

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

**Course Title: Mathematics Education Leadership for School Change**

**Program Code: EDCI 646-001(3 credits)**

Fall 2010

Instructor: Dr. Christopher Johnston  
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Class Meets: Wednesdays, 4:30 – 7:10 p.m. Robinson A243 (including four online meetings)

### **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. Develop skillful and flexible use of different instructional formats – whole group, small group, partner, and individual – in support of learning goals.
- B. Use various instructional applications of technology, judiciously, in ways that are mathematically and pedagogically grounded.
- C. Use the formative assessment cycle (administer a formative assessment task, analyze student responses to the task, and design and re-teach lessons based on this analysis) and be able to find or create appropriate resources for this purpose.
- D. Use leadership skills to improve mathematics programs at the school and district levels.
- E. Read, interpret, and discuss methodologies for implementing school change in mathematics education and for coping with the emotional aspects of change.
- 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.

(\*\*\*Outcomes A – D are taken directly from the 2010 AMTE *Standards for Elementary Mathematics Specialists: A Reference for Teaching Credentialing and Degree Programs*)

### **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.

#### **IV. Nature of Course Delivery**

The delivery of this course combines methods of lecture, discussion, independent study, student group presentations, 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, M. (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. Coaching Project—(30%) Video and Analysis (20%) Coaching Reflection Paper (10%)*

For this assignment, participants will plan and videotape a coaching session (one pre-conference, one classroom observation and one post-conference) with the classroom teacher. Participants should *not* videotape the actual lesson that is taught by the classroom teacher. As part of this assignment, participants will choose one 10-minute uninterrupted clip from both conferences (20 minutes total) and present these clips to a small group of their classmates. After discussing the clips with the small group, participants will develop a 2-4 page written summary of the important ideas related to mathematical pedagogy and mathematical content that surfaced during their own pre- and post-conferences. Each small group will also choose a representative clip (one pre- or post-conference clip) to discuss with the entire class. During class 11 bring your video clips for small group discussion. A final copy of the 2-4 page summary, as well as a description of the lesson and analysis of student work, will be due the last day of class.

A rubric with specific requirements will be posted on Blackboard.

*2. Group Presentation and Bibliography (25%)*

Student groups (3 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 a bibliography of the literature, and prepare a presentation on the topic for their peers.

Specifically, 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 bibliography. Each presentation will be approximately 60 minutes.

Groups will also create a handout for class participants. The handout will serve two functions:

1. Highlight the salient points of the presentation. (In other words, what should teachers take away from the presentation, based upon the research?)
2. Identify at least 8 readings related to the topic as discussed in the presentation.

A rubric with specific requirements will be posted on Blackboard.

*3. Technology Professional Development Activity (25%)*

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.

*4. Completion of the CITI Program Training (10%)*

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. *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 topics, 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).

Syllabus Updated 8/24/10

COURSE SCHEDULE EDCI 646-001 FALL 2010 – ON-CAMPUS

Note: The course schedule is subject to revision at the discretion of the instructor. Revisions will be announced in class and posted on Blackboard. **Revised 8/24/10**

Class	Date	Topic	Reading Due this Class Session	Assignments Due This Class Session
1	Wed. Sept. 1	Introduction: Course Overview and Course Logistics  What is meant by “school change”?  Sign up for Assignments 2 & 3 (Groups)/Meet in Groups to Begin Planning		
2	Wed. Sept. 8	Effecting School Change: Lesson Study  Lesson Study: Phase 1	Article (posted on e-Reserves)	<ul style="list-style-type: none"> <li>Bring SOLs and Pacing Guides, as well as Curricular Materials</li> </ul>
3	Wed. Sept. 15	Content Focused Coaching  Meet in Groups to Continue Planning (Assignments 2 & 3)	West & Staub Chapters 1-4	
4	Wed. Sept. 22	<b>ONLINE CLASS MEETING</b> Content Focused Coaching Video Cases 1 & 2	West & Staub Chapters 5-6	
5	Wed. Sept. 29	Content Focused Coaching Video Case 3  Effecting Change: Action/Teacher Research	West & Staub Chapters 7-10	<ul style="list-style-type: none"> <li>Group Presentation: Action/Teacher Research (Assignment 2)</li> </ul>
6	Wed. Oct. 6	Effecting Change: Curriculum Materials  Effecting Change: The Achievement Gap		<ul style="list-style-type: none"> <li>Curriculum Materials (Assignment 2)</li> <li>Group Presentation: The Achievement Gap (Assignment 2)</li> </ul>
7	Wed. Oct. 13	<b>ONLINE ASSIGNMENTS</b> <ul style="list-style-type: none"> <li>Completion of the CITI Program Training</li> <li>Technology Evaluation Activity</li> </ul>		

8	Wed. Oct. 20	Effecting Change: Teacher Leadership  Effecting Change: Using Data		<ul style="list-style-type: none"> <li>• Submit Completion Report for CITI Program Training (Assignment 4)</li> <li>• Group Presentation: Teacher Leadership (Assignment 2)</li> <li>• Group Presentation: Using Data (Assignment 2)</li> </ul>
9	Wed. Oct. 27	TECHNOLOGY PROFESSIONAL DEVELOPMENT ACTIVITY <b>(Need computer lab)</b>  Lesson Study: Phases 2 and 3 (Groups A & B)		<ul style="list-style-type: none"> <li>• Technology Professional Development Activity (Assignment 3) GROUPS A &amp; B</li> </ul>
10	Wed. Nov. 3	TECHNOLOGY PROFESSIONAL DEVELOPMENT ACTIVITY <b>(Need computer lab)</b>  Lesson Study: Phases 2 and 3 (Groups C & D)		<ul style="list-style-type: none"> <li>• Technology Professional Development Activity (Assignment 3) GROUPS C &amp; D</li> </ul>
11	Wed. Nov. 10	Subtraction with Regrouping: Approaches to Teaching a Topic  Coaching Project – Small Group Discussions	Ma Chapter 1	Bring Coaching Video Clips for Small Group Discussion
12	Wed. Nov. 17	<b>ONLINE CLASS MEETING</b>  Multidigit Number Multiplication: Dealing with Students' Mistakes  Generating Representations: Division by Fractions  Exploring New Knowledge: The Relationship Between Perimeter and Area	Ma Chapter 2  Ma Chapter 3  Ma Chapter 4	
	Wed. Nov. 24	NO CLASS – THANKSGIVING RECESS		

13	Wed. Dec. 1	<b>ONLINE CLASS MEETING</b> Teachers' Subject Matter Knowledge: Profound Understanding of Fundamental Mathematics When and How Is It Attained?	Ma Chapter 5  Ma Chapter 6 Ma Chapter 7	
14	Wed. Dec. 8	Share Coaching Project Results Course Evaluations Final Thoughts		<ul style="list-style-type: none"> <li>• Coaching Project (Assignment 1)</li> </ul>
15	Wed. Dec. 15	Snow Make Up Day Class (If needed)		