discussion. PowerPoint slides are a good way to organize your presentation.

The proposal narrative should be submitted electronically as a docx attachment sent to patc@umd.edu. Your written proposal narrative will constitute 20% of your final grade (60 possible points).

**Determination of Final Grades**

Final grades will be determined by summing all earned points, determining percentage achieved, and assigning grades based on the scale noted below.

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<thead>
<tr>
<th>Total Points</th>
<th>Total Percentage</th>
<th>Final Letter Grade</th>
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<tbody>
<tr>
<td>270-300</td>
<td>90-100%</td>
<td>A</td>
</tr>
<tr>
<td>261-269</td>
<td>87-89.7%</td>
<td>B+</td>
</tr>
<tr>
<td>240-260</td>
<td>80-86.7%</td>
<td>B</td>
</tr>
<tr>
<td>231-239</td>
<td>77-79.7%</td>
<td>C+</td>
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<tr>
<td>210-230</td>
<td>70-76.7%</td>
<td>C</td>
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<tr>
<td>0-209</td>
<td>0-69.7%</td>
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**Course Materials**

Selected readings as noted in the semester schedule and the following publications.


*Faculty Early Career Development Program.* [On-line].

**Course Procedures and Policies**

**Course Meetings and Attendance Policy**

The central topics of the course will be developed in weekly class meetings (Mondays 4:15 – 7:00 p.m.). As noted above under “Course Participation,” attendance is required, as this supports your learning and engages you in discussion, supporting the learning of others. In the event that a class must be missed due to illness, religious observances, or an emergency, please be courteous and notify me in advance via email.

In the unlikely event that the University is closed due to inclement weather during the time that class would normally be held, class is cancelled. Discussion of the readings assigned for that date will occur at the next scheduled class session, along with discussion of the readings assigned already assigned for that date. If an assignment was due on the date of a cancelled class, then the assignment should be submitted as an email attachment, with extension presumed if electrical power is interrupted.

**Course Evaluations at the University of Maryland**

As a member of our academic community, you as a student have a number of important responsibilities. One of these responsibilities is to submit your course evaluations each term.
though CourseEvalUM in order to help faculty and administrators improve teaching and learning at Maryland. Your feedback is confidential. CourseEvalUM will be open for you to submit your evaluations for Fall 2014 on or around December 1. You can access the submission system at www.courseevalum.umd.edu. More information is at: https://www.irpa.umd.edu/Assessment/CourseEval/FacFastFacts.html

Accommodations

Students with documented disabilities who would like accommodations should contact me soon as possible so we can make appropriate arrangements through Disability Support Services (301-314-7682).

Students will not be penalized because of observances of their religious beliefs. Whenever possible, students will be given reasonable time to make up any academic assignment that is missed due to participation in a religious observance. Please let me know as soon as possible (during the first two weeks of classes if possible) about any intended absences for religious observances.

Academic Integrity

The Honor Code and Honor Pledge at the University of Maryland prohibits cheating on exams, plagiarizing papers, submitting the same paper for credit in two courses without authorization, buying papers, submitting fraudulent documents, and forging signatures. You are expected to adhere to the University of Maryland’s Code of Academic Integrity as the standard in this course. This code can be accessed at www.testudo.umd.edu/soc/dishonesty.html. Failure to adhere to the code may result in the grade of XF (failure due to academic dishonesty). You are expected to uphold these standards in this course. You are expected to use APA style to document references, to assign credit for synthesized resources, and to identify attributions for direct quotations in submitted papers. Unless you are specifically advised to the contrary, the following pledge statement should be written and signed on front cover of every paper, examination, and academic assignment submitted for evaluation in order to meet the expectations of this course:

“I pledge on my honor that I have not given or received any unauthorized assistance on this examination (or assignment).”

Semester Schedule (Sessions available for student-led discussion are marked with *.)

September 8: Introduction to the course; federal involvement in education policy


September 15: Policy as a vehicle for stimulating reform


**September 22: Linking policy and practice**


*September 29: Teacher learning*


*October 6: Teacher Effectiveness*


**October 13: Preservice teacher education**


**October 20: Teacher education as a mechanism for reform**


**Reminder:** Formative evaluation or policy report is due next week.

**October 27: Writing a research proposal**


*November 3: Teacher knowledge*


*November 10: Teacher knowledge and student achievement*


*November 17: What do we know about professional development? How do we know it?*


NOTE: Read Banilower et al. (2007) or Heck et al. (2008).
*November 24: Considerations when designing professional development*


**December 1: Issues for reform**


**December 8: Student presentations**

The National Science Foundation (NSF) has notified you that your proposal is one of the top 10, but all of the top proposals cannot be funded. You have been asked to come to the NSF and present a brief description of your proposed project in a 15-20 minute period. Your presentation should include power point slides and should “make the case” for funding, addressing the RFP that you responded to as well as the common standard of intellectual merit and broader impact that all NSF proposals must meet.

**Reminder:** Proposal narrative is due in one week.

**December 15: Final project (proposal narrative) is due**

**Additional Resources**

**Professional Development**


**Teacher Change and Leadership**


**Teacher Education**


**Policy and Reform**


Pollock, M. (2001). How the question we ask most about race in education is the very question we most suppress. Educational Researcher, 30(9), 2-12.


