

**GEORGE MASON UNIVERSITY**  
**Graduate School of Education**  
**Mathematics Education Leadership**

**Course Title: Mathematics Education Leadership for School Change**  
**Program Code: EDCI 646-601(3 credits)**  
Summer 2010

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Class Meets: Tuesdays and Thursdays, 4:15-7:45 p.m., May 11 – June 17, 2010  
Main Building/Independent Hill – Room 247/247B (as well as 2 online sessions)

### **I. Course Description**

This course is designed for master's level students in the mathematics education leadership cohort program. Course surveys current literature and large-scale studies in mathematics education and engages students in research, study, and discussion of factors that impact teaching and learning of mathematics in school settings.

Prerequisite: Admission to the Mathematics Education Leadership Master's Degree Program or instructor permission.

### **II. Student Outcomes**

This course is designed to enable students to:

- A. Read, interpret, and critique mathematics education research on teaching and learning and examine its impact in school settings;
- B. Read, interpret, and discuss methodologies for implementing school change in mathematics education and for coping with the emotional aspects of change;
- C. Design and propose a research project investigating mathematics teaching and/or learning;
- D. Develop an attitude of inquiry towards the one's own and others' practice;
- E. Develop skills in reviewing research literature, designing action research, and writing research questions;
- F. Become familiar with guidelines and regulations for conducting social/behavioral research using human subjects;
- G. Explore and discuss the various aspects of the work of a mathematics leader including: working with different populations (i.e., new and experienced teachers, administrators, parents, and school cultures); managing discussions; identifying and implementing structures for professional development (i.e., Lesson Study, Content-Focused Coaching, Professional Learning Communities, Action Research); and transitioning into the role of a mathematics specialist.
- H. Examine leadership skills needed to improve mathematics programs (i.e., evaluating teachers' learning, evaluating program outcomes).
- I. Develop the leadership skills needed to be successful in improving mathematics programs (i.e., proficiency in assessment, measurement and evaluation of outcomes; identification of students' and teachers' needs; ability to bring forth and carry through new initiatives).

### III. Relationship to Program Goals and Professional Organization

EDCI 646 is designed to enable mathematics education leaders to use strategies to implement and evaluate school change in mathematics teaching and learning. Students need knowledge of effective instruction in mathematics as well as vehicles for change so that they can be a catalyst for school improvement in mathematics. The course was developed according to the joint position statement of the Association of Mathematics Teacher Educators (AMTE) and the National Council of Teachers of Mathematics (NCTM) on Principles to Guide the Design and Implementation of programs in Mathematics Education and the joint position statement of the National Council for Accreditation of Teacher Education (NCATE) and the National Council of Teachers of Mathematics (NCTM) on Standards for Elementary Mathematics Specialists. These position statements indicate that the core knowledge expectations in mathematics education include:

- Demonstrate knowledge about research on mathematics teaching and learning,
- Become familiar with reports from major commissions, committees, and professional organizations,
- Conceptualize and conduct research in the field of mathematics education;
- Help practicing teachers acquire knowledge of research on teaching and translate it to their own practice,
- Critically reflect about one's own teaching.

### IV. Nature of Course Delivery

The delivery of this course combines methods of lecture, discussion, independent study/research, student presentation, writing, and online meetings/assignments. Access to Blackboard and GMU email are required to participate successfully in this course.

### V. Texts and Readings

#### Required Texts:

Ma, L. (2010). *Knowing and teaching elementary mathematics: Teachers' understanding of fundamental mathematics in China and the United States*. Lawrence Erlbaum.

West, L. & Staub, F. C. (2003). *Content-focused coaching: Transforming mathematics lessons*. Portsmouth, NH: Heinemann.

#### Required Article (posted on e-Reserves):

Takahashi, A., & Yoshida, Mo. (2004). Ideas for establishing lesson-study communities. *Teaching Children Mathematics*, 10(9), 436-443.

#### Suggested Readings:

Andrews, D., & Lewis, M. (2002). The experience of a professional community: Teachers developing a new image of themselves and their workplace. *Educational Research*, 44, 237-254.

