

George Mason University
College of Education and Human Development
Mathematics Education Leadership
EDCI 859 - Current Issues in Mathematics and STEM Education Research
Credits 3
Fall 2021 Wednesdays 4:30-7:10 p.m.
Face-to-face (Horizon Hall 3001) and synchronous online (Links in Blackboard)

Faculty

Name: Jennifer Suh
Office Hours: By Appointment
Office Location: Thompson Hall 2401
Cell Phone: (703) 973-4642
Email Address: jsuh4@gmu.edu

Prerequisites/Corequisites

Students enrolled in the course must be enrolled in the Mathematics Education Leadership doctoral program.

University Catalog Course Description

Introduces contemporary topics in mathematics education research. Engages students in current issues in research design and topics of interest in mathematics teaching, learning, policy and practice. Conducts search on research literature to develop pilot studies. Offered by Graduate School of Education. May be taken for variable credits.

Course Overview

This course was designed with three primary goals: (1) to introduce MEL students to contemporary issues in mathematics and STEM education; (2) to support students in critically reading research in mathematics and STEM education; and (3) to develop skills related to writing literature reviews and designing research.

Course Delivery Method

This course will be delivered using a weekly seminar format.

Learner Outcomes or Objectives

This course is designed to enable students to do the following:

- Analyze and critique contemporary mathematics education research
- Understand major theories in contemporary mathematics education/ STEM education research
- Examine current issues and topics in mathematics education, teaching, learning, and school-based reform

- Demonstrate the ability to search the literature and to craft a literature review pertinent to their research interests that integrates seminal and contemporary literature in mathematics education
- Develop the research design for a pilot study informed by the literature review
- Develop and reinforce critical thinking, oral, and writing skills
- Write clearly and coherently
- Use APA style of writing

Required Texts

Seda, P. & Brown, K. (2021). Choose to see. Dave Burgess Consulting. ISBN-13: 978-1951600808.

Bartell, T. G. (2018). *Toward Equity and Social Justice in Mathematics Education*. Springer. <http://doi.org/10.1007/978-3-319-92907-1>

This handbook reflects the most current research toward equity and social justice in mathematics education, addresses the challenge of meeting the needs of marginalized students in mathematics education and includes contributions from educators writing critically about mathematics education in diverse contexts

Kaiser, G, & Presmeg, N. (2019). *Compendium for Early Career Researchers in Mathematics Education*, Springer. <http://doi.org/10.1007/978-3-030-15636-7>

This compendium presents a state-of-the-art introduction for early career researchers into important theories and relevant empirical approaches for mathematics education

American Psychological Association (2020). *Publication manual of the American psychological association*. American Psychological Association.

Use APA 7-

https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/general_format.html

Course Performance Evaluation

Students are expected to submit all assignments on time in the manner outlined by the instructor (e.g., Blackboard).

Assignments and Examinations

Current Issues in Mathematics Education Research Topic Search (total 30 points)

Part 1: Brief Synthesis Paper (20 points)

You will review the top journals , recent funded projects through NSF and IES on topics related

to your research interest(s). Provide a summary and critique related to the project and related papers. The critique should include the following parts: purpose, methods, results and critical comments as well as reflections about the article.

Part 2: Lead a Research Expertise Presentation (10 points) Sign up

You will give a (10 minute) oral presentation using a PowerPoint related to the current issues you explored that highlights the seminal, historic, and current research that informs your research topic of choice. Provide 1 or 2 papers from your synthesis for your classmates to enjoy on BB reading collection.

B. Pilot Research Knowledge Assignment (40 points)

You will create an individual pilot study to address a research question informed by your topic of interest and methodological choices that are best suited for your study. Sections of the paper will include:

PART 1: (1) Statement of the Problem; (2) Purpose of the Study; (3) Significance of the Study; (4) Research Questions (3~5 pages)

Draft due Session

PART 2: (5) Review of Literature (your synthesis may be worked in here) (~15-20 pages)

PART 3: (6) Design: Methods and Procedures; (7) Sample; (8) Measures; and (9) Data Collection. (10) Preliminary Analysis (3~5 pages)

<https://docs.google.com/document/d/19E-BSNRkydcZ5MlmodBGDLIYtFemXjAqPH1O9gzyfpo/edit?usp=sharing>

C. Preparing a Publication or a proposal for a MET Grant (15 points)

Students will identify possible category for a Publication/MET grant for their area of interest. You may collaborate with a partner on a similar interest for a MET grant and/or a publication for a journal.

D. Weekly Reading Reflection and leading a discussion (15 points)

Each of you will on the readings and it's connection to your research interest and/or a methodology that is relevant to your work. Reflection should include at least 3 big ideas, 2 questions, 1 connection to your research that you want to bring up in class discussions.

Students are expected to attend class regularly and fully participate.

Course Performance Evaluation Weighting

<i>A. Current Issues in Mathematics and STEM Education Research Topic Search (30 points)</i>	30
<i>B. Pilot Research Knowledge Assignment (40 points)</i>	40
<i>C. Collaborative Work- Preparing a Proposal for a MET Grant (15 points)</i>	15

<i>D. Weekly Reading Reflection and Participation (15 points)</i> 3 big ideas, 2 questions, 1 connection to your research	15
TOTAL	100 pts

Grading

The final evaluation criteria utilizes the graduate grading scale and is as follows:

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

Professional Dispositions

Students are expected to exhibit professional behaviors and dispositions at all times.

Core Values Commitment

The College of Education and Human Development is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles: <http://cehd.gmu.edu/values/>.

GMU Policies and Resources for Students

Policies

- Students must adhere to the guidelines of the Mason Honor Code (see <http://oai.gmu.edu/the-mason-honor-code/>).
- Students must follow the university policy for Responsible Use of Computing (see <http://universitypolicy.gmu.edu/policies/responsible-use-of-computing/>).
- Students are responsible for the content of university communications sent to their Mason email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account.
- Students with disabilities who seek accommodations in a course must be registered with George Mason University Disability Services. Approved accommodations will begin at the time the written letter from Disability Services is received by the instructor (see <http://ods.gmu.edu/>).
- Students must follow the university policy stating that all sound emitting devices shall be silenced during class unless otherwise authorized by the instructor.

Campus Resources

- Support for submission of assignments to Tk20 should be directed to tk20help@gmu.edu or <https://cehd.gmu.edu/aero/tk20>. Questions or concerns regarding use of Blackboard should be directed to <http://coursessupport.gmu.edu/>.
- The George Mason University Writing Center staff provides a variety of resources

- and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing (see <http://writingcenter.gmu.edu/>).
- The George Mason University Counseling and Psychological Services (CAPS)
- staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance (see <http://caps.gmu.edu/>).
- The George Mason University Office of Student Support staff helps students negotiate life situations by connecting them with appropriate campus and off-campus resources. Students in need of these services may contact the office by phone (703-993-5376). Concerned students, faculty and staff may also make a referral to express concern for the safety or well-being of a Mason student or the community by going to <http://studentsupport.gmu.edu/>, and the OSS staff will follow up with the student.

For additional information on the College of Education and Human Development, please visit our website <https://cehd.gmu.edu/>.

Class Schedule

Faculty reserves the right to alter the schedule as necessary, with notification to students. Smaller assignments may be assigned to help you work toward completion of the major projects in the course.