Cochran-Smith, M. & Lytle, S. (1999). The teacher research movement a decade later. *Educational Researcher*, 28(7), 15-25.

Evitts, T. A. (2004). Action research: A tool for exploring change. *Mathematics Teacher*, 97(5), 366-370.

Hatch, T., White, M. E., & Faigenbaum, D. (2005). Expertise, credibility, and influence: How teachers can influence policy, advance research, and improve performance. *Teachers College Record*, 107, 1004-1035.

Lewis, C., Perry, R., & Hurd, J. (2004). A deeper look at lesson study. *Educational Leadership*, 61(5), 18-22.

Lewis, C. C., & Tsuchida, I. (1998). A lesson is like a swiftly flowing river: How research lessons improve Japanese education. *American Educator*, 22(4), 12-17; 50-52.

Snow-Gerono, J. L. (2005). Professional development in a culture of inquiry: PDS teachers identify the benefits of professional learning. *Teaching and Teacher Education: An International Journal of Research Studies*, 21, 241-256.

## VI. Course Requirements, Assignments, & Evaluation Criteria

The assignments across the semesters are intended to develop skills in implementing, leading, and evaluating school change in mathematics teaching and learning. Students read and analyze research on effective mathematics instruction, explore vehicles for school change, examine principles and methods of designing research, and propose a research study investigating change in mathematics teaching and learning. All assignments are to be completed on time so that class members might benefit from the expertise and contributions of their colleagues. Late assignments will be worth a lower grade. Additional details for the assignments will be provided in separate handouts and/or posted on Blackboard.

Successful completion of this course requires the following:

### 1. *Mathematics Research Project Proposal (15%)*

Students will individually design and propose a research study investigating change in mathematics teaching and learning. The proposal will describe a problem or area of interest, research questions, the setting and participant sample for the study, and the method of inquiry. For this course: The student is not required to conduct the study. The components of the assignment follow below.

Purpose statement, potential questions, and participants: Students will draft an initial statement (3-4 pages, double-spaced) describing their initial thinking about their Research Project Proposal. This statement should include a discussion of the purpose of the project including the problem to be addressed, a rationale for the study's focus, potential research questions, study participants & setting.

### 2. *Group Presentation and Annotated Bibliography (30%)*

Student groups (4 max per group) will explore and present information on one of the following topics and how it can be used to bring about school change: Teacher Leadership, Action/Teacher Research, Professional Learning Communities, Achievement Gap, Curriculum Materials (learning from/with), or Data (using data to bring about change). The group will explore research literature on their topic, create an Annotated Bibliography of the literature, and prepare a presentation on the topic for their peers. The components of the assignment follow:

#### Annotated bibliography (15%)

Groups will submit an Annotated Bibliography documenting scholarly readings on the presentation topic. The Annotated Bibliography includes a brief description of the content of the book(s), articles(s), or other academic readings. Annotations should be brief but of sufficient length to convey the essence of the material contained in the reading. The Annotated Bibliography must include a minimum of 8 academic readings.

#### Class presentation (15%)

Groups will prepare a presentation for the class examining their topic. The presentation should highlight the essential idea of the topic, engage the class in exploring those ideas, and provide examples of the topic. The presentation should incorporate relevant information from the research literature included in the Annotated Bibliography. Each presentation will be approximately 60 minutes.

### 3. *Research Article Synthesis (20%)*

Students will individually locate, read, and synthesize 4 research articles related to one or more of the following topics: effective mathematics instruction, improving mathematics instruction, or implementing

school or instructional change. Articles should come from scholarly, peer-reviewed journals (see a suggested list below) and should describe research conducted on the topic (not a commentary or an opinion piece). These articles could potentially include some of the same readings selected for the students' Group Presentation (Assignment 2). A sample template and rubric will be posted on Blackboard.