Date EDCI 859	Topic Readings	Assignment Due
Week 1- 8/25/21 Synchronous	Introduction & Course Overview In class Current Issues: Headlines https://algebra.org/wp/ Organizations and Thought leaders Where we've been and where we are headed... Set up Medeley https://infoguides.gmu.edu/c.php?g=997801	Bring an artifact that represents a current issue in Math and STEM education that you are interested in sharing
Week 2- 9/1/21 On-campus	Choose to See Pamela Seda and Kendall Brown Ch. 1 Complex Instruction Cohen, E., & Lotan, R. (1995). Producing Equal-Status Interaction in the Heterogeneous Classroom. <i>American</i>	Update Vitae/Link to portfolio site

	<p><i>Educational Research Journal</i>, 32(1), 99-120. doi:10.2307/1163215</p>	
<p>Week 3- 9/8/21 online</p>	<p>Choose to See Pamela Seda and Kendall Brown Ch. 2 Aguirre Math Identity Aguirre, J., & del Rosario Zavala, M. (2013). Making culturally responsive mathematics teaching explicit: a lesson analysis tool. <i>Pedagogies</i>, 8(2), 163–190. https://doi-org.mutex.gmu.edu/10.1080/1554480X.2013.768518 Evolution of TeachMath & CRMT2</p>	<p>*Current Issues Topic selection due In 1-2 pages, share your research interests and the topic you plan to use for your literature review.</p>
<p>Week 4- 9/15/21 On-campus</p>	<p>Choose to See Pamela Seda and Kendall Brown 3 from Bartell, T. G. (2018) Making the Implicit Explicit: Building a Case for Implicit Racial Attitudes to Inform Mathematics Education Research Dan Battey and Luis A. Leyva</p>	
<p>Week 5- 9/22/21 Online</p>	<p>Choose to See Pamela Seda and Kendall Brown 4 Cultural Relevant Pedagogy from Bartell, T. G. (2018) Part III Student Learning and Engagement in PreK–12 Mathematics Classrooms 10 “So We Only Have One We Share with More, and Then They Have Way More and They Share with Less”: Mathematics and Spatial Justice Laurie H. Rubel, Vivian Y. Lim, and Maren Hall-Wieckert</p>	<p>B. Pilot Research- Part 1 due</p>
<p>Week 6- 9/29/21 On-campus</p>	<p>Choose to See Pamela Seda and Kendall Brown 5 Access Activate and Build on Prior knowledge Jansen Rough Draft math</p>	

	* Literature Reviews: Searching, Surveying, and Organizing	
Week 7- 10/6/21 Synchronous Online	<p>Choose to See Pamela Secada and Kendall Brown 6 Release Control- Agency</p> <p>Tru Framework & Lesson Study Schoenfeld, A.H. Reframing teacher knowledge: a research and development agenda. <i>ZDM Mathematics Education</i> 52, 359–376 (2020). https://doi-org.mutex.gmu.edu/10.1007/s11858-019-01057-5</p> <p>*Literature Reviews: Synthesis of Research Findings</p> <p>How can the Center provide this connection to STEM interests?</p>	
Week 8 10/13/21 On-campus	<p>Choose to See Pamela Seda and Kendall Brown 7 & 8 Expect More- Asset based</p> <ul style="list-style-type: none"> Superfine, A.C. An asset-based perspective on prospective teacher education. <i>J Math Teacher Educ</i> 24, 331–333 (2021). https://doi.org/10.1007/s10857-021-09503-6 <p>* Crafting Research Questions and/or Hypotheses (In class) Submit a memo that presents you research question(s) and/or hypotheses related to your research topic</p>	<p><i>A. Current Issues in Mathematics Education Research Paper due</i></p> <p>*Sign up for Current Issues Presentations</p>
Week 9 10/20/21 Synchronous Online	<p>Readings from Compendium for early researchers 1 Argumentation Analysis for Early Career Researchers Christine Knipping and David A. Reid</p> <ul style="list-style-type: none"> Teacher Support for Argumentation: An Examination of Beliefs and Practice <i>Journal for Research in Mathematics Education</i> AnnaMarie Conner and Laura Marie Singletary <p>*Research Design: Selecting Appropriate Methodological Approaches</p>	*Sign up for Current Issues Presentations
Week 10 10/27/21 On-campus	<p>Chapter 2. Specific Design Research: An Introduction Koeno Gravemeijer and Susanne Prediger</p> <ul style="list-style-type: none"> A. Supovitz, J., Ebby, C. B., Remillard, J. T., & Nathenson, R. (2021). Experimental Impacts of 	*Sign up for Current Issues Presentations

	<p>Learning Trajectory–Oriented Formative Assessment on Student Problem-Solving Accuracy and Strategy Sophistication, <i>Journal for Research in Mathematics Education</i>, 52(4), 444-475. Retrieved Aug 15, 2021, from https://pubs.nctm.org/view/journals/jrme/52/4/article-p444.xml</p> <p>*Research Design: Selecting Appropriate Methodological Approaches</p>	
<p>Week 11 11/3/21 Synchronous Online</p>	<p>Chapter 4 An Introduction to Grounded Theory with a Special Focus on Axial Coding and the Coding Paradigm</p> <ul style="list-style-type: none"> • Hunt, J.H., Martin, K., Patterson, B. <i>et al.</i> Special educators’ knowledge of student mathematical thinking. <i>J Math Teacher Educ</i> (2021). https://doi.org/10.1007/s10857-021-09508-1 • Shaughnessy, M., Garcia, N.M., O’Neill, M.K. <i>et al.</i> Formatively assessing prospective teachers’ skills in leading mathematics discussions. <i>Educ Stud Math</i> (2021). <p>*Research Design: Selecting Appropriate Methodological Approaches</p>	<p>*Sign up for Current Issues Presentations</p> <p>B. Pilot Research Part 2</p>
<p>Week 12 11/10/21 Synchronous Online</p>	<p>Chapter 6 Planning and Conducting Mixed Methods Studies in Mathematics Educational Research</p> <ul style="list-style-type: none"> • Borko, H., Carlson, J., Deutscher, R. <i>et al.</i> Learning to Lead: an Approach to Mathematics Teacher Leader Development. <i>Int J of Sci and Math Educ</i> 19, 121–143 (2021) <p>*Research Design: Selecting Appropriate Methodological Approaches</p>	
<p>Week 13 11/17/21 On-campus</p>	<p>Chapter 9. Problematising Video as Data in Three Video-based Research Projects in Mathematics Education</p> <p>Teacher Practice-Noticing Jacobs, V. R., Lamb, L. L. C., & Philipp, R. A. (2010). Professional noticing of children’s mathematical thinking. <i>Journal for Research in</i></p>	<p>*Sign up for Current Issues Presentations</p> <p>B. Pilot Research-Part 3 due</p>

	<p><i>Mathematics Education</i>, 41(2), 169–202. Jacobs, V. R. & Spangler, D. (2017). Research on Core Practices in K-12 Mathematics Teaching. In Jinfa Cai (Ed.), <i>Compendium for Research in Mathematics Education</i> (pp.766-792). Reston, VA: National Council of Teachers of Mathematics.</p> <p>*Research Design: Selecting Appropriate Methodological Approaches</p>	
Week 14 11/24/21	THANKSGIVING BREAK ☺	
Week 15 12/1/21 On-campus	*Presenting your Research	<i>C. Proposal for a Grant Idea due (15 points)</i>

RESOURCES for MEL Doctoral Students

[Learn about the Writing Process for Academic Writing](#)

[Publications for STEM Educators, Policymakers, and Researchers](#)

[Storytelling 101: Writing Tips for Academics](#)

[Tips for Writing a Winning Conference Proposal](#)

[Relevant Conferences for STEM educators](#)

[**Early Career Researchers and Developers in the DRK–12 Program: Needs, Supports, and Recommendations**](#)

DRk12 -<http://cadrek12.org/sustaining-and-scaling-professional-development>

<http://cadrek12.org/technology-enhanced-assessment>