#### Some Suggested Peer-Reviewed Journals

*Action in Teacher Education*  
*Curriculum Inquiry*  
*Educational Researcher*  
*Educational Studies in Mathematics*  
*Journal for Research in Mathematics Education*  
*Journal of Computers in Mathematics and Science Teaching*  
*Journal of Curriculum Studies*  
*Journal of Education for Teaching*  
*Journal of Mathematics Teacher Education*  
*Journal of Teacher Education*  
*School Science and Mathematics*  
*Teachers College Record*

#### 4. *Completion of the CITI Program Training (5%)*

Students will individually complete the CITI Training Program, an online, mandatory training program for individuals conducting research using human subjects. Additional details are provided on Blackboard. Successful completion of this training is required prior to enrollment in the EDLE 791 mathematics internship.

#### 5. *Technology Professional Development Activity (20%)*

In groups, students will conduct a 45-minute group professional development activity focusing on one technology resource which supports the learning and teaching of one mathematical concept. This assignment has several purposes, which include:

- Developing your skills as leaders of professional development in your schools
- Introducing other teachers to specific technology resources
- Developing your TPACK (Technology, Pedagogy, and Content Knowledge)

Students will also reflect upon the professional development activity, with a focus on the planning, the actual activity, and lessons learned after leading the activity. A rubric with specific requirements will be posted on Blackboard.

#### 6. *Class Participation (10%)*

The quality of this course depends heavily and primarily on the regular attendance and participation of all involved. Participation will include taking part in discussions informed by critical reading and thinking, leading discussions about selected mathematics problems, and sharing with the class the products of various reading/writing assignments and teacher leader experiences.

Attendance. It is your responsibility to attend all class sessions. Please report your reasons for any absences to the instructor in writing. Tardiness. It is your responsibility to be on time for each class session. Please report your reasons for any tardiness to the instructor in writing.

ELEMENT	LEVEL OF PERFORMANCE			
	<i>Distinguished (9 – 10 points)</i>	<i>Proficient (8 points)</i>	<i>Basic (6 - 7 points)</i>	<i>Unsatisfactory (1 - 5 points)</i>
Attendance & Participation	The student attends all classes, is on time, is prepared and follows outlined procedures in case of absence. The student actively participates and supports the members of the learning group and the members of the class. Presentations demonstrate a deep knowledge of content as well as implications for teaching.	The student attends all classes, is on time, is prepared and follows outlined procedures in case of absence; the student makes active contributions to the learning group and class. Presentations demonstrate sufficient knowledge of content as well as implications for teaching.	The student is on time, prepared for class, and participates in group and class discussions. The student attends all classes and if an absence occurs, the procedure outlined in this section of the syllabus is followed. Presentations demonstrate minimal knowledge of content and/or implications for teaching.	The student is late for class. Absences are not documented by following the procedures outlined in this section of the syllabus. The student is not prepared for class and does not actively participate in discussions. Presentations are lacking knowledge of content and connections to teaching.

### Evaluation Criteria

#### Graduate Grading Scale

A	93%-100%	B+	87%-89%	C	70%-79%
A-	90%-92%	B	80%-86%	F	Below 70%

## VII. UNIVERSITY POLICIES

### HONOR CODE

To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of George Mason University and with the desire for greater academic and personal achievement, George Mason University has set forth a code of honor that includes policies on cheating and attempted cheating, plagiarism, lying and stealing. Detailed information on these policies is available in the GMU Student Handbook, the University Catalog, of the GMU website ([www.gmu.edu](http://www.gmu.edu)).

### INDIVIDUALS WITH DISABILITIES POLICY

The university is committed to complying with the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 by providing reasonable accommodations for applicants for admission, students, applicants for employment, employees, and visitors who are disabled. Applicants for admission and students requiring specific accommodations for a disability should contact the Disability Resource Center at 993-2474, or the University Equity Office at 993-8730.

### ATTENDANCE POLICY

Students are expected to attend the class periods of the courses for which they register. Although absence alone is not a reason for lowering a grade, students are not relieved of the obligation to fulfill course assignments, including those that can only be fulfilled in class. Students who fail to participate (because of absences) in a course in which participation is a factor in evaluation, or students who miss an exam without an excuse, may be penalized according to the weighted value of the missed work as stated in the course syllabus (GMU University Catalog, pg. 32).

COURSE SCHEDULE EDCI 646-601 SUMMER 2010

*Note: The course schedule is subject to revision at the discretion of the instructor. Revisions will be announced in class and posted on Blackboard.*

<b>Class</b>	<b>Date</b>	<b>Topic</b>	<b>Reading Due this Class</b>	<b>Assignments Due This Class Session</b>
1	Tues May 11	Introduction: Course Overview and Course Logistics  Setting Goals for Instructional Improvement (Review School Improvement Plans)  Introduction to Reading Educational Research  Sign up for Assignments 2 and 5 (Groups)/Meet in Groups to Begin Planning	n/a	Bring School Improvement Plans
2	Thurs May 13	MEETINGS in Groups: <ul style="list-style-type: none"> <li>• Develop Technology Professional Development Activity (Assignment 5)</li> <li>• Plan Group Presentations (Assignment 2)</li> </ul> [Note: You as a group will decide when to meet. It can be anytime between May 11 & 18.]	n/a	• n/a
3	Tues May 18	Effecting School Change: Lesson Study  Lesson Study Teams: Phase 1	Article – see GMU’s e-reserves	• Bring SOLs and Pacing Guides, as well as Curricular Materials
4	Thurs May 20 <b>LAB</b>	TECHNOLOGY PROFESSIONAL DEVELOPMENT ACTIVITY  Lesson Study Teams: Phase 2	n/a	• TPDA (Assignment 5)
5	Tues May 25	Subtraction with Regrouping: Approaches to Teaching a Topic  Multidigit Number Multiplication: Dealing with Students’ Mistakes  Effecting Change: Action/Teacher Research  Lesson Study Teams: Phase 3	Ma Chapters 1 & 2	• Group Presentation: Action/Teacher Research (Assignment 2)
6	Thurs May 27	Effecting Change: The Achievement Gap  Effecting Change: Professional Learning Communities  Effecting Change: Curriculum Materials  Planning an Online Meeting: Using the Chat and Discussion Board Features of Blackboard	n/a	<ul style="list-style-type: none"> <li>• Group Presentation: The Achievement Gap (Assignment 2)</li> <li>• Group Presentation: Professional Learning Communities (Assignment 2)</li> <li>• Group Presentation: Curriculum Materials (Assignment 2)</li> </ul>

7	Tues June 1	<b>ONLINE MEETING</b> Exploring New Knowledge: The Relationship Between Perimeter and Area  Teachers' Subject Matter Knowledge: Profound Understanding of Fundamental Mathematics When and How Is It Attained?	Ma Chapter 4  Ma Chapters 5, 6, 7	
8	Thurs June 3	Effecting Change: Teacher Leadership  Effecting Change: Using Data  Content Focused Coaching	West & Staub Chapters 1-4	<ul style="list-style-type: none"> <li>• Group Presentation: Teacher Leadership (Assignment 2)</li> <li>• Group Presentation: Using Data (Assignment 2)</li> </ul>
9	Tues June 8	Content Focused Coaching  Video Cases 1 & 2	West & Staub Chapters 5 & 6	<ul style="list-style-type: none"> <li>• Research Article Synthesis (Assignment 3)</li> </ul>
10	Thurs June 10	Content Focused Coaching  Video Case 3	West & Staub Chapter 7-10	<ul style="list-style-type: none"> <li>• n/a</li> </ul>
11	Tues June 15	<b>ONLINE MEETING</b> <ul style="list-style-type: none"> <li>• Completion of the CITI Program Training</li> <li>• Technology Evaluation Activity</li> </ul>	n/a	<ul style="list-style-type: none"> <li>• Submit Completion Report for CITI Program Training (Assignment 4)</li> </ul>
12	Thurs June 17	Share Mathematics Research Project Proposals Course Evaluations Final Thoughts	n/a	<ul style="list-style-type: none"> <li>• Mathematics Research Project Proposal (Assignment 1)</li> </ul>

Updated 4/29/